3rd International Congress on Multidisciplinary Natural Sciences and Engineering

Abstracts Booklet

Hikmet Y. Çoğun
İshak Parlar
Hasan Üzmuş
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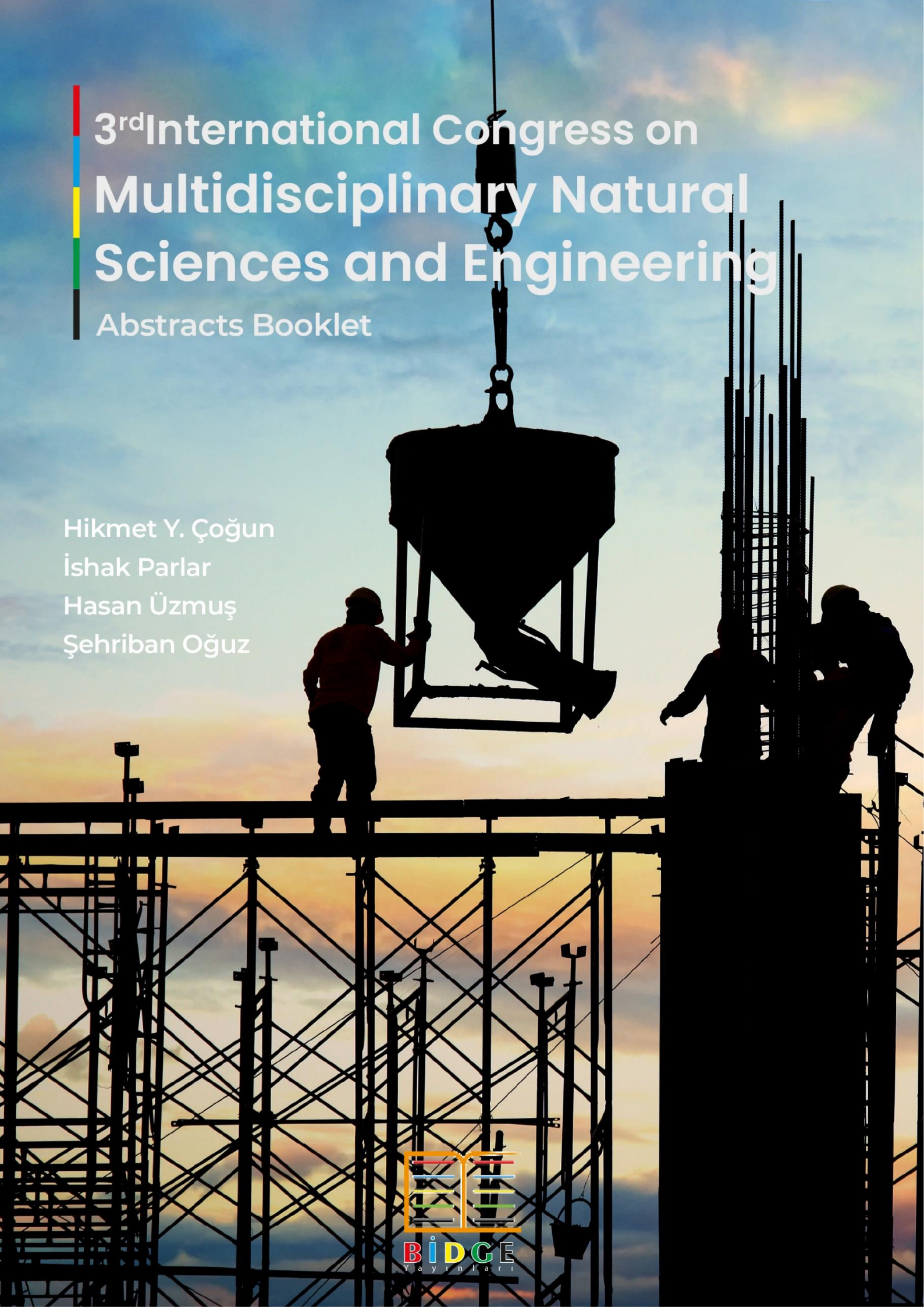

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A Novel Matrix Representation Combining Customers' In-store Sequential Behavior Data and Purchasing Data

Ayla GÜLCÜ[1]
İnanç ONUR[2]
Sümeyra ÖZTOP[3]
Ebru FUŞA[4]

Abstract

Customer segmentation provides valuable information about customer profiles which then can be used to make marketing decisions. Incorporating behavioural factors such as shopping time, wandering routes and visiting patterns can yield significant improvement in the segmentation quality. Once the customer segments are created, each customer can be recommended a set of products that customers with similar in-store behaviour patterns have previously purchased. In-store behaviour data can also be used to identify the most visited aisles and to discover the most frequent customer paths in a retail store. In this study, we focus on customer segmentation based on both customer in-store behavior and purchasing data. We present the findings of the first phase of a research project which aims to create a system that analyzes the in-store behaviours of the customers of a home improvement retailer company. Within the scope of the project, customer in-store data will be collected using BLE Beacon sender and receiver devices that will be placed on shelves and shopping carts in a selected store. After data collection and data preprocessing steps, customer in-store behaviour data along with customer purchase data will be used to identify the customer segments. We present a novel matrix representation that combines sequential behaviour data and purchasing data of the customers which then can be used as a distance metric in any clustering algorithm. We provide the results based on a synthetic dataset that has been created by observing shopping behaviours of the customers of the retailer store. We have designed this synthetic dataset so that it carries all the characteristics of the dataset that will be collected once the enviroment setup is complete. Experimental results show that the proposed matrix representation can handle both types of datasets and be used in almost all clustering algorithms yielding in high quality clusters.

Keywords: Customer Segmentation, Clustering, Behaviour Analysis, Sequential Data Representation, Similarity Metric

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Intelligent Listing and Content Display Based on Marketing Data Trends

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Jehat ÇELIK[2]
Kadir AKAR[3]
Okan BURSA[4]
Deniz KILINÇ[5]

Abstract

In the rapidly evolving digital landscape, user behaviors and purchasing decisions are increasingly influenced by results from social media and search engines. Traditional marketing methods are becoming less effective, making personalized content delivery based on real-time trends a pivotal sales strategy. This paper introduces an innovative system designed to harness real-time data from Google search and social media trends to offer dynamic content tailored to individual users. The foundational phase of the research involves meticulous collection of 2 years of CRM and 1 year of GA4 data and analyzing the valuable data points from this data for data extraction. A robust infrastructure is established after data collection, followed by extensive preprocessing using natural language processing techniques, including POS tagging and Turkish NER. This infrastructure continues with AI-assisted text processing to contextualize trends, leveraging both traditional TFxIDF calculations and the unsupervised machine learning approach, Word2Vec. To fine-tune personalization, we embarked on predicting the User's Lifetime Value by harnessing the capabilities of the FoCVS (Future-Customer-Value-Segments) for 661.167 hotel and 41.586 tour customers and 668.897 hotel customers by Crystalvalue libraries. This enriched data set the stage for customer persona creation via clustering by conducting the k-means clustering algorithm in BQML (Big Query Machine Learning). Our approach, deeply rooted in personalization, strives to boost customer satisfaction by ensuring content aligns seamlessly with user preferences and effectively ranks products and services based on individual trends.

Keywords: Personalized Content Delivery, Real-time Marketing Trends, Social Media Analytics, Search Engine Data Utilization, AI-assisted Text Processing

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Logo Generation Using Deep Generative Adversarial Networks: A Comparison That Uses 1000 or Less Training Epochs

Eren EKREN[1]
Oğuz ATLUN[2]

Abstract

Logos are one of the important elements in a company's branding, and large companies are increasingly placing more importance on their design. Additionally, logo design is a lengthy and costly process for a designer because it's not possible to provide a definitive description of a good logo. However, advancements in generative deep networks offer models that can potentially provide a solution to this problem. Generative Adversarial Networks (GANs) are types of deep learning models that can be used to generate realistic images, texts, and other types of data. In this study, GANs were used for the design of company logos, and the CycleGAN, DiscoGAN, StyleGAN, and PixelCNN architectures were tested on a limited number of epochs. When comparing the results obtained, StyleGAN stood out with its successful outputs and conditioning architecture, which allowed for control over the generated image.
Keywords: Logo Generation; Deep Networks; Generative Networks; Deep Learning

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Doctor-Patient Interactive Mobile Application with POS Integration

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Abstract

In the provision of healthcare services, which have become more complex today, the aim is to ensure communication between the patient and the experts in the relevant branch remotely, via mobile or web interface. The mobile platform created in this study aims to optimally organize the process by sharing report files, messaging, reviewing treatment details, appointment tracking, and sharing daily tasks. Thus, the aim is to improve existing conditions through a process that is easy to access and manage. Studies have observed that existing applications do not appeal to all age groups or are not preferred due to their functional inadequacies. For this reason, it is planned to develop a mobile application that can appeal to a wider age range, is easy to use, has high user experience and has functions that can meet the needs of the sector. The needs of the sector are determined in line with the literature review and information received from experienced people in the relevant field. Virtual POS integration and various payment methods are important for mobile health application users to access healthcare services easily and safely. It allows users to quickly access healthcare services and benefit from different payment options. Thus, healthcare providers both increase customer satisfaction and optimize business processes by facilitating the financial transactions of users of mobile health applications.

Keywords: mobile health application, treatment follow-up, flutter, healthcare services, virtual POS

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Development of a Campaign Recommendation System for Marketplace Applications

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Deniz KILINÇ[3]

Abstract

A recommendation system is a type of software application or algorithm designed to analyze and predict user preferences or behavior and provide personalized suggestions or recommendations. These systems are widely used in various domains, including e-commerce, social media, and more, to enhance user experience and engagement. The aim of the study is to make personalized campaign recommendations by using the events of past shopping experiences and site navigation data of Boyner customers. This personalized approach is anticipated not only to strengthen the brand-customer relationship but also to significantly enhance overall customer satisfaction and experiential quality. The baseline phase of the study involves the systematic collection of a comprehensive dataset of customer product navigation data from February, March and April 2023. Rigorous data pre-processing is implemented, involving the inspection and refinement of a large dataset of 19,050,352 data records. Subsequent curation results in a distilled dataset of 687,843 unique customers and 78,083 unique products, which forms the basis for subsequent analytics. Some of the features used in the dataset are customer ID, product ID, number of views, number of clicks, number of basket additions and number of purchases. The calculation of a rating score for individual products within specific customer segments is of particular importance for the recommendation. This rating variable is derived through a methodical process that involves the weighted aggregation and scoring of a variety of features, and provides a nuanced assessment of the attractiveness of a product within a particular customer cohort. Finally, the recommendation process is performed using the collaborative filtering method.

Keywords: Recommendation, Collaborative Filtering, Personalization

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Optimizing AI-Driven Solutions in Car Rental Services: Enhancing Customer Experience through Advanced Data Analysis

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Behçet MUTLU[3]
Deniz KILINÇ[4]

Abstract

In the rapidly evolving domain of car rental services, Wingie Enuygun Group stands out for its commitment to meeting diverse customer preferences, ranging from price/quality considerations to trust in service providers. This abstract outlines our pioneering approach, employing AI-driven solutions specifically, Hybrid Matrix Factorization (HMF) and a predictive booking possibility scoring model to address this wide range of customer needs.

Our research delved into five months of historical customer behavior data with the aim of refining traditional Extract, Transform, Load (ETL) pipelines. The focus was on addressing key challenges: the underperformance of the HMF due to labeling issues and the overrepresentation of certain behaviors in the dataset. These insights led to the development of a nuanced, more accurate HMF model, better capturing the multifaceted nature of customer preferences.

In addition, we explored the successful alignment of our predictive model (an embedding model that combines machine learning and deep learning techniques) with the marketing department's vision, notably its rapid response time and market adaptability. This synergy has been instrumental in developing innovative strategies to further enhance model effectiveness. The strategies focus on real-time adaptability in market conditions, which is crucial for maintaining a balance between trust, quality, and cost-effectiveness in customer rental choices. The potential impact of this optimized AI approach is significant. By more accurately predicting customer preferences, our model not only improves operational efficiency but also significantly enhances the customer experience. This dual benefit positions the Wingie Enuygun Group at the forefront of the car rental industry, poised to meet both current and future market demands. In conclusion, our research demonstrates the power of advanced AI solutions in transforming customer service paradigms and provides valuable insights for both academics and industry.

Keywords: Recommendation Systems, Hybrid Matrix Factorization, Customer Behaviour Analysis

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Web Application for Robot Management and Monitoring

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Abstract

With the development of technology, the usage areas of robots are increasing. Robots are used in many areas such as education, industry, defense and health. The increase in usage areas and the need for systems containing multiple robot have paved the way for new solutions in the management of robots. Needs such as remote management of robots and monitoring of robot systems from a single point are very important for operations involving more than one robot. For this reason, different solutions such as web application and mobile application have been put forward. In this study, it is aimed to manage and monitor robots with ROS operating system through a web application. The application developed in the study consists of a web user interface, REST API and database layer. The web user interface was developed using Reactjs and the REST API was developed using the Java programming language. The application developed in the study supports multiple robots and does not require ROS installation. Postgresql database was used to store data such as robot information, map information and task contents. Communication between the application and robots is done via Rosbridge using the WebSocket protocol. Operations such as creating a task, sending a target location, sending a message, configuration settings and map updating can be done through the application. The application provides operational needs such as tracking the location of the robots on the map, charging percentage and monitoring some parameters. In addition, the created tasks are controlled by the developed service and the system is constantly updated. Thus, robot task statuses can be monitored via the application. The application was tested with Turtlebot3 robots in a simulation environment. It has been observed in the tests that the operations can be carried out successfully.

Keywords: ROS, robot controlling, robot monitoring, web application, task management

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Development of a Cyber Attack Detection System Based on Log Records

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Abstract

Information security is one of the leading issues in information technologies. With each passing time, the number of devices in the internet is increasing incredibly. This situation causes the emergence of security vulnerabilities of devices located in homogeneous and heterogeneous networks in the internet environment. This situation makes it easier for cyber attackers to infiltrate network systems. At the same time, it increases the size and severity of cyber attacks on network systems every day. In this study, log records were investigated in detecting and preventing cyber attacks. This study continues to be researched within the scope of the thesis. Logging technologies are available on many systems. Log records are recorded and stored in many network systems in accordance with the law numbered 5651. In this context, it is widely used on network systems open to internet users. It is known that keeping log records on network systems provides many benefits. It provides benefits in many ways, from identifying errors on the system to detecting cyber attacks. Log records provide information on which systems users operate on network systems and which devices they pass through. Log records help systems to operate more regularly and healthier. Log records are signed with a time stamp to record information such as the creation, saving, modification and sending of transactions. Thus, the time stamp fulfills its function on log records. The timestamp makes log records more secure and makes it easier for experts to examine log records. In this sense, the crypto box of logs is the timestamp. When log records are analyzed in terms of cyber security, log records are used for the detection of cyber attacks in the future. It is thought that good analysis and interpretation of log records can be used in cyber attack detection. In this sense, while many technological developments are increasing day by day, it is revealed that there is a rapid increase in terms of cyber vulnerabilities and vulnerabilities occur as a result of many cyber attacks. The acceleration of technological developments has led to an extraordinary increase in the number of devices used on the internet. At the same time, technology manufacturers have provided users with numerous benefits in performing versatile operations. It is thought that there are more software vulnerabilities in terms of security vulnerabilities on newly developed and used technologies systems than previously developed technologies. Although this situation is not noticed by users, it is noticed by cyber security experts. These vulnerabilities can be detected and prevented by log records. Today, although technology devices provide many benefits to users, it is known that they can put users in a difficult situation in terms of cyber security vulnerabilities. Cyber security is one of the most important issues on systems. In this sense, new technologies are weaker in terms of cyber vulnerability. The vulnerabilities of the hardware and software on the systems may not be detected at once. Cyber vulnerabilities may take some time to detect or may not be detected at all. In this respect, log records should be analyzed well. It is seen in the studies that log records can prevent cyber attacks as well as reduce them. It is stated in some sources that an intrusion detection system and intrusion prevention system can be developed through the analysis of log records. In this respect, research has been conducted in this study on intrusion detection and prevention on cyber security using open source systems. The open source systems used are IPS (Intrusion Prevention System) and IDS (Intrusion Detection System). It is thought that an open source application can be developed with log analysis using IPS/IDS systems. If Intrusion Detection System and Intrusion Prevention System firewall integration can be provided, it is thought that the security level of the systems will increase one more layer.

Keywords: Log records, log analysis, cyber attacks, intrusion detection system, intrusion prevention system

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Ad Traffic Acquisition Optimization in Online Advertising

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Abstract

Online advertising ecosystem is an example of new generation industries that emerged in recent years. Businesses in this ecosystem aim to connect millions of publishers, hundreds of thousands of advertisers, as well as match the available advertising inventory, which connects countless actors with various functions, to the advertisers' demands. In online advertising processes, computer software and algorithms are used to facilitate the connection between publishers and advertisers, and thus, compared to its traditional counterpart, it not only reaches a wider audience but also allows for more precise measurement of the ads' impact. Various tools are used to increase efficiency in advertising operations, make faster decisions, and provide personalized experiences. Due to its highly dynamic and uncertain nature, the industry poses numerous optimization challenges. Effective utilization of advertising space and appropriate resource selection are crucial, especially for small and medium-sized businesses. In this highly competitive sector, there are several possible factors that determine the success of advertising revenues. In this study, two different optimization methods to maximize the expected revenue are examined for an advertising platform that connects advertisers with publishers. The first method involves developing a model to predict the dynamic "click-through/user acquisition" rate for purchasing ad traffic, while the second focuses on purchasing ad traffic across multiple inventory channels.

Keywords: Online Advertising, Real-Time Bidding, SSP, DSP, Ad Traffic

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The Effect of Transition to Distance Education Method on Success of Engineering Students in the Covid-19 Epidemic Outbreak

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Abstract

Die weltweit grassierende Covid-19-Pandemie hat sich negativ auf die Bildungseinrichtungen ausgewirkt, da sie alle Bereiche betroffen hat. In diesem Sinne mussten die Hochschuleinrichtungen, wie auch andere Bildungseinrichtungen, auf ein Fernunterrichtssystem umstellen. In dieser Studie werden die Auswirkungen der Pandemie auf das Bildungswesen erörtert. Es wurde untersucht, inwieweit Studierende der Ingenieurwissenschaften während der Epidemie den Kurs mit der Fernunterrichtsmethode verstanden haben und wie sich dies auf ihre Prüfungsnoten auswirkte. In dieser Studie wurden Studenten der Fakultät für Ingenieurwissenschaften ausgewählt und ihr Erfolg in numerischen, mündlichen und praktischen Kursen per Fernunterricht analysiert. In dieser Studie wurde untersucht, wie sich der Fernunterricht an Hochschulen während des Covid-19-Ausbruchs in zwei verschiedenen Zeiträumen auf den Erfolg der Studenten auswirkte. Es ist bekannt, dass der Ausbruch von Covid-19 die größten negativen Auswirkungen hat. In diesem Sinne erscheint der Gegenstand dieser Studie als eine Studie, in der die Leistungen von Studenten, die aufgrund der Epidemie den Fernunterricht fortsetzen, in Kursen im Rahmen von Bildungsaktivitäten analysiert werden. In dieser Studie wurden die Faktoren untersucht, die den Kurserfolg während des epidemischen Prozesses beeinflussen. In dieser Studie wurden die Leistungen von Ingenieurstudenten (Computertechnik, Elektrotechnik-Elektronik, Maschinenbau) in numerischen, verbalen und feldbasierten Kursen und die Faktoren, die ihre Leistungen beeinflussen, analysiert. Für die Datenerhebung wurde ein Fragebogen für Studierende der Ingenieurwissenschaften entworfen. Der Fragebogen wurde über Google-Formulare ausgefüllt. An der Studie nahmen Studierende der Ingenieurwissenschaften (Computertechnik, Elektrotechnik und Maschinenbau) teil (n=549). Die Ergebnisse der Untersuchung zeigen, dass der Erfolg in den praktischen und mündlichen Kursen höher ist als in den numerischen Kursen. Der Grund dafür könnte darin liegen, dass numerische Kurse Mathematik auf Ingenieursniveau und recht abstrakt sind. Das Bildungsniveau der Familien der Schüler ist eine der Variablen, die sich positiv auf die Leistungen auswirken. Ob der Schüler bei seinen Eltern wohnt oder nicht, ist die wichtigste Variable unter den Variablen, die den Erfolg negativ beeinflussen.
Keywords: Covid-19 outbreak, Distance Learning, Engineering Education, Student Success.

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Image Denoising with Transformers: A Survey

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Abstract

Recent advancements in deep learning have wielded substantial influence over the realm of noise reduction and various other image-processing tasks. Among the pivotal breakthroughs in deep learning, the integration of transformers stands out for its ability to discern intricate relationships between features. Transformers have garnered escalating attention in recent years, finding widespread application in the domain of image denoising. While previous research has produced numerous surveys focused on convolutional neural networks (CNNs) tailored for noise reduction in images, this paper distinguishes itself by offering an exclusive survey centered solely on image denoising using visual transformers. Furthermore, it is widely acknowledged that the selection of hyperparameters plays a critical role in the success of network training, often relying on heuristic guidelines. In light of this, providing insight into previously employed hyperparameters can furnish researchers with valuable perspectives when making their own selections. Hence, the presentation of the chosen hyperparameters specifically for image denoising with transformers is added.

Keywords: image denoising, visual transformers, survey, review

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Design of a Web Application Development Platform with Low-Code/No-Code Capabilities

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Emrah TOKALAK[2]
Önder DEMİR[3]

Abstract

The COVID19 pandemic has accelerated digital transformation processes all over the world. These processes, which companies accelerate in order not to fall behind in competition, have increased the demand for software solutions rather than hardware. However, since the general-purpose solutions offered to the market cannot solve the problems specific to some sectors or organizations, organizations are forced to develop various special solutions. This situation increases the demand even more. In this amount of software projects, there are great difficulties in terms of developer human resources. An alternative solution to this human resource, which is not easily available, is the adoption of low-code/no-code development platforms. Low-code/no-code platforms enable people who do not have advanced knowledge of writing code to easily develop applications with drag-and-drop features, while enabling those who have competence in this field to complete their processes faster and more efficiently. In this study, a low-code/no-code web application development platform has been designed with data and integration capabilities with digital platforms that can play a central role in the end-to-end flows of all organizations from small to large scale. The designed platform will offer a comprehensive development environment with "Data / Content Modeling" features that users can easily use to design data structures, "Template Development" supported by Liquid technology that users can use to develop the interfaces of the structures they model, and "Workflow Development" features where various business information based on this data and flows based on logical controls can be developed. The platform is designed with an all-inclusive (All in One) scope that can meet all the needs of large-scale organizations, as well as a combinable architecture that can enable the end-to-end integration of different applications desired by businesses that do not prefer it and can be managed from a single center at various levels of control.

Keywords: Software Development, Web Application Platform, Low-Code Development Platform, No-Code Development Platform, Digital Transformation

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Query Suggestion System for Search Engines Using Ground Truths and Machine Learning

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Abstract

The increasing and easier access to the internet in recent years has encouraged users to spend more time and interact in the online world. Users want to quickly and accurately access what they are looking for. Query suggestions aim to eliminate ambiguities in users' searches. Thus ensuring that the users' expectations are met. Search engines can use users' sessions, similarities to queries from other users, and the underlying meanings of queries to meet this expectation. The meaning of queries is of great importance for the search task. In cases where users cannot express what they are looking for in a way that machines can understand, search engines try to provide accurate query suggestions by capturing the deep meanings underlying these phrases. Nowadays, various methods are used for query suggestions. These methods can perform well if the target is determined correctly. The ground truth is used to express the set of values that can be considered correct for a task. Especially in the field of machine learning, the correct labeling of data directly affects the performance of the created model. Due to the nature of the query suggestion problem, it is quite difficult and complex to define a query as ground truth. Because user behavior and interactions are quite different, therefore, generating the query that corresponds to a query can vary. The aim of this study is to create a set of ground truths using the AOL query logs dataset and develop a machine learning model based on these truths. The performance results of the proposed ML-based query suggestion system will be shown by BLEU-score and Perplexity metrics.

Keywords: Query Suggestion**,** Machine Learning, Ground Truths, Text Similarity, Search Engines

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A Software System Design For E-commerce Companies To Collect Data From Mobile Devices and Machine Learning Supported Analysis

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Abstract

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Online Sales Prediction with Machine Learning Based Regression Methods: An Empirical Study for E-commerce

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Alper ANAPALI[3]
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Abstract

Online shopping is a very popular and growing industry today. Institutions have turned to online commerce (E-commerce) to quickly meet shopping needs of customers. Evaluation of customer habits for product sales also has an important place in e-commerce. One of the biggest problems of businesses is desire to create future business strategies correctly by evaluating big data in e-commerce to be useful and efficient. For this, it is important to analyze and predict data in a meaningful way by choosing right methods. In this study, it is aimed to create a model of the number of packages purchased by customers by using sales data of Ideasoft, which sells e-commerce infrastructure packages over the internet. In this direction, within the scope of the study, the number of sales are predicted in e-commerce data by using regression methods. Multivariate Linear Regression (MLR), Support Vector Regression (SVR), Lasso Regression and Ridge Regression methods based on machine learning are used for implemented applications. In the e-commerce dataset, results are compared by looking at the error rates according to the methods selected in the applications. The coefficient of determination (R^2), Mean Square Error (MSE), Root Mean Square Error (RMSE), Mean Absolute Error (MAE), Mean Absolute Percent Error (MAPE) and Relative Absolute Error (RAE) metrics are taken into account as error rates. Successful results have been obtained in Python software language by using Scikit-Learn library in applications. When the results are examined, it has been revealed that SVR model is that makes the best prediction of the number of sales with a value of 0.7759 in four different models according to R^2 value. With this study, it is aimed to provide an application example of which regression methods can be successful for predicting the number of sales in the field of e-commerce and to support the company in making business decisions according to the results of the analysis based on the customer data.

Keywords: Sales Prediction, E-commerce, Machine Learning, Regression Methods, SVR

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A Novel Ensemble Learning Method for Automated Classification of White Blood Cells

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Abstract

White blood cell counts are used to diagnose many diseases in the human body. White blood cell types such as Neutrophils, Eosinophils, Monocytes and Lymphocytes are usually examined and classified by a specialist under a blood smear microscope. This manual procedure, performed by an experienced hematologist, takes time. In the absence of experienced analysts, erroneous conclusions may be drawn. Automatic classification of white-blood cell types by computer-assisted systems is important. Convolutional Neural Networks (CNNs), a type of deep learning architecture, successfully perform automatic image classification. Unlike machine learning, CNNs also perform feature extraction automatically. However, in medical image analysis, the success rate decreases due to insufficient labeled images, high inter-class similarity and unbalanced class distributions. In addition, CNN architectures often face overfitting the training dataset because of these problems. This reduces the classification performance of the models on the unseen test dataset. Existing works have often used transfer learning to overcome these problems, but in the case of a limited labeled dataset, the desired high accuracy has not been achieved. In this study, a novel ensemble learning method is proposed for the classification of white blood cells. First of all, the open access white blood cell dataset was divided into training and testing sections. With the training dataset, DenseNet121, DenseNet201 and Xception CNN models were trained by hyperparameter optimization. The accuracies of these trained models on the test dataset were 93.08%, 90.55% and 91.11%, respectively. Using these trained models, the feature vectors after the last convolution layer were obtained. These feature vectors contain 1024, 1920 and 2048 features respectively. Using the minimum-redundancy-maximum-relevance (mRMR) feature selection method, an optimum of 500 features were selected from each model and these features were combined. The 1500 feature sets obtained for each image in the test dataset were retrained in the Support Vector Machine learning algorithm and the classification result was obtained in the test dataset. On the test dataset, the proposed novel ensemble learning method achieved 99.87% accuracy and F1-score value. The proposed method outperforms existing works and can be easily integrated into systems for automatic classification of white blood cells.

Keywords: White Blood Cells, Convolutional Neural Networks, Support Vector Machine, Computer-Aided Classification, Feature Selection, Optimization

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Machine Learning Based Traffic Signs Driver Support System*

Erinc KILIC[1]
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Abstract

The aim of this study is to develop a system that recognises traffic signs using artificial neural networks and transfer learning methods, and audibly informs the driver about the recognised sign. In order to realise this idea, a web application has been developed using the machine learning library TensorFlow.Js, which can run in different internet browsers. This web application can run on any desktop or laptop computer with an internet connection and a webcam. Traffic signs are presented to this application by pressing the traffic sign button when the traffic sign enters the camera's field of view. After presenting the traffic sign to the system from different angles and with as many examples as possible, the recognition process is performed automatically.

The traffic sign recognition system has been tested with a web camera mounted on the right rear view mirror of a vehicle, while the vehicle was travelling at a constant speed of 20 km/h in an outdoor environment. An average accuracy of 60% was achieved using 10 different angles, positions and distances per sign. An accuracy of 90% was achieved with 20 demonstrations per sign. The success of the system is directly proportional to the samples chosen during training. The system can be generalised by taking samples at different angles, distances and lighting levels. The developed system can be used to teach traffic signs to drivers in driving courses as well as to help drivers to recognise traffic signs accurately and completely. With this system, driver errors due to inattention or ignorance can be minimised, thus making traffic safer and reducing traffic accidents.

Keywords: Traffic signs, machine learning, transfer learning, driver assistance systems

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Decision Support System that can be Used For Waste Collection

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Abstract

In order to organise the collection of rubbish in cities, rubbish bins are placed in various locations. However, it can be observed that rubbish is not only left in the bins, but also around them, and the lack of collection or late collection of full or overflowing bins causes pollution, inconvenience to city dwellers and the rapid spread of harmful organisms.

In this project, an intelligent image processing system is developed to prevent the negative effects of full bins. For this purpose, a binary classification system has been developed that can discriminate between 'dirty' and 'clean' according to the presence or absence of rubbish around the bin, using two different transfer learning architectures. The resulting digital images were resized to 224x224 and used to train the neural network. The model was fine-tuned both in terms of model size and recognition performance using the MobileNetV2 architecture. After a total of 20 epochs of training, the model achieved 88.8% classification success on the test dataset.

The results show that such a system can be used as a decision support tool for waste collection in smart cities. Images from street cameras can be processed in an intelligent image processing system to quickly check a large number of bins. Such a process would be impossible for humans to perform, both in terms of speed and scope. To increase this success, more images can be collected and used for training and model regularisation using methods such as dropout, digital data replication and normalisation.

Keywords: smart city, waste collection system, environmental cleaning, waste management, artificial neural networks.

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Predicting Smoking and Disease Risks with Machine Learning: A Scientific Perspective

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Abstract

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Morphological Analysis of Turkish E-Mails with Sentiment Analysis and Machine Learning Methods

Yunus Emre PALAVAR[1]
Ahmet ALBAYRAK[2]

Abstract

With the widespread use of online platforms, the increase in text data and the ease of access to this data has led to an increase in the number of studies in the field of text classification. Text classification techniques have a great contribution in many areas such as spam detection and sentiment analysis. Although there are many studies on text classification in English, there are very few studies on Turkish data in this field. The aim of this study is to perform morphological analysis of Turkish e-mails using sentiment analysis and machine learning techniques and to compare the success of the models in detecting spam and normal e-mails. In this direction, two Turkish e-mail datasets in the literature were utilized within the scope of the study. While performing these operations on the data sets, one data set was obtained from two data sets and three data sets were created from this data set. The first data set was created by applying basic data preprocessing steps to the data. The second data set was created by removing non-Turkish words and data that were too short to form meaningful sentences from the first data set. The third data set was created by removing the data rows from the second data set from the first data set. Thus, the effect of non-Turkish words on the results was observed. These datasets were clustered with K-means and Isolation Forest methods and the performance of these methods were evaluated. In addition, sentiment analysis was performed on these datasets and the status of normal and spam e-mails were observed. The data were classified with Naive Bayes, Random Forest, Logistic Regression and Support Vector Machine classification algorithms and the results of the methods were evaluated with the criteria of acuity, precision, recall and f1-score. As a result of the operations, a categorical morphology of the e-mails was extracted.

Keywords: Sentiment Analysis, Machine Learning, Model Selection, Morphological Analysis, Spam Mail

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A Comparative Performance Analysis of GPS Receiver Position Estimation Methods

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Abstract

There are so many applications that require small tolerance to position error. It is so critical for nearly all military and avionics systems. Enhancing accuracy of position estimation a few centimeters is not insignificant improvement. Estimation errors occur due to a lot of error sources, like multipath effects, ionosphere, and troposphere effects, Doppler shift, clock sensitivity. Besides these sources, mathematically position calculation process after obtaining satellite positions and measuring pseudoranges also causes an error. GPS systems calculate position via the distance between receiver and satellites. An equation is obtained for each satellite the receiver monitors, and the unknowns can be solved by a set of equations. Different mathematical methods have been developed to solve the set of equations. In this study, the effects of three different position calculation algorithms used in literature are compared by means of position accuracy. Satellite positions are learned from a GPS record of a fixed GPS receiver station whose position is known, and a set of equations is formed for receiver position including satellite positions and the distances between the receiver and the satellites. This set of equation is processed with three different position calculation algorithms which are the least squares method, the weighted least squares method and the multilateration algebraic method and calculated receiver position is compared with known receiver position.

Keywords: GPS, error, least squares, weighted least squares, multilateration

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Advanced Driver Assistance Systems (ADAS) and Traffic Safety

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Abstract

Almost every day, we encounter traffic accidents of various magnitudes in our daily lives, and globally, traffic accidents pose a significant problem. In an effort to prevent these accidents or mitigate their effects, Advanced Driver Assistance Systems (ADAS) present a considerable potential solution. ADAS, short for Advanced Driver Assistance Systems, comprises hardware and software systems designed to provide drivers with a safer driving experience. ADAS generally includes systems such as Lane Departure Warning, Adaptive Cruise Control, Automatic Emergency Braking, Parking Assistance, Traffic Sign Recognition, Driver Fatigue Detection, Rear-View Cameras and Sensors, Collision Warning, and Night Vision System. Especially features like Lane Departure Warning, Adaptive Cruise Control, and Automatic Emergency Braking address critical factors such as driver inattention, speed control, and sudden reactions, potentially reducing the likelihood of traffic accidents. These systems continuously monitor environmental variables using detection technologies and artificial intelligence, employing intelligent algorithms to warn or intervene when necessary. Advancements in autonomous driving technologies could further enhance the integration and effectiveness of ADAS. Additionally, as vehicle-to-vehicle and vehicle-to-infrastructure communication technologies improve, they can provide more opportunities to optimize traffic flow and prevent accidents. With high-resolution sensors and artificial intelligence integration, ADAS may better comprehend complex traffic scenarios and predict driver behaviors more effectively in the future. Moreover, equipped with various hardware to intervene during emergency situations, ADAS systems could elevate safety standards significantly. The publication of the 2019/2144 EU directive by the European Economic Commission marked a significant milestone in automotive design. This directive, by advocating for the adoption and integration of Advanced Driver Assistance Systems (ADAS), placed a considerable emphasis on active safety systems, forming the foundation for secure transportation.

With a focus on enhancing traffic safety within the European Union, the directive aimed to standardize advanced driver assistance systems in contemporary vehicles. Considered a precursor to groundbreaking changes in the automotive industry, this directive steered vehicle manufacturers toward innovative technologies and safety-centric designs. In conclusion, Advanced Driver Assistance Systems (ADAS) offer an effective solution to enhance driving safety based on a scientific foundation. Widespread utilization of these systems could mark a significant step towards reducing traffic accidents and enhancing driving safety.

Keywords: Advanced Driver Assistance Systems, Lane Departure Warning, Traffic Accidents, Safety, Detection Technologies

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LSTM – Based Methods in Time Series Electric Load Forecasting

Fatma YAPRAKDAL[1]

Abstract

Smart grids differ from traditional grids by providing smart, energy-efficient and uninterrupted electrical energy service with their infrastructure developed with information technologies. In order to provide uninterrupted and reliable electrical energy, it is possible to establish a balance between electrical energy generation and consumption, and at this point electric load forecasts come to the fore. In addition, electric load forecasting provides significant benefits to utility companies by allowing cost-effective operation, optimal planning, and management of power systems. Electric load data is a time series data because it includes sequential observations that have occurred in a certain time period, Therefore, electric load forecasting is a time series problem with linear and nonlinear characteristics. Due to the large size and complicated structure of electric load data, traditional methods experience losses in time series properties and are insufficient. Due to the considerable size of electric load data and its complicated structure containing certain trends, cycles, seasonality and outliers, traditional methods experience losses in time series properties and are insufficient. The Long Short-Term Memory (LSTM) model is an extended version of the conventional recurrent neural network (RNN), which extracts long-term dependencies from time series data by its memory cell. Rather, due to this feature, the LSTM-based models have become one of the most used machine learning approaches in load forecasting problems. The aim of this study is to analyze the performance of LSTM-based approaches used in electric load forecasting studies carried out in the literature so far, according to their usage areas and structures.

Keywords: LSTM, time series analysis, electric load forecasting

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MEMS Resonator Fabrication using a Silicon-on-insulator Wafer

Serdar TEZ[1]

Abstract

This study presents a three-mask fabrication of micro-electro-mechanical systems (MEMS) resonator by using only a silicon-on-insulator (SOI) wafer. The SOI wafer has a 2-micrometer-thick buried oxide layer, a 35-micrometer-thick structural layer, and a 300-micrometer-thick handle layer. Furthermore, the SOI wafer has silicon dioxide layers with a 2-micrometer-thick on its front and rear sides. In the first step, the front side silicon dioxide layer is removed by using the buffered hydrofluoric acid (BHF) while that on the rear side is protected with the photoresist. In the next step, the photoresist is used to pattern the silicon dioxide layer on the rear side of the SOI wafer, the patterned photoresist is hard-baked after the lithographic processes. Then, the rear side silicon dioxide layer is etched by using BHF. After this step, the deep reactive ion etching (DRIE) is used on the patterned rear side of the wafer until the buried oxide layer. Next, the fabrication process is continued with the formation of metal pads on the front side of the wafer; which is achieved by the lift-off process. Afterwards, the structural layer is patterned by using the DRIE process with a device mask which includes the physical dimensions of the MEMS resonator. The final step includes releasing the MEMS resonator devices, which can be performed by etching the buried oxide layer with the vapor HF. The functionality of the devices on the SOI wafer is checked by using the test setup comprised of a LCR meter and a probe station.

Keywords: MEMS resonator, Silicon-on-insulator (SOI), Fabrication process flow

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Mosaicing of Non-Overlapping Images Using Deep Learning Based Homography Estimation

Ali Batuhan YELLİ[1]
Gökhan Koray GÜLTEKİN[2]

Abstract

Image mosaicing is the process of stitching two images with a larger field of view (FOV) to create a new large image with high resolution. Two kinds of approaches have generally been used for mosaicing. The first kind of approaches are called the traditional methods which are based on feature detection. Mosaicing quality depends on the number of features. Traditional methods do not perform well on images with low number of features. The supervised learning-based image mosaicing solutions unreliable because these methods often experience the problem of missing data. Studies in this field in the literature generally aim to stitch images with a common overlap area. In this article, we try to stitch images with translational displacements along the edges that do not have overlapping areas. For this, we propose a learning-based method and use a deep homography estimation network. The network is trained using a custom generated dataset to estimate the displacement amount of the target image in the horizontal and vertical axis relative to the reference image. Experimental tests are carried out using a custom generated dataset including landscape images and their gaussian noise added versions. The test results shows that the network can successfully predict the displacement amount in the horizontal and vertical axis between the two images and therefore the two images can be stitched from the right point.

Keywords: Computer vision, deep image mosaicing, deep homography estimation, image registration, image blending.

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Production of Commonly Used Components in the Cathode Active Substance Of Lithium-ion Cells by Enrichment with Graphene Derivatives

Brayda ALPARSLAN[1]
Ekin ASLAN[2]

Abstract

The components found in layers within lithium-ion batteries fundamentally consist of the following: cathode, anode, electrolyte, and separator. The positive electrode is the cathode, while the negative electrode is the anode. These electrodes are separated from each other by a separator. Electrolyte is used to facilitate ion transfer between the electrodes. Cathodes and anodes, being positive and negative electrodes, respectively, can have different chemical compositions. Among the well-known cathode materials are $LiCoO_2$, $LiMn_2O_4$, $LiFePO_4$, $LiNi_{0,8}Co_{0,15}Al_{0,05}O_2$ (NCA), and $LiNi_xMn_yCo_zO_2$ (NMC). Today, NCA and NMC cathode materials stand out due to their high energy density among these cathode materials. NMC batteries can be found in the traction batteries of many electric vehicles.
The NMC cathode is a commonly used and reliable cathode in the market. Efforts are indeed underway to achieve even better cathode performance, as the NMC cathode electrode encounters a rapid capacity drop issue in the charge-discharge cycles during advanced stages. This study is conducted to enhance the capacity in the NMC cathode electrode and eliminate potential adverse reactions within the battery. The carbon (C) atom is efficiently harnessed, and derivatives of graphene (GFN), recognized for their honeycomb-like structure of carbon atoms, are employed. The modified Hummers method is chosen for the synthesis of reduced graphene oxide (rGO), commonly known as 'pseudo-graphene.' High-purity NMC powders, to be used for the cathode, are synthesized through a predetermined process. Subsequently, in the electrode preparation process, the synthesized NMC, rGO, and additional carbon black (C Black) powder are mixed with a binder (PvDF) to integrate them with each other homogeneously, making the electrode ready. Promising results have emerged from the conducted tests. The incredibly lightweight nature and excellent conductivity of graphene will undoubtedly herald a new era in the battery industry.

Keywords:
Lithium ion, Cell, Battery, NMC, Graphene, Carbon black, Cathode, High-purity

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Performance Analysis of a Custom TTL Circuit Using Monte Carlo Analysis Method

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Abstract

Logic gate circuits form the building blocks of digital electronics. In particular, it has enabled microprocessor speeds to reach such high speeds today. Compressing identical logic gate circuits to a certain scale region in a chip manufacturing process brings with it certain problems. Logic gate circuits placed at the nanoscale are generally in TTL (Transistor-Transistor-Logic) structure. This ensures that it can work in harmony with both speed and operating units. Millions of these nanoscale elements come together to form an operating unit. Tolerance errors or differences caused by such a large number may force the system to work stably. In this study, Monte Carlo Analysis was used with Pspice circuit drawing package program. A special and widely used logic gate circuit is discussed. This gate circuit is compared with 0% - 5% and 10% tolerance values. Monte Carlo analysis, which is one of the advanced analysis methods, gave us the current, voltage, power and performance responses of both identical TTL circuits at different tolerance scales. Thanks to this analysis, which offers a statistical evaluation feature, the number of samples, sigma value, median value, mean values, maximum and minimum values can be interpreted in detail. As a result, by using Monte Carlo Analysis method of a special TTL circuit, it has been observed that the performance of the application circuits increases as the tolerance values decrease.
Keywords: TTL, monte carlo analysis, logic circuits, pspice tutorial

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Decomposition of Eeg Signals Using Discrete Wavelet Method

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M.Bahaddin KURT[2]

Abstract

In this study, two sets of data sets, healthy and individuals with epilepsy disease, were tested under Electroencephalogram (EEG) signal. One of the clusters is epileptic EEG data and the other is normal healthy EEG data. Each cluster consists of 100 EEG signals. Each signal consists of 23.6 seconds. The signals in the normal EEG dataset were recorded from healthy subjects with their eyes open. The signals of the epileptic EEG dataset consist of recordings taken from patient subjects during epileptic seizures. EEG signals received from the subjects had a sampling frequency of 0.53-40 Hz and a band-pass filter was applied. Discrete Wavelet Transform (DWT) has been applied to decompose the EEG signal at the resolution levels of the components of the EEG signal. Discrimination levels were compared in healthy and diseased individuals. As a result, when the averages and standard deviations of D1, D2, D3 and D5 levels were examined, the values of the healthy data set were higher than the patient data set, and the D4 level was lower. When the entropy averages of D1, D2, D3, D4 and D5 levels were examined, the values of the healthy data set were lower than the patient data set. The healthy data set results were higher in the mean and standard deviation of the A5 level. When the entropy averages of the A5 level were examined, the healthy data set results were lower. As a result, in the healthy data set, the mean and standard deviation mean values of the levels are higher than the patient set data, except for D4, and the entropy mean value is low.

Keywords: Electroencephalogram (EEG), Discrete Wavelet Transform (DWT), Epilepsy

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Comparison of Lithium-Ion and Supercapacitor Batteries in Electric Vehicles

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Abstract

In a period of rapid technological advancement in electric vehicle (EV) technology, energy storage systems such as lithium-ion batteries and supercapacitors significantly influence the performance and sustainability of vehicles. These technologies play a crucial role as power sources for electric vehicles. However, striking a balance between the features, advantages, and challenges of lithium-ion batteries and supercapacitors constitutes a strategic decision point for stakeholders in the electric vehicle industry.

Currently, various battery technologies (e.g., lead-acid, nickel-metal hydride, lithium-ion) are employed in electric vehicles. The most common type is lithium-ion batteries, which are also used in portable electronic devices such as smartphones, tablets, and laptops. The primary advantage of lithium-ion batteries over other rechargeable battery types is their high energy density. However, it is important to note that lithium-ion batteries pose a risk of explosion, and they come with a relatively high cost.

Supercapacitors, also known as "ultracapacitors," result from the combination of "super" and "ultra." Capacitors that can store significantly more energy achieve this by having larger plates with less spacing between them. The dielectric is also replaced with a thinner insulating material. Plates immersed in electrolytes further enhance the potential energy. Supercapacitors are already used in various electronic devices, and reports suggest their use in regenerative braking systems in electric vehicles.

Furthermore, supercapacitor batteries have the advantage of being rechargeable, ensuring continuous charging capability. Despite offering several benefits compared to lithium-ion batteries, supercapacitors also have disadvantages. The most significant difference lies in energy density. Supercapacitors do not have the same storage capacity as batteries. For instance, the system in Sián can only contribute 34 hp. Creating a supercapacitor system capable of independently powering an electric vehicle would require it to be larger than the battery pack.

In conclusion, when comparing lithium-ion batteries and supercapacitor batteries, both technologies have distinct advantages in certain application scenarios. The preference for one over the other in the electric vehicle industry depends on specific use cases.

Keywords: Electric Vehicles, Lithium-Ion Batteries, Supercapacitors, Batteries, Charging Time

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PID Tuning with Metaheuristic Algorithms For Synchronization of Chaotic Oscillator

Selma BEDİR[1]
Rıdvan SARAÇOĞLU[2]

Abstract

Chaotic oscillators are used to ensure data security and to prevent unauthorized persons from accessing the transmitted data. While providing this security, signals generated from chaotic oscillators are used. With the help of these oscillators, our data is encrypted. In this study, the synchronization of chaotic oscillators at the transmitter and receiver sides to decode the encrypted voice or any data at the receiver side is performed with PID controller coefficients obtained from two different metaheuristic algorithms, Butterfly-based particle swarm optimization and Gray Wolf Optimization algorithm. Metaheuristic algorithms are algorithms inspired by the behavior of animals in swarms. Thanks to these algorithms, the controller coefficient was found, synchronization between chaotic oscillators was realized and a secure communication was contributed.

Keywords: Chaotic Oscillator, Butterfly Based Particle Swarm Optimization, Gray Wolf Algorithm

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Biyomedikal Cihazlarda 5G Frekans Bandı Girişimini Bastırmak için Frekans Seçici Yüzey ile Filtre Tasarımı

Mehmet Enis KARTALI[1]
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Abstract

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Comparison of Lithium-Ion and Super Capacitor Batteries

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Abstract

In contemporary times, energy storage technologies play a pivotal role in meeting escalating energy demands and effectively managing the surging utilization of renewable energy sources. Within this context, various storage technologies, such as supercapacitors and lithium-ion batteries, present distinct advantages tailored to diverse application scenarios.

Supercapacitors draw particular attention due to their rapid charge/discharge capabilities. This characteristic renders them ideal for promptly meeting short-term energy demands and swiftly adapting to sudden energy fluctuations. It is observed that supercapacitors play an indispensable role in scenarios such as the rapid charging of electric vehicles or addressing emergency energy requirements. Furthermore, their prolonged lifespan and minimal maintenance requirements render supercapacitors appealing for long-term energy storage solutions.

On the other hand, lithium-ion batteries provide an effective solution to long-term energy storage needs, owing to their high energy density and extended lifespan. They prove instrumental in storing energy derived from continuous sources such as solar or wind, facilitating its utilization as needed. The high energy density becomes particularly advantageous in enhancing spatial efficiency, especially in large-scale energy storage facilities.

Comprehensive research endeavors have undertaken a comparative analysis of the efficiency of supercapacitors and lithium-ion batteries. These comparisons contribute significantly to the selection and design of energy storage technologies tailored to specific application scenarios. Additionally, ongoing efforts to continually enhance and optimize these technologies hold the promise of further amplifying the potential within the field of energy storage.

Keywords: Batteries, Lithium-Ion Batteries, Super capacitor, Energy Density, Energy Storage Technologies

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Ackerman Steering System

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Veysel TİLEĞİ [3]

Abstract

Steering systems constitute fundamental components facilitating the motion and directional control of vehicles, representing critical elements that significantly impact the driving experience, safety, and overall vehicular performance. The Ackerman steering system, a directional control mechanism, endeavors to optimize the maneuverability of vehicles by ensuring differential angular rotation of the inner and outer wheels during turns. This system is intricately designed with a focus on enhancing control and safety during maneuvers, particularly in turning scenarios.

Acknowledged as a pivotal technology in guiding vehicular movement, the Ackerman steering system enhances maneuverability by orchestrating distinct angular rotations between inner and outer wheels during turns. Its primary objective is to provide a more consistent vehicle movement, especially in narrow turns and at low speeds, affording the driver greater control. Consequently, this system elevates driving safety and minimizes the tendency for wheel slippage.

The Ackerman geometry explicates the principle by aiming to achieve differential angular rotations of the inner and outer wheels during turns. The outer wheel, possessing a wider radius, undergoes a more extensive rotation. This configuration enables the vehicle to exhibit a more stable motion during turns, mitigating the inclination of the wheels to slip.

The Ackerman steering system represents an engineering solution grounded in Ackerman geometry, practically applying the aforementioned principle. Predominantly employed in four-wheeled vehicles, this steering system optimizes coordination between wheels during turns, affording the driver improved maneuverability and a safer driving experience.

The application of Ackerman geometry and the development of the Ackerman steering system based on this principle signify a substantial advancement in automotive engineering. These systems augment the driving experience by facilitating the safer and more effective directional control of vehicles. Moreover, the Ackerman steering system operates effectively, particularly at low speeds and in tight turns, ensuring coordinated wheel rotation and enabling the vehicle to enter and exit turns more efficiently.

Keywords: Ackerman System**,** Maneuverability, Safety Enhancement, Directional Control, Engineering Innovation

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Welding Current Effect on Failure Analysis of A Welded Dissimilar Metal Beam

Mehmet YETMEZ
Müberra RÜVEYDA KOÇAK

Abstract

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Investigation on the Small-Scale ORC Turbine Design

Alperen Buğra ÇOLAK[1]
Oğuz ARSLAN[2]

Abstract

The turbine is the most important component in an ORC system that affects the efficiency of the system. The small-scale turbines could be useful to evaluate the waste energy from the small-scale energy systems. Although there are many studies in the literature on radial and axial type turbine type expanders and positive displacement expanders, the number of studies on regenerative flow turbomachines is quite limited. In this study, a three-dimensional model of a regenerative flow turbine taken as a reference was created and steady state CFD analysis were performed on ANSYS / Fluent. Air has been used as the working fluid to verify the analyses. The results obtained using air were compared with the results in the reference study using statistical metrics. The performance of the turbine was evaluated with the organic fluid R601 (n-pentane) using the k-w SST turbulence models, which gave the closest results to the results in the reference study. As a result of the CFD study, the highest efficiency value of 19.37% and the highest power value of 2.54 kW were obtained for the analyzes between the turbine inlet temperatures between 475 K and 500 K and the mass flow rate between 0.25 and 1.00 kg/s.
Keywords: Numerical analysis, Micro-scale regenerative turbine, Organic Rankine Cycle, R601.

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Multi-Objective Optimization with Multiple Surrogate Models in Assembled Rotor Modules with Bolted Flange Connections

Kadir Kaan AYTUĞ [1]
Erdem ACAR [2]

Abstract

Bolted flange connections are essential in aircraft engine design, connecting stationary and moving parts. The preliminary design phase involves evaluating bolt numbers, sizes, positions, and flange dimensions against structural integrity criteria. This evaluation requires computationally costly finite element model simulations, especially as the rotor assembly faces variable thermal and mechanical loads.

In addressing the computational burden, surrogate modeling has become a vital tool for efficiency and innovation. This study, referenced in NASA and GE's E3 High-Pressure Turbine Test Hardware Detailed Design Report, examines surrogate modeling for bolted flange connection design in a high-pressure turbine module's rotor group.

Three flange regions were identified, each modeled using finite element analysis. Surrogate models were developed with bolted flange design parameters as inputs. The outputs include stresses, and contact forces in bolted flange regions. These models were developed using Ansys software, employing Latin Hypercube Sampling for design experiments and the Genetic Aggregation Response Surface Method for building surrogate models and Multi-Objective Genetic Algorithm method for multi-objective optimization.

The constructed surrogate models achieved a 0.98 determination coefficient (R^2) for training point cross-validation and Relative Root Mean Square Error values below 2%. Integration of the surrogate models into optimization led to significant improvements: mass reductions of 8%, 21% and 7% in the three flange regions, and stress reduction of 2.7%, -0.5% and 12%, respectively.

This study demonstrates that using multiple surrogate modeling techniques enables the examination of large models through sub-models, and facilitates the identification of optimal design alternatives.

Keywords: Aircraft engines, Structural integrity, Bolted flange connections, Finite element analysis, Surrogate modeling, Multi-objective optimization

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Investigation of Bullet-Wall Interactions by Ballistic Simulations against Rigid and Deformable Walls

Ibrahim Kutay YILMAZCOBAN[1]
Kaan FERİKEL[2]

Abstract

The study presents an investigation via explicit computational simulations to analyze the ballistic impact dynamics defining the interaction of a 9 x 19mm Full Metal Jacket (FMJ) bullet with rigid steel and deformable aluminum walls. The research validates the numerical simulations performed through the explicit code LSDYNA with experimental results, focusing on bullet impacts against walls to understand the reactions of the bullet and the walls with a speed of 350m/s. The comparison represents an acceptable correlation between the validated numerical approach and the experimental data for the rigid wall, proving the computational simulations' approach.

With the validated simulation methodology established, the study applies this numerical approach to scenarios involving 6061-T6 Aluminum deformable wall. Despite the absence of experimental data for deformable walls, the study evolves with the validated simulation. This methodology implements it to simulate the impact of a 9 x 19mm bullet against a deformable wall. The study investigates the deformation patterns and energy transfer dynamics induced by the bullet-wall interactions.

The computational simulations offer an accurate virtual definition of the deformation behavior of the bullet against a rigid steel wall. Then, wall thickness optimization is applied to reach a sufficient thickness of the aluminum deformable wall to hold the 9 x 19mm FMJ bullet and protect the target from destruction. Although experiments for the deformable wall are missing, this study shows the potential application of validated numerical approaches in predicting the deformation patterns where experimental data might be limited based on validated behaviors. Finally, these findings allow us to improve the development of various structures and materials against ballistic threats.

Keywords: Terminal ballistics, Explicit simulation, Ballistic impact, Penetration, Numerical validation, LSDYNA.

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Briquetting Vehicle Design by Automatical Control System

Abdulkadir İNCİ[1]
Burcu YALÇINSOY KARADAYI[2]
Aden GÜNSÜREN[3]
Berat Fırat DALĞIÇ[4]

Abstract

This article will introduce the vehicle design to eliminate the effects of storage problems, excess of boron oil consumption, transportation and human health and safety related negligence on the manufacturing enterprises. The iron chips, which are CNC counter, are separated from the boron oil by magnet assemblies and then charged to the conveyors. The iron chips which is charged into the conveyor occupy a considerable space in volume, and this creates some problems for industrial enterprises. Despite the existence of various briquetting devices for solving these problems, a new design was needed because the existing briquetting devices could not meet the technical inadequacies and needs. In this work, the process of designing a briquetting tool suitable for the needs is included. In addition, some of the mechanical and electrical components of the designed vehicle have been introduced and included in the circuit diagrams and 3D view of the project.

Keywords: Boron Oil, CNC Counter, Briquetting

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Rear Underrun Protection Device Design That Can Be Changed Position By Using Gas Piston Compliant with UNECE R58.03 Regulation

Yusuf Can BULUT[1]

Abstract

Bumpers designed according to the UN ECE R58.03 regulation can be positioned in different positions. With the reduction of the ground clearance of the bumpers from a maximum of 550 mm to 450 mm, the fact that the bumpers have a removable function has gained importance when the vehicles are loaded on ships and trains and go abroad. This function is provided with the help of gas pistons in O4 category vehicles, and high-weight profiles are made manageable with manpower.

Keywords: Rear Underrun Protection Device, Bumper, Gas Piston

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Structural Optimization with Surrogate-Based Optimization Method for An Aircraft Wing

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Erdem ACAR[2]

Abstract

In today's world, simulation technology has high reliability which takes plenty of time. Due to the restricted schedule of the study, extended simulation time is always a problem. Surrogate-based optimization (SBO) improves a meta-model for an optimization process. It approximates objective and constraint functions by allocating diverse designs of experiment points. The methods of optimization have been developed to yield the best results in the last two decades. To have the best option, the meta-model is improved with an adequate number of design of experiment samples. A surrogate model helps to obtain a mathematical model of simulations. As a numerical form of analysis, the meta-model is a practical way to optimize structural parts. SBO is an efficient way to optimize several simulation data, such as the results of computational fluid dynamics (CFD) simulations for complex engineering problems. This study extends a 2D-validated CFD setup to a 3D wing model, ensuring the use of a realistic structural model. Then, it effectively validates the optimization algorithms through a Speed Reducer test case. The research employs SBO in conjunction with a parametrized finite element model (FEM) by focusing on mass optimization while considering constraints of frequency and compliance. An optimum is achieved in about 36 iterations with results suggesting promising outcomes, although the results are not definitive best candidates. The optimization method's validity is further supported by comparison with established optimization methods by highlighting its potential in structural optimization.
Keywords: Aircraft wing, sequential quadratic programming (SQP), structural optimization, surrogate-based optimization (SBO), weight minimization

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Product Life Cycle (plm) and Its Importance

Almila GÖKÇE DAL

Abstract

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Selection of Springs Used in Cabin Shock Absorbers in Armored Military Heavy Tonnage Vehicles

Mehmet Emre SEVENOL[1]
Ali ORHAN[2]

Abstract

In this study, the shock absorber spring calculation calculated by analytical method in armored military heavy tonnage vehicles, the factors affecting the calculation, the calculation and its verification with real tests were examined. As a result of the research and analysis, it has been observed that the most important issue in order for the shock absorber to fulfill its duty is the spring selection. When choosing this spring, the following items were determined as the most important parameters.

- Spring Wire Material
- Spring Wire Diameter
- Number of Spring Windings
- Spring Wire Thickness

Keywords:

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Interactions Between Red Palm Weevil, Rhynchophorus ferrugineus (Oliver, 1790) (Coleoptera: Curculionidae), and Entomopathogenic Nematodes

Refik BOZBUĞA[1]
Doğancan KAHYA[2]

Abstract

Palm trees, belonging to the plant family Arecaceae and growing in tropical and subtropical regions, are also present in Turkiye. One of the significant pests affecting palm trees is the red palm weevil, *Rhynchophorus ferrugineus* (Oliver, 1790) (Coleoptera: Curculionidae). This invasive species was first identified in the Mersin province of Turkiye in 2005 and has since become widespread, particularly along the Mediterranean coastline. The larvae of this pest, emerging from eggs, infest various parts of the trunk, including wound sites, creating tunnels in the soft fibrous tissue. As the number of tunnels increases, the trunk weakens, leading to decay and ultimately causing the death of the tree. The economic impact of the red palm weevil on palm and date palm trees has been documented in numerous countries, resulting in significant economic losses. Cultural measures, biotechnical approaches, and chemical control are extensively used for red palm weevil control. In biotechnical control, pheromone traps are commonly used. Research has identified the presence of biological control agents against this pest, both in our country and globally. Several studies have investigated by some researchers the infective capabilities of entomopathogenic nematodes against the red palm weevil at different life stages, with *Steinernema carpocapsae* and *Heterorhabditis bacteriophora* emerging as the most effective against larvae. This review aims to provide information on studies related to the use of entomopathogenic nematodes, contributing to the biological control of the red palm weevil.

Keywords: Red palm weevil, *Rhynchophorus ferrugineus,* Entomopathogenic nematodes, Biological control

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Herbicide Use in Türkiye and the Potential Risk of Resistance Based on Mode of Action Mechanisms

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Abstract

In crop cultivation, the presence of weeds can result in economic losses negatively impacting both yield and quality. While Integrated Weed Management Strategies (IWM), which do not rely on chemical substances, are employed in crop cultivation to mitigate the impact of weeds, herbicides are commonly used. In recent years, there has been a concerted effort in Europe and several other countries to reduce the use of herbicides, driven by initiatives such as the Green Deal, alongside the pursuit of new active ingredients for weed control. In line with this objective, it has become imperative to comprehensively understand the mode of action mechanisms (MoA) of existing active ingredients and their associated resistance risk scenarios. In Türkiye, the options for herbicide active ingredients and formulations available for weed control are relatively limited. Consequently, the need to use chemicals with the same mode of action mechanism has made resistance that has a significant concern for producers. In the future, the implementation of rotation practices based on the action mechanisms of herbicides across a broader spectrum of crops holds promise for reducing herbicide resistance in weeds. This study establishes the updated grouping codes of mode of action mechanisms for herbicides in Türkiye and evaluates potential resistance risk scenarios based on their action mechanisms. As of 2023, it has been determined that 18 mode of action mechanisms for herbicides are used in Türkiye with 103 active ingredients from 50 different chemical classes, as classified by HRAC/WSSA, controlled for weed management. Additionally, the mode of action associated with the Acetolactate Synthase (ALS) Enzyme (HRAC/WSSA Group 2) is anticipated to present a notably high level risk in the years ahead (the emergence of new weed species and the development of resistance) for use of the active ingredients.
Keywords: herbicides, MoA, resistance, risk level, Türkiye, updated groups

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Controlling of Gryllotalpa gryllotalpa L. (Orthoptera: Grylotalpidae) by Entomopathogenic Nematodes

Doğancan KAHYA[1]
Refik BOZBUĞA[2]

Abstract

Numerous factors influence yield during the cultivation of agricultural products. Among these factors, pests, diseases, and weeds cause both yield losses and a reduction in product quality, resulting in economic losses in agricultural production. *Gryllotalpa gryllotalpa* L. (Orthoptera: Grylotalpidae), commonly known as European mole cricket, is a pest categorized among these pests. The adult and nymph stages of this pest create galleries within the soil, causing damage on various plant materials such as seeds, roots, and tubers. European mole cricket particularly affects newly planted or germinating seedlings by cutting their roots, leading to drying of leaves, and causes economic losses in tuberous vegetables. Various control methods, including cultural practices and chemical treatments such as baits, have been implemented against this pest. However, there is limited research on biological control methods. This review provides insights into the potential use of entomopathogenic nematodes (EPNs), specifically *Heterorhabditis bacteriophora* and *Steinernema carpocapsae*, as biocontrol agents against *Gryllotalpa gryllotalpa*. Several studies by different researchers have demonstrated the effectiveness of these nematode species in laboratory and field conditions, indicating their potential as safe and efficient biological control strategies for managing mole crickets in vegetable crops within integrated pest management programs. This review combines information regarding the potential use of entomopathogenic nematodes in controlling the European mole cricket pest.

Keywords: *Gryllotalpa gryllotalpa*, Entomopathogenic nematodes, *Cydia pomonella,* Biological control, European mole cricket

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Potential Use of Entomopathogenic Nematodes in the Control of Cydia pomonella L. (Lepidoptera: Tortricidae)

Doğancan KAHYA[1]
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Abstract

Pests, diseases, and weeds are significant threats to agricultural production, leading to important yield losses. Apple, a vital agricultural product in our country, is adversely affected by various pests, diseases, and weeds, impacting both yield and quality. The codling moth, *Cydia pomonella* L. (Lepidoptera: Tortricidae), is among the pests affecting apple trees, with its larvae opening galleries within fruits by burrowing directly into them. This damage, inflicted on the fruit, diminishes both yield and quality, negatively impacting market value. Various methods, including cultural, biotechnical, biological, and chemical approaches, are applied for codling moth control. Phromone traps, registered in our country as part of biotechnical control, are widely used by producers. Furthermore, studies have demonstrated the use of egg parasitoids and entomopathogenic biocontrol agents in biological control against codling moths. In Türkiye, entomopathogenic agents containing *Bacillus thuringiensis* have been employed in controlling codling moths. Several studies have been conducted globally and in Turkiye, evaluating different entomopathogenic nematode species against codling moths; for instance, *Steirnema jeffreyense* is highly effective in field trials, while *S. feltiae* demonstrates increased virulence in laboratory bioassays at lower temperatures. This review provides insights into the opportunities and studies related to the global and national utilization of entomopathogenic nematodes for biological control against the codling moth.
Keywords: The codling moth, *Cydia pomonella,* Biological control, *Entomopathogenic* nematode

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First report of the Yellow-Necked Dry-Wood Termite, [*Kalotermes flavicollis* (Fabricius, 1793) (Isoptera: Kalotermitidae)] on Turkish Hazelnut Orchards

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Abstract

Termites are pests that cause significant economic losses in some agricultural products, forest flora, and wooden structures grown in the tropical climate zones. One of these, the Yellow-necked dry-wood termite *Kalotermes flavicollis* (Isoptera: Kalotermitidae), is an important termite species that damages feeding from dead or weak wood tissues in olives, figs, citrus trees, and vineyards. In addition, the insect causes significant damage to wooden structures. It has reported to be found in Turkey's Mugla, Istanbul, Bartın, and Zonguldak provinces. In this study, the damage status and risks of *Kalotermes flavicollis* (Isoptera: Kalotermitidae) on hazelnut were assessed based on surveys conducted in Samsun hazelnut orchards. It was detected in the root necks of hazelnut trees during the observations made in the Tekkeköy district of Samsun province in August and September 2022, and it was determined that the dense termite population causes damage by opening galleries in the hazelnut branches during the productive period, causing the weakened branches to break or dry out quickly. Termite density in the 0–30 cm section of termite-infested hazelnut quarries is higher than in the 30-90 cm section. Therefore, it was observed that the onset of infection occurred close to the root collar. As a result, the basic biology, hosts, distribution areas, and damage of *Kalotermes flavicollis*, which is a new pest for the hazelnut pest fauna in the region, were explained to be evaluated in future surveys and research.

Keywords: Termites, Hazelnut, Black Sea Region.

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Use and Effects of Anthocyanins in Animal Nutrition

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Abstract

Anthocyanins are flavonoids synthesized by the phenylpropanoid pathway, seen in important tissues of plants (root, leaves, flower, and fruit parts). Anthocyanins are esterified with sugars such as glucose, xylose arabinose, fructose, and lactose, but are found freely in foods. Anthocyanins in animals; play a role in antioxidant, prevention of lipid oxidation, rumen fermentation, and methane production. In addition, anthocyanins also reduce oxidative stress by scavenging free radicals, so they can be used to prevent problems such as decreased dry matter intake, decrease in milk composition and yield, decrease in fertility, ketosis, sepsis (blood poisoning) and pneumonia (pneumonia) caused by oxidative stress. Moreover, since anthocyanins affect rumen fermentation, they can affect milk composition and yield by adding to the total amount of volatile fatty acids in the rumen fluid. However, anthocyanin-rich feed ingredients can reduce feed consumption and dry matter consumption, as they have a bitter taste. For this reason, the use of a small amount of anthocyanin-rich feeds in the ration, especially dairy cattle being more sensitive to oxidative stress, will reduce oxidative stress, and overall milk yield and composition can be positively affected. This review, it is aimed to give information about the use and effects of anthocyanins in animal nutrition.

Keywords: Anthocyanin, Animal nutrition, Rumen fermentation, Essential fatty acid, Milk composition, Milk yield

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Evaluating the Effectiveness of Some Fungicides in the Control of Neoscytalidium dimidiatum in Apricot

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Erçin OKSAL[3]
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Abstract

Neoscytalidium dimidiatum is a devastating disease causing significant damage to apricot trees globally and, in recent years, in Turkey as well. This disease causes various detrimental effects in apricot trees, including dieback, stem canker, necrosis in vascular tissues, gumming, and ultimately the complete death of the host. This study was conducted in the province of Malatya, Turkey, which holds a leading position in apricot production worldwide, during the years 2021-2022. The aim of this research was to evaluate the efficacy of some chemical and biological fungicides against *N. dimidiatum*, which causes destructive effects in apricot trees. In the disease control efforts, 10 chemical and 2 biological fungicides were tested under laboratory and field conditions. The efficacy of the biological fungicides was assessed only in field studies. This study holds a pioneering status as it was conducted under field conditions for the control of *N. dimidiatum*. In the in vitro experiments conducted to determine the inhibitory levels of chemical fungicides, all fungicides, except for metalaxyl-m + acibenzolar-s-methyl, successfully inhibited the mycelial growth of *N. dimidiatum*. In laboratory studies, tebuconazole (%100), cyprodinil + fludioxonil (%99.43), azoxystrobin + difenoconazole (%99.40), and floupyram + tebuconazole (%99.26) were found to be the most effective fungicides in inhibiting the mycelial growth of the pathogen. The efficacy of the identified chemical fungicides in inhibiting mycelial growth, along with the commercial biopesticides *Bacillus subtilis* and *Trichoderma harzianum* Rifai KRL-AG2 (T-22), was tested under field conditions using two different methods both pre- and post-inoculation. In the field conditions, azoxystrobin + difenoconazole, floupyram + tebuconazole, and tebuconazole were determined as the most effective fungicides both before and after artificial inoculation in the control of *N. dimidiatum*. Cyprodinil + fludioxonil showed high efficacy only in pre-inoculation application. The commercial biopesticides *B. subtilis* and *T. harzianum* did not exhibit significant efficacy against *N. dimidiatum* under field conditions in this study.

Keywords: *Neoscytalidium dimidiatum*, chemical fungicide, biological control, apricot, stem canker

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Mite Species Found on Stone Fruit Trees in Tekirdag Province*

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Abstract

This study was conducted to determine the phytophagous and predatory mite species on stone fruit trees of the genus *Prunus* (plum, peach, apricot, sour cherry and sweet cherry) in Tekirdağ province (Turkey). Sampling was carried out from May to October and a total of 4921 leaf samples were collected. 52.44% of the samples were found to be infected with mites. In the survey, 16 mite species were identified, of which 4 species belonged to Tetranychidae (*Tetranychus urticae* Koch, *Amphitetranychus viennensis* Zacher, *Panonychus ulmi* Koch and *Bryobia rubrioculus* Scheuten). Seven species of Phytoseiidae were recorded (*Phytoseiulus persimilis* Athias-Henriot, *P.echinus* Wainstein & Arutunjan, *P.finitimus* Ribaga, *Paraseiulus triporus* Chant & Yoshida-Shaul, *Euseius finlandicus* Oudemans, *Typhlodromus athiasae* Porath & Swirski and *Kampimodromus aberrans* Oudemans). In addition *Tyrophagus putrescentiae* Schrank, *Cheletomorpha lepidopterorum* Shaw, *Tydeus californicus* Banks, *T.kochi* Oudemans and *Zetzellia mali* Ewing were recorded during the surveys. *T.urticae* was the most common harmful mite species with 559 individuals, while *P.ulmi* was recorded with only 7 females. Among the predatory species, *E.finlandicus* was the most abundant species with 518 individuals, while *K. aberrans* was the second most abundant species with 345 individuals. Plum was found to be the most preferred host for mites with a total of 995 mites, followed by sweet cherry with 513 mites. It was also noteworthy that nine predatory mite species were found on plum trees.

Keywords: Acari, mite, stone fruit trees, Tetranychidae**,** Phytoseiidae

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Examination of the Possibility of Utilizing Olive Leaves as Raw Material in Tea Production

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Abstract

Olive tree (Olea europaea L.) is a versatile ancient cultural plant that has a place in human history. Olive (Olea europaea L.) is a very special and economically important tree for Mediterranean Basin countries and Turkey. Since the homeland of olive is Hatay-Maraş-Mardin strip, it shows a very wide distribution area in our country. In our country, there are olive production areas on the Aegean, Mediterranean, Marmara and Black Sea coasts. It is unfair to look at the olive tree, which is described as a miracle tree, as only its fruit and olive oil obtained from its fruit, because the leaf of the olive is also a part of the olive tree that contains very valuable compounds for human health, due to the hundreds of beneficial compounds it contains. These precious compounds that make the olive leaf valuable are Oleuropein, flavonoids and phenolic compounds that strengthen the immune system of the human body and increase the body's resistance against diseases. . Oleuropein, which has antimicrobial and antioxidant properties, strengthens the immune system, increases body resistance and prevents diseases. Olive leaf has been stated as the most important known source of oleuropein. This article is a search on the possibilities of using olive leaves in tea production. The article has been created with the thought that it will be very beneficial both in terms of gaining a product beneficial to health and in terms of bringing the leaves to the country's economy.

Keywords: Olive leaf, Herbal tea, Oleuropein, Phenolic compounds.

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The Applicability of Image Classification Method in A Defined Soil Profile

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Abstract

The image classification method is a widely used technique in agriculture field especially determination of soil properties so it is one of the most important methods used in the production of soil maps and classifications.In soil science, it is one of the most important methods used in the production of soil maps and in determining land use types. This research aims to evaluate the information that can be obtained by applying this technique to a soil profile with defined horizons in the field. In this study, the soil profile in the East Thrace Region of Turkey, on a main material of sandstone with the horizon sequence Ap-A2-C1-C2, was used as an example for profile description and image. During the image classification stage, 5, 10, and 15 classes have been applied. As a result, the best horizon and horizon boundary distinction was achieved in the 3rd Application with 15 classes. The results obtained from these three applications have shown that the image classification method is highly effective in accurately determining the number of classes for distinguishing horizon features of soil profiles.

Keywords: Image classification, soil horizon, soil properties, cropping, profile photo.

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Development of Physical Parameters within Transportation Systems and Their Implications on Traffic Assignment

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Abstract

The majority of transportation engineering design issues include several physical parameters and choice variables as well as multipart objective functions. This study investigates the dynamic evolution of physical parameters intrinsic to transportation systems and evaluates their profound implications on the process of traffic assignment. Through a comprehensive analysis, encompassing a range of transportation modes and infrastructural elements, this research elucidates the nuanced interplay between evolving physical attributes and the distribution of traffic flows. To do this work, this research employs advanced modeling techniques to differentiate the intricate relationships between factors such as capacity constraints, network topology, and mode split, providing valuable insights into the evolving dynamics of transportation systems. Furthermore, this study utilizes empirical data and simulation models to validate and contextualize the findings, ensuring their practical applicability. Also, uncertainties in all methodologies and infeasibility in the applications have been reduced. This research contributes to the field of transportation engineering, planning and management by decoding the multifaceted influences of altering coefficients on traffic assignment. The results hold substantial effects for the design and optimization of transportation networks, informing policies aimed at enhancing transportation system efficiency, resilience, and sustainability in the face of evolving urban environments and transportation demands.

Keywords: Transportation Systems, Physical Parameters, Traffic Assignment.

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Forecasting Future Trade Amount between Turkiye and Central Asian Countries

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Abstract

In order for a country to develop, it must have strong political and commercial relations with other countries. As we all know, the relationship between Central Asia and Turkiye is in the dimension of brotherhood. The reason for this is that the nations that form the backbone of these countries are from the same lineage. These countries, which are very rich in natural resources, are also at the crossroads of world trade in terms of location. The main reason fort his situation is that the People's Republic of China, one of the centers of world trade, is located in East Asia. The fact that Central Asia and Turkiye are on the historical Silk Road corridor has led to the growth of foreign trade and the strengthening of commercial and political relations with European countries. The fact that Central Asian countries and Turkiye are still on majör trade corridors also means that these countries are reliable partners for commercial and political relations. Using the Central Asia and Turkiye route in the Belt and Road Initiative (BRI) and China Railway Express (CR Express) corridors initiated by China will provide growth opportunities in the foreign trade of these countries.

The aim of this study is to analyze the imports and exports of Turkey and Central Asian countries to each other and to make forecasting for the future. According to the Ministry of Commerce of the Republic of Turkiye, the Central Asian countries are Azerbaijan, Georgia, Kazakhstan, Turkmenistan, Uzbekistan, Tajikistan, and Kyrgyzstan. Data on the trade between these eight countries, including Turkiye, between 2010 and 2021 were used. "The Observatory of Economic Complexity" website was taken as the main data source.

Keywords: Foreign Trade, International Freight Transportation, Trade Relationship, Central Asia and Turkiye Trade, Trading Analysis

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Investigation of the Effects of the Covid-19 Pandemic on the Transportation Sector: Passenger Transportation in Turkey and the World

Abdulgazi GEDİK[1]

Abstract

The restrictions and measures implemented during the COVID-19 pandemic have globally affected passenger- and freight-movement in all transport modes. Concerns about not maintaining sufficient and necessary social distance, concerns about the insufficient use of masks, gloves and other personal protective equipment, and the resulting risk of infection of passengers during and after travelling have caused a significant decline in the number of passengers in highway, railway, maritime, airway and multidisciplinary transportation. This sharp decline in global demand has caused major financial burden and liquidity problems for many transportation companies, forcing them to save cash, lay off staff and ask for governmental support.

This study investigates the COVID-19 induced change in passenger mobility for different transportation modes in Turkey, while comparing it with the corresponding change in other leading countries. Considering the period before the outbreak of the COVID-19 pandemic (2012-2019) and the pandemic period itself (2020-2022), the transportation mode that experienced the most significant decline in the number of passengers in Turkey was maritime transportation, with a decrease of 81%. Globally, with a decrease of 75%, the biggest decrease was observed in the number of airway passengers. In the transportation sector, where at least 5-10 years are needed for full recovery after the global pandemic, states and governments have once again grasped the importance of active transportation instead of motorized transportation. Hence, as in other leading countries of the world, efforts to increase infrastructure to support cycling paths and walkways for pedestrians have been accelerated in Turkey.

Keywords: COVID-19, transportation sector, number of passengers, restriction, pandemy

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The Impact of Foehn Winds on Forest Fires in the Mediterranean Region

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Abstract

The Mediterranean region, known for its scenic landscapes and diverse ecosystems, faces a recurrent threat in the form of forest fires. Among the various factors contributing to the ignition and escalation of these fires, the influence of Foehn winds, particularly originating from the Taurus Mountains, emerges as a significant catalyst. This study explores the correlation between Foehn winds and forest fires, specifically examining the relationship between Santa Ana winds and wildfires in California. Foehn winds, characterized by their warm and dry nature, result from air descending on the leeward side of mountain ranges. In the Mediterranean context, the Taurus Mountains play a pivotal role in generating Foehn winds that sweep across the region, impacting the environmental conditions conducive to forest fires. Drawing parallels with the Santa Ana winds in California, these phenomena share similarities in their ability to transform the atmosphere into a tinderbox. Understanding the relationship between Foehn winds and forest fires is crucial for devising effective prevention and mitigation strategies. Foehn winds not only elevate temperatures but also desiccate the landscape, making it more prone to ignition and rapid fire spread. By examining the parallels between Foehn-influenced fires in the Mediterranean and the Santa Ana-driven wildfires in California, policymakers and environmental experts can enhance their preparedness and response mechanisms. In conclusion, this article underscores the significance of Foehn winds in the context of Mediterranean forest fires, shedding light on their analogous counterparts like the Santa Ana winds in California. Acknowledging the role of these winds in creating conditions conducive to wildfires is essential for implementing proactive measures to safeguard the unique ecosystems of the Mediterranean region.

Keywords: Wildfires, Forest Fires, Mediterranean, Foehn Winds, Santa Ana Winds

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Comparative Investigation of the Performances of Hybrid, Glass Fiber Reinforced Polymer Rod (GFRP) and Steel Reinforcements

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Caner ŞİMŞEK[4]
Melih Cemal KUŞHAN[5]

Abstract

Modern construction industry aims to enhance the durability and sustainability of structures through advancements in building materials and design technologies. In this context, the possibilities of using glass fiber-reinforced polymer (GFRP) bars as a substitute for traditional steel reinforcement or employing these two solutions complementarily in a hybrid system have become a widespread research topic in the construction industry. This study comparatively examines the performances of steel, GFRP reinforcement, and a hybrid system within structures. Detailed investigations have been conducted on the mechanical properties of concrete structures reinforced with GFRP and steel, including factors such as elastic modulus, tensile strength, corrosion resistance, and long-term durability, through experimental and analytical methods. As a result of the obtained data, it has been concluded that GFRP reinforcements exhibit higher strength compared to steel reinforcements. GFRP reinforcements are lighter than steel reinforcements, and their usability is higher in terms of factors such as material lifespan and cost. Additionally, external studies indicate that steel reinforcements exhibit more ductile behavior compared to GFRP, GFRP reinforcements demonstrate a linear slope up to the point of rupture, and unlike steel reinforcements, there are no post-yield hardening and heterogeneous regions in GFRP reinforcements.The results highlight the advantages and limitations of both materials, indicating the potential of hybrid materials to enhance structural durability.

Keywords: Glass Fiber-Reinforced Polymer (GFRP) reinforcement, Steel Reinforcement, Hybrid Beam, Building Materials

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The Impacts of Kocaeli Integrated Health Campus On Regional Traffic and Real Estate Values

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Abstract

Large-scale public investments create significant effects on the region they are located in, not only during the construction phase but also from the moment the decision to build is made. These types of public investments are long-term investments that general and local governments decide on after long-term planning. Although large-scale public investments have a negative impact on the lives of people in the region during the long construction process, they provide added value to the region they are located in afterwards. In Turkey, public investments made under the general name of "City Hospitals" have had a significant share in public investments in the last 10 years. In this study, the traffic and real estate effects of Kocaeli Integrated Health Campus, which was put into service within this scope, were measured with data before and after the facility was put into service, and the sustainability of these effects was evaluated. According to the results of the study, it was observed that the hospital caused a significant increase in traffic density and real estate values in the region. With the data collected based on the US dollar, in the last 4 years, the real estate prices in the surrounding neighbourhoods where the facility was built increased by approximately 20% more than the price change rates of the central district İzmit, where the facility is located.

Currently, in order to reduce the negative effects of the change in traffic density on users, it is recommended to accelerate the construction of the tram line that will enable rail transportation to the hospital, which is already delayed. As a result of the interviews conducted with the region's users, it was understood that improvement works should be carried out at the intersection of the hospital's main entrance. Therefore, the necessary regulations should be made by the public authority to facilitate access to the hospital on foot.

Keywords: Kocaeli, City Hospitals, Traffic Density, Real Estate Values

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The Mathematical Analysis of Non-Homogeneous Horizontal Flow Model for Salinization in the Gediz Delta (Izmir)

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Ecem TUNCER UYSAL[2]

Abstract

The study is undertaken to elucidate the dynamic interplay between river and seawater. The literature review discerns that in river systems, notably during arid seasons, diminished flow velocities facilitate the dispersion of sea salt along the riverbed. Natural topographical features such as cascades or anthropogenic structures like dams serve as impediments in the longitudinal advancement of salinity. Conversely, in the absence of obstructions, salinity permeates riverbeds and extends into deltaic regions, thereby jeopardizing the subterranean water quality in agriculturally productive landscapes. To comprehend the temporal evolution of this environmental concern, a mathematical model expounding on riverine salinization was meticulously scrutinized utilizing the finite difference method, specifically applied to the Gediz Delta. The outcomes delineate the nuanced analysis of the Gediz Delta under predefined initial and boundary conditions, culminating in the calculation of the temporal requisites for attaining peak salinization. The salinity reached 12‰ levels in the first three days and was calculated as 23‰ on the 10th day of the analysis. According to the analysis results, the salinity ratio between the river and the sea equalized on the 60th day. Additionally, the density change of river water due to salination was determined. The analytical framework proffered for the Gediz Delta holds transferable applicability to diverse riverine contexts contingent upon disparate flow regimes. The systematic examination of salinization progression enables the prospective design of structures geared towards impeding such encroachment, thereby safeguarding agricultural hinterlands against deleterious salinization effects.

Keywords: River-Seawater Interaction, Non-Homogeneous Flow, River Salinisation, Fluid Mechanics, Hydromechanics.

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Detecting Presence and Expression Profiles of Antiviral miRNA's in Some Medicinal Plants with Potential Antiviral Activity*

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Emel SÖZEN[2]
Merve SAĞLAM[3]
İsmail POYRAZ[4]

Abstract

Along with this study, antiviral miRNAs isolations were done from the fresh above-ground parts of *Euphorbia helioscopia* L.(*Euphorbiaceae*), leaves of Salvia *absconditiflora* Greuter & Burdet (Syn.: *S. cryptantha* Monbret & Aucher ex Bentham), *S. officinalis* L. (*Lamiaceae*), *Ficus benjamina* L. (*Moraceae*) (cultured) and *Olea europea* L. (*Oleaceae*), inflorescens of *Sambucus nigra* L. (*Adoxaceae*) and *Lonicera periclymenum* L. (*Caprifoliaceae*); dry leaves of *Viscum album* L. (*Santalaceae*) (herbalist) and flowered above-ground stems of *Lavandula angustifolia* Mill. (*Lamiaceae*) (cultured) and the control group, caryopsis fruits of *Triticum aestivum* L. (*Poaceae*) (Kutluk type). The presence and expression levels of miR765, miR954, miR1086, miR1328 and miR2911 were determined by Real Time-PCR analyzes from their cDNAs. Specific stem-loop primers were designed for each miRNA and cDNA synthesis was performed using these stem-loop primers. The presence of antiviral miRNAs from the obtained cDNAs was indicated by using SYBR green-based real-time PCR. The differences of transcription/expression levels of each antiviral miRNA in subjected plants organs compared to the control group and each other were revealed. The expression profiles of different antiviral miRNAs in these plants, which grow in Turkey and have various medicinal uses, has been comparatively demonstrated for the first time. With this comparison, advantageous species of plants with high expression levels of miRNAs in case the prevention of viral infections have been present by suppressing viral genes.
* This study was supported by Anadolu University Scientific Investigation Projects Commission (Grant Number: 1809S300).

Keywords: Antiviral miRNA, miRNA isolation, medicinal plant, gene expression, qRT-PCR

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Health risk assessment of heavy metals in some vegetables, Türkiye

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Abstract

In this study, we focus on three widely consumed vegetables in daily diets: cucumber (*Cucumis sativus*), zucchini (*Cucurbita pepo*), and eggplant (*Solanum melongena*), originating from the Cucurbitaceae (cucumber and squash) and Solanaceae (eggplant) families. Recognized for their high fiber content and a rich array of vitamins and antioxidants found in their seeds, these field plants contribute significantly to overall health. However, the alarming rise in environmental pollution across Europe poses substantial health risks associated with these vegetables and a myriad of fruits and vegetables. Environmental pollutants, primarily from soil, air, and water contamination, have become pervasive. In this research endeavor, we employed statistical analysis to examine elemental interactions within soil samples collected from diverse regions in Turkey. Heavy metals such as Cd, Cr, Co, Cu, Fe, Mn, Ni, Pb, and Zn were scrutinized using Inductively Coupled Plasma Optical Emission Spectrometry (ICP-OES) through the microwave dissolution method. The outcomes of this analysis facilitated the calculation of Health Index risk, estimated daily intake, and target hazard quotient revealing values. The inextricable link between air pollution and proximity to industrial zones emerged as a crucial factor influencing these findings. Consequently, decision-makers must acknowledge these findings and integrate them into policy considerations. As the results underscore the pervasive impact of environmental pollution on the elemental composition of soil and, by extension, the vegetables we consume, this research advocates for proactive measures to mitigate the adverse health effects of environmental contaminants. Ultimately, this study serves as a call to action for informed decision-making to safeguard public health in the face of escalating environmental challenges.

Keywords: Health index; heavy metal; icp-oes; pollution; vegetable

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Effect of Methyl Jasmonate Elicitor on the Amount of Verbascoside, Luteolin, and Aucubin in Callus Culture of Verbascum biledschikianum Bornm.

Dilan ÜREK[1]
Nurşen ÇÖRDÜK[2]
Ebru CAMBAZ[3]

Abstract

Verbascum biledschikianum Bornm. species, known as "Bilecik mullein", is an endemic biennial plant distributed in Bursa-Bilecik, Türkiye. In this study, the effect of methyl jasmonate (MeJA) elicitor on the amount of verbascoside, aucubin, and luteolin in callus cultures of endemic *V. biledschikianum* was investigated. Leaf explants, obtained from 9-week-old plants, were cultured on Murashige Skoog medium containing 3% sucrose, 1 g/L polyvinylpyrrolidone (PVP), 0.7% (w/v) phyto agar, and different concentrations and combinations of plant growth regulators (0, 0.5 mg/L Kinetin + 0.5 mg/L 2,4-D, and 2 mg/L Kinetin). The medium containing 2 mg/L Kinetin was determined as the most suitable medium for callus induction. The obtained calli were transferred to MS media supplemented with 0 µM, 50 µM, 100 µM, and 200 µM MeJA. After 21 days, wet and dry weights of calli were taken and biomass of calli was determined. The extraction was made with 99% methanol. Then, the amounts of verbascoside, aucubin and luteolin were determined by HPLC-DAD analysis. According to the results, the amount of aucubin was 0.19 mg/g in MS with 0 µM MeJA, while the highest amount of 0.96 mg/g was observed in MS with 50 µM MeJA. While the amount of luteolin was 0.05 mg/g in MS with 0 µM MeJA, the highest value was observed with 1.06 mg/g in MS with 50 µM. While the amount of verbascoside was 1.95 mg/g in the medium with 0 µM MeJA, the highest amount (380.09 mg/g) was observed in MS with 100 µM MeJA.

Keywords: aucubin, callus, elicitor, luteolin, mullein, verbascoside

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In vitro Adventitious Shoot Formation in Endemic Verbascum biledschikianum Bornm.

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Ebru CAMBAZ[3]

Abstract

Verbascum biledschikianum Bornm., known as "Bilecik mullein", is an endemic biennial plant distributed in Bursa-Bilecik, Türkiye. The species is an endemic plant in the flora of Türkiye and is classified as a vulnerable (VU) category by the Red Data Book of Turkish Plants. In this study, leaf explants were cultured on Murashige & Skoog basal medium supplemented with various concentrations and combinations of cytokinins and auxins for shoot induction. Leaf explants of approximately 0.5x0.5 cm in size were cut and placed five in each petri dish in the shoot induction medium, with each trial set up with 3 replicates. All *in vitro* culture experiments were conducted in a plant growth chamber set to a 16/8-hour photoperiod, 25±2°C, with a light intensity of 72 µmol $m^{-2}s^{-1}$, and a relative humidity of 55-60%. Callus tissues and adventitious shoots primordium were formed around the wound edges of leaf explants cultured on MS medium with BAP and NAA after 4 weeks of culture. All cultures were retained for four weeks, then the adventitious shoots were sub-cultured onto the MS medium with the same formulations as the shoot induction medium to facilitate shoot multiplication within eight weeks of culture. According to the results, BAP and NAA combination were more effective for induction of shoot primordium than KIN and 2,4 D in *V. biledschikianum*.

Keywords: adventitious shoot, auxin, cytokinin, in vitro, mullein

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Evaluation of Water Quality of Lake Golünyazı in Çorum by Epiphytic Diatom Diversity and TDIL Index

Çelebi ŞAHİN[1]
Faruk MARAŞLIOĞLU[2]

Abstract

The monthly variation of epiphytic diatom diversity in Gölünyazı (Eymir) Lake of Çorum was investigated by examining epiphytic diatoms on plant samples taken from two stations selected on the lake in monthly periods between April 2021 and March 2022.In our study, a total of 37 taxa belonging to 13 orders of Bacillariophyta were identified.In epiphyton, the highest number of organisms on a seasonal basis was recorded in spring (1674 pieces/cm2), while the lowest total number of organisms was recorded in autumn (879 pieces/cm2).The most dominant taxon in the area is *Surirella angustata* with a relative abundance of 7%.This taxon was followed by *Ulnaria ulna* (6.8%) and *Pinnularia viridis* (6.5%) respectively. When looking at the water quality indicator status of epiphytic diatom species, it is seen that there are 45.2% sensitive, 29.5% facultative (sensitive/tolerant) and 25.3% tolerant species.The fact that the total ratio of tolerant and facultative species, which are indicators of pollution, is 55%, shows that there is a partial pollution pressure on the lake.The average shannon diversity index (H') calculated for the epiphytic diatoms of Gölnyazı Lake was calculated as 1.16 bits/org.According to the result of this Shannon diversity index, the lake has "poor" ecological quality and is in the "oxygen-free-very polluted" pollution class.According to the results of the Trophic Diatom index for Lakes calculated using the epiphytic diatoms detected in Lake Gölnyazı, the average TDIL value of the 1st station was calculated as 1.7, while the average TDIL result of the 2nd station was calculated as 1.9.The calculated average TDIL value of 1.8 indicates that the lake has a "poor" ecological status and a "eutrophic" trophic structure.

Keywords: Çorum, Lake, Epiphytic, Waterquality, Pollution**.**

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Green Linkages: The Importance of Ecological Corridors for Wildlife

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Abstract

Ecological corridors are defined as landscape structures that enable the movement of organisms between islands of suitable habitat in fragmented landscapes. Corridors used by animals in daily or seasonal movements (migration, dispersal, etc.) also contribute to other ecological functions in the landscape. Wildlife conservation studies have largely focused on establishing networks of protected areas. Most protected areas are small and do not support viable populations of many native species, especially large mammals. According to basic habitat ecology, many habitat forms in the ecosystem create a rich mosaic in the landscape. While these forms can gradually transform from one to the other, they can also change due to natural causes or human-induced limitations. Wildlife populations require strong and connected ecosystems. Habitat fragmentation is shown as the primary reason for the worldwide decline of species. Low genetic variation (reduced heterozygosity) has been a major concern. A critical determinant of heterozygosity is the amount of gene flow between spatially separated populations. Identifying and prioritizing core habitats and ecological corridors for endangered wildlife species is of great importance. In this study, species-based examples from different parts of the world were compiled, the principles in the design of ecological corridors were stated, and the importance of these green linkages for wild animals was explained. Ecological corridor strategies specific to priority protected species are emphasized. In summary, Wildlife corridors are not recommended as compensation for habitat destruction. However, with careful planning and design, wildlife corridors can help reduce the negative effects of habitat fragmentation by allowing individuals to disperse among large patches of remaining habitat.

Keywords: Ecological corridors, Wildlife, Habitat fragmentation, Habitat destruction

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Development of Antimicrobial Nanofiber Membranes from Acrylized Cellulose Acetate Butyrate

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Abstract

This study focused on antimicrobial nanofiber membranes, whose importance has increased with the latest Covid-19 pandemic; It is aimed to obtain antimicrobial nanofiber membranes from acrylated cellulose acetate butyrate using the electrospinning production method with a UV lamp. It is planned to compare the properties of the obtained membranes with the current membranes used in the industry by testing and examining them with various methods such as SEM, FTIR and H-NMR.

This study aims to develop an antimicrobial nanofiber membrane from acrylated cellulose acetate butyrate by electrospinning production method with a UV lamp. Acrylated cellulose acetate butyrate nanofiber membrane was produced by electrospinning method with UV lamp, and its antimicrobial property was provided by acrylated quaternary ammonium salt obtained from dissolved 1-Bromodecane and 2-Dimethylmethacrylate ionic solution. The general goal of this study is to develop knowledge about the creation of acrylated cellulose acetate butyrate nanofiber membrane with UV lamp and electrospinning method with acrylated quaternary ammonium salt that will provide antimicrobiality, to solve the problems in practice and to optimize the production parameters and antimicrobial properties.

Cellulose acetate butyrate was first acrylated by reaction with acryloyl chloride. Meanwhile, 1-Bromodecane and 2-(Dimethylamino)ethyl methacrylate reacted at 70°C and an ionic structure (Acrylated quaternary ammonium salt) was obtained that would provide antimicrobiality. Then, the solution obtained by mixing acrylated cellulose acetate butyrate and acrylated quaternary ammonium salt, which will give it antimicrobial properties, was spun under a UV lamp and fibers were obtained. The obtained fibers were characterized by various methods such as SEM.

The importance of ultraviolet light curing technology is increasing day by day with its significant advantages and ever-increasing areas of use. Therefore, the importance of materials coated by ultraviolet light is increasing and studies on new materials are gaining momentum. For this reason, it is thought that this study may shed light and support future studies on these issues. The fact that the system can be applied effectively without the need for post-electrospinning techniques and that the electrospinning process can be used with a UV lamp supports the few studies in the literature that use similar systems.

Key Words: Cellulose Acetate Butyrate, Electrospinning, UV Lamp, Antimicrobial, Nanofiber

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Synthesis, Characterization, New Homopolynuclear Metal Complexes with Schiff Base bound Benzoylthiourea

Gülşah KURT[1]

Abstract

Benzoylthiourea and schiff base derivatives are important compounds due to their wide range of applications. They are functional ligands in coordination chemistry and they coordinate to metals via both O, S or N atoms. These compounds have been reported as extractants for various valuable metals, catalytic and biological activity. The synthesis of ligands containing benzoylthiourea and schift base functional groups together is new. In this research, new benzoylthiourea ligand containing schiff base derivative were successfully synthesized. The Ni(II), Cu(II) homopolynuclear metal complexes of the synthesized ligand were obtained and their structures were characterized using elemental analysis, 1HNMR, 13CNMR, UV, FT-IR spectra. Additionally, Surface properties of polymers were examined with SEM-EDAX. The cupper amount of SA2BTCu complexes was found %64,02. In this study, firstly, benzoic acid structures containing Schiff base group was obtained Then, the prepared SA2 reacted respectively with oxalyl chloride, potassium thiocyanate and 2- amino-4-methyl pyridine (SA2BT). The structural features and coordination in square-planar nickel(II) and cupper(II) ions with polydentate N,O, S ligands were discussed.

Keywords: Benzoylthiourea, Schiff Base, Polynuclear, Metal Complexes

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Lower Critical Solution Temperature Behavior of Maleic Anhydride-Vinyl acetate Copolymer in Some Common Organic Solvents

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Abstract

Numerous studies have been conducted on the lower critical solution temperature (LCST) of polymers in aqueous media, but their behavior in organic solvents has not been studied extensively. This is because polymers generally do not exhibit an LCST behavior in organic solvents. Although some studies have been conducted under harsh conditions, the number of studies, especially under mild conditions, is limited. Maleic anhydride-Vinyl acetate (MAVA) is an alternative copolymer. In this study, the polymerization reaction of maleic anhydride and Vinyl acetate was first carried out by free-radical solution polymerization in ethyl methyl ketone solvent under relatively mild conditions at our laboratory. Subsequently, some of its structural properties were elucidated, and then the phase behavior of the Maleic anhydride-Vinyl acetate copolymer in different organic solvents (tetrahydrofuran, hexane, propyl acetate, n-alkanes, 1,2-dichloroethane, butyl acetate) was studied. The copolymer formation was confirmed by FT-IR, and the average molecular weight was determined as ~22,500 g/mol by gel permeation chromatography using tetrahydrofuran (THF) as the eluent solvent and standard polystyrene for molecular weight calibration. The LCST phase behavior of the synthesized copolymer was observed at different solvent ratios and under mild conditions, and the turbidity temperature of the polymer solution can be adjusted with appropriate ratios.

Keywords: Maleic anhydride coplymer, Organic solvent, LCST, Turbidity

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Hazards and Risks Caused by Chemicals To Which Workers Are Exposed in the Hospital Environment

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Ahmet CİHAN[2]
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Abstract

Due to the nature of the work, healthcare services involve serious dangers and risks for healthcare workers. While healthcare professionals protect public and individual health from existing dangers and treat diseases, they may face the risk of losing their health if the necessary precautions are not taken. If necessary precautions are not taken for chemical substances in healthcare institutions, dangers and risks may arise for healthcare workers. Healthcare workers may be affected by many chemicals during the diagnosis and treatment process of diseases, both in laboratories and in support services such as laundry, cleaning and maintenance. Healthcare workers, whose main mission is to diagnose and treat diseases, may face chemical risks because they do not think that they may be affected by chemicals or do not take them seriously enough. In addition to this, it should be taken into consideration that employees who perform different work and activities in health institutions and whose duties are separate work as a team and chemical hazards can be effective in all jobs and professions in the hospital. This study consists of three parts; In the first chapter, the purpose, method, scope and sections of our study are revealed. In the second part, the dangers and risks caused by hazardous chemicals used in the health sector, the departments where the chemicals are used, professional groups that may be exposed to chemicals, and the measures to be taken to protect healthcare personnel from dangers are defined by an extensive literature review. In the third chapter, an evaluation was made by presenting the findings and the comparative results of the obtained findings, and additional measures to increase the awareness and attention level of the employees were presented based on the results obtained as a result of this evaluation.
Keywords: Healthcare workers, chemicals, risks, dangers.

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Computational Investigation for Lone-Pair Interactions with Transition Metals: The Complexes Formed by Cr+, Mn+, Fe+, Co+, Ni+, Cu+, and Zn+ Binding with Aza-Cryptands

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Abstract

Cryptands are known to be incredibly useful in a variety of fields, from chemistry to materials science. In the recent study, we undertake an extensive study to elucidate the structures and interaction energies of the complexes formed by transition metals, such as Cr^+, Mn^+, Fe^+, Co^+, Ni^+, Cu^+ and Zn^+, with 36adamanzane aza-cryptand employing density functional theory. At their optimized geometries of complexes studied, the 3^6adz−Cr^+, Fe^+, Ni^+, and Cu^+ complexes maintain the S_4 symmetry of 36adz, whereas the 3^6adz−Mn^+, Co^+, and Zn^+ complexes is lowered to C_1. The computed interaction energies of all 36adz−M^+ considered complexes were presented with and without relativistic effects at the ωB97XD/6-311++G(d,p) level. The 36adz−Ni^+ complex having a greater IE value (−162.0 kcal mol-1) is more stable than the other complexes because it fits into the cage cavity more easily.

Keywords: Cryptands, Transition metal complexes, 3^6adamanzane, DFT

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Pbxn-9: Development of Production Process and Characterization

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Abstract

Plastic Bonded Explosives (PBXs) consist of explosive components bonded together by a polymeric binder. Plastic Bonded Explosives (PBX) are a class of military explosives that are widely used today due to their advantages such as being easily shaped and used in a wider temperature range. It is especially ideal for demolition operations, as it can be shaped and divided into pieces of the desired size. The desensitization process, which is the process of coating energetic materials with an inert polymeric matrix, is the basic manufacturing process for pressable PBX.

The most common connector systems in current PBXs are polyurethane-based. Ammunition with reduced sensitivity to unintentional explosion has become an important focus in the development of explosives. Plastic Bonded Explosives (PBX) are used in many different applications, from rocket fuels to the main explosive material used in conventional munitions such as air-to-air missiles, air-to-surface missiles, torpedoes, and tank munitions.

Typically PBXs contain 2-10% (by mass) polymer; Other components used in the formulation are 1,3,5,7-Tetranitro-1,3,5,7-tetrazocane (HMX), 1,3,5-Trinitro-1,3,5-Triazinan (RDX), in the form of small crystals. It consists of a secondary explosive such as Pentaerythritol Tetranitrate (PETN) or Triamino Trinitrobenzene (TATB). The use of polymers used with secondary explosives and acting as a binder has two main purposes.

1. To desensitize the secondary explosive with high explosive power to undesirable external factors
2. To provide structural integrity to the composite material.

PBXN-9 explosive formulation consists of a mixture of low boiling point plasticizer (Diisooctyl Adipate (DOA)) and HYTEMP 4454 coded polyacrylate elastomer and HMX as the energetic component.The flexibility of the structure reduces the sensitivity of the bulk material to shock and friction and is available in the form of white granular powder.

Keywords: Pbx, Pbxn, Pbxn-9, Plastic Bonded Explosive, Polymer Bonded Explosive

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Characteristic Properties of Manganese (II) Center in Micro-crystalline CaCO3 at Low Temperature: An Electron Paramagnetic Resonance Investigation

Özgül KARATAŞ[1]

Abstract

The interaction between the substitutional impurity manganese (Mn^{2+}) ion and the microcrystalline lattice of calcite ($CaCO_3$), which was collected from a vessel fragment was investigated using electron paramagnetic resonance (EPR) spectroscopy at low temperatures. To obtain random crystal orientations, the sample was powdered by slowly grinding. The major and minor mineralogical components of the sample were identified using X-ray diffraction (XRD) method. The EPR signals were recorded between 4.2 K – 298 K temperatures at the X-band frequency (9.4 GHz).

The results showed that the EPR spectra contained six-line centered around g = 2, originating from Mn^{2+} ions which were located in the ionic lattice sites. It was understood that Ca^{2+} ions were replaced by Mn^{2+} ions in the crystal structure. Additionally, the presence of a free radical (g = 2.004) located between the third and fourth lines, which was thought to have formed during the firing of the sample, was observed. The temperature dependence of spin Hamiltonian parameters for Mn^{2+} in Ca sites was calculated from EPR spectra. It was concluded that the crystalline field parameters (*D, a*) and the hyperfine coupling constant (*A*) were observed to decrease in magnitude with increasing temperature, but there was no measurable change in g over this temperature range.

Keywords: EPR, XRD, $CaCO_3$, Manganese

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Understanding Chloropicrin's Molecular Interaction Mechanism Through Spectroscopic Characterization, and DNA Docking Analysis

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Neslihan KAYA KINAYTÜRK[2]

Abstract

Chloropicrin, a type of Fumigan, has a high carcinogenic effect. In this study, a theoretical analysis based on structural and spectral data was carried out in order to explain the molecular interaction mechanism of the chloropicrin molecule. Quantum chemical computations were performed using B3LYP level density functional theory based on the 6311++G(d,p) basis set. Molecular electrostatic potential surface (MEPs) and Electrostatic potential surface (ESPs) have been determined that O4 and O5 atoms have negative potential and are active sites for nucleophilic attacks. HOMO and LUMO energies were calculated by the time-dependent DFT (TD-DFT) method. The molecule was determined to be reactive and polarizable based on the HOMO-LUMO energy range. The crystal structure of the 1BNA protein was retrieved in *.pdb format from the protein database. The AutoDock Vina tool was used to investigate the protein's interaction with the optimized geometry of the ligand. In addition, the molecular interaction mechanism was explained by determining the hydrogen bond regions and numbers that could form between the ligand and the protein. According to molecular docking analysis, the interaction between chloropicrin and DNA occurred between the Guanine (G)-Cytosine (C) amino acids in the DNA and the oxygen atoms in chloropicrin. The agreement between MEP and molecular docking data is impressive. These findings provide a basic understanding of the mechanism of DNA damage as well as the toxicological effects of the fumigant. The agreement between MEP and molecular docking data is impressive. These findings provide a basic understanding of the mechanism of DNA damage as well as the toxicological effects of the fumigant.

Keywords: DFT, Molecular Docking, DNA, Fumigant

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Structure of Kidney Stones and Spectrometric Techniques That Can Be Used to Determine Constructional Differences in Kidney Stones

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Abstract

A kidney stone (also called renal calculi, nephrolithiasis or urolithiasis) is a solid mass that is made from chemicals in the urine. A major risk factor for kidney stones is persistently low urine volume. Stones often form when urine becomes concentrated and minerals crystallize and stick together. Other possible causes are exercise (too much or too little), obesity, weight loss surgery, or consuming foods that contain too much salt or sugar. Infections and family history may be important in some people. There are different types and colors of kidney stones. The cause of the problem depends on the type of stone. How you treat them and stop new stones from forming depends on what type of stone you have. Knowing the type of kidney stone, it can help you determine the cause of kidney stone formation, as well as give you tips on how to reduce your risk of developing more kidney stones in the future. In our previous studies, we stated that kidney stone analysis should be done using modern methods such as Fourier transform infrared spectroscopy or X-ray diffraction. The aim of this study is to describe the structure and types of urinary stones and to compare and evaluate the methods commonly used in analysis in recent years.

Keywords: Kidney stone, Types of kidney stone, Fourier transform infrared spectroscopy, X-ray diffraction.

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Erosion Research Methodology and Basic Spectrometric Techniques Used in These Researches

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Abstract

Understanding the properties of teeth and the basic principles and mechanisms involved in the interaction of teeth with the surrounding environment depends on modern achievements in dental science. Tooth erosion is defined as the irreversible loss of dental hard tissue through a chemical process without exposure to bacteria. Dissolution of mineralized tooth structure occurs when the oral cavity comes into contact with acids introduced from intrinsic (such as eating disorders or gastric reflux) or extrinsic (high consumption of acidic drinks and food) sources. With the increase in the review of literature on tooth erosion, we can talk about a relatively new interest in this subject, especially in Europe. In recent years, tooth erosion and its associated mechanical wear (abrasive tooth wear) is a risk factor for tooth damage and has attracted the attention of more and more researchers. Various methods are used to evaluate the ultramicroscopic effects of beverages on teeth; these include, quantitative light-induced fluorescence, atomic force microscopy, elemental analysis of solid samples, ultrasonic measurements and scanning electron microscope (SEM). The purpose of this review is to examine the studies on tooth erosion in recent years.

Keywords: Tooth erosion, scanning electron microscope, abrasive tooth wear.

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Control of Metal to Semiconductor Transition in VSSe Monolayer Transition Metal Dichalcogenides by External Electric Field

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Şener ÖZÖNDER[2]
Soner OZGEN[3]

Abstract

Janus-type transition metal dichalcogenides (TMDs) represent a novel class of two-dimensional materials with unique layered structures, where each layer consists of different elements, offering a wide range of electronic and optical properties. These materials have garnered significant interest due to their potential applications in next-generation electronic and optoelectronic devices. In this study, we investigate VSSe, a representative of magnetic semiconductors within Janus-type TMDs, focusing on its suitability for field-effect transistors (FETs) which are pivotal in modern electronics. The unique feature of VSSe is its narrow band gap, which is crucial for enhancing the performance of FET-type transistors. We employed density functional theory (DFT) to analyze the electronic structure of H-phase monolayer VSSe. The methodology involved applying an external electric field ranging from 0.8 to 3.2 V/Å in the -z direction, characterized as a saw-type field. Our findings indicate that VSSe inherently possesses a band gap of 0.28 eV and exhibits magnetic semiconductor properties. Significantly, we observed that the band gap of VSSe decreases progressively with an increasing electric field. At an electric field of 2.4 V/Å, VSSe transitions into a type-II spin-gapless semiconductor, and further increases to 3.2 V/Å induce a transition to a metallic phase. This study is key for advancing FET transistor development. By controlling VSSe's electronic phase with an external electric field, we introduce a method for creating semiconductors with tunable properties. This is crucial for improving semiconductor technology, especially for producing high-performance, miniaturized FETs. Our findings highlight VSSe as a valuable material for next-generation FETs.

Keywords: Janus-type Transition Metal Dichalcogenides (TMDs), VSSe Monolayer, Field-Effect Transistors (FETs), Density Functional Theory (DFT), Insulator-Metal Phase Transition.

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Supplıer Selectıon Usıng Sustaınabılıty Approach In Project Management

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Aden GÜNSÜREN[2]
Abdulkadir İNCİ[3]

Abstract

Project management is the application of processes, methods and skills to achieve Project objectives. One of the important field is supplier selection in correct way throughout the Project process.
Project management involves tracking the project schedule for clients and suppliers, ensuring timely supply of the products to be used according to desired time. While tracking, it covers creating the necessary environment for Project stakeholders to collaborate towards a common goal.
During the stages, Project managers may encounter various challenges and rhey actively participate in finding solutions to these problems along with Project stakeholders, playing an effective role in the progresses of the process.
One of the most crucial aspects for a Project manager is the selection of suppliers. A mistake in supplier selection can lead to the repetition of the process and significant resource wastage besides time wasting.
In this study, it is aimed to make the right supplier selection at one time with a sustainability approach. The aim is to shorten the logistics processes with the previous references of the supplier, the ability to do business, the logistical proximity of the supplier to the relevant company, the accessibility of the supplier company, and to minimise time losses with the right supplier and ease of accessibility at one time.
Sustainability approaches and criteria that will affect the decision-making method were determined by questionnaire method. The criteria are weighted in order of importance and calculated using the Analytical Hierarchy Process method.
As a result of the study, it is aimed to develop the most accurate decision-making method with the criteria determined in supplier selection.
Keywords: Project Management, Supplier Selection, Analytical Hierarchy Process, AHP Method, Sustainable Supplier Selection

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A Novel Multi-Objective Mathematical Model for The Placement Problem of Electric Vehicle Charging Stations

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Abstract

The emergence of electric vehicle (EV) technology has given rise to an increased need for charging points, which are projected to be the predominant energy source for EVs in intelligent cities. For an effective charging infrastructure, it is essential that drivers have nearby access to charging points while also reducing associated costs. Building upon the multi-objective programming (MOP) model proposed by Dinc Yalcin et al. (2022) for the placement of electric vehicle charging stations, we introduce novel decision variable, constraints, and objective function to enhance the existing model. We have designated the capacity of each charging station location as a decision variable rather than a parameter. Consequently, we could assign optimal capacities to each location, subject to novel constraints: each location's capacity must exceed the demand and be below the allowable capacity limit. A new cost function, dependent on capacity, serves as a novel objective function. Thus, the model comprises two objectives. The first objective is inherited from the previous MOP and aims to minimize the distance between two charging stations and between a charging station and a region. The second objective is to minimize the cost function based on capacities. The model is then implemented in Eskisehir, Turkey, and solved using scalarization methods. The practicality of our model is demonstrated, and the results are critically analyzed.

Keywords: Electric vehicle; charging station; sustainability; multiobjective optimization; scalarization methods; smart city

Reference: Dinc Yalcin, G., Ozsoy, C. Y. & Taskin, Y. (2022) A multiobjective mathematical model for the electric vehicle charging station placement problem in urban areas, International Journal of Sustainable Energy, 41:8, 945-961, DOI: 10.1080/14786451.2021.2016761

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Facility Location Problem for Drone Stations: A Case Study

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Abstract

While fires occur in unexpected moments of climate crisis or human-induced effects are violent and occur in unpredictable places, intervention can be difficult either because people can be harmed or because geography makes intervention impossible. As a result, small fires in the area will be put out with fireballs and drones before they spread. The maintenance of drone charging alone, as well as the installation of drone charging stations for these fireballs, are intended to address the facility planning problem. In this study, a dataset obtained from NASA, containing fire data in Turkey from 2000 to 2021 (acquired from Kaggle), was utilized for data analysis, feature engineering, and feature extraction. Additionally, latitude and longitude information were used to obtain address details through an API. Following that, the most common type of fire, known as "vegetation fire," was chosen, as well as Antalya, the date and location of the most fires occurring on that date. The most appropriate algorithms for setting up appropriate drone stations in this region are Spectral Clustering, K-Means, and DBSCAN. The mathematical model integer linear formulation, which includes drone batteries, was developed for the problem of facility location. Since NP-Hard is a problem, optimal results were obtained using a genetic algorithm, which is one of the metaheuristic methods.
Keywords: k-means, spectral clustering, dbscan, drone, facility location

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Analysis of Shopping Centers by Integer Programming

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Abstract

Shopping centers in a city, country or continent are the developing investment and financial areas for the respect of human beings. The number of incoming, staying and shopping customers for a shopping center in a city is the key factor for that shopping center to work effectively and profitably. In this sense, the capacity of shopping center, the lower and upper limits for the number of incoming, staying and shopping customers in the weekdays and in weekends affect the optimal number of customers, working periods and total revenue for the shopping center.

In this work, an integer-programming model, which is conceptual, has been proposed for shopping centers. In this model, the total expense of all customers staying for short and long time in a period for shopping centers has been maximized under some generalized constraints. A number of parameters restrict the number of customers arriving to center in a period. Besides, the capacity of center is taken as a basis for the number of customers staying for a long time at the center. In addition, some additional constraints such as customer preferences, the attributes of firms, the marketing strategies of firms could be brought. Additional objectives such as time maximization for customer-firms and customer-firms utilization could also be brought for the mathematical model.

In this study, the proposed mathematical model has been resolved through integer programming method (IP) via Matlab. By analyzing the results, the numbers of potential customers, the estimated total expense and the solution have been given by customer groups with respect to shopping center types. In future studies, more complex models will be proposed and solved through the accurate methods, heuristic and metaheuristic algorithms for the developing investment and financial area.

Keywords: Combinatorial Optimization, Integer Programming, Mathematical Modeling, Shopping Center

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The Place of Nutrition Culture Based on Vegetable Biodiversity in Traditional Knowledge in Giresun Region

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Abstract

In the Eastern Black Sea Region, especially in the Giresun region, the culinary culture is generally vegetable-based. Most of the vegetables are wild plants and mushrooms grown in the region. It is collected from nature and consumed throughout the season. Each edible and drinkable wild plant has its place, time and consumption in different ways, and this information is about to be forgotten with urbanization. The secrets of the local people to a long and healthy life are hidden in their nutritional culture and traditional knowledge. In addition to consumption of wild plants for food and health purposes, they also provide economic income for the people living in the village. Local people generate financial income by selling wild vegetables collected from nature in fresh, dried and pickled form in public markets. Today, rapid urbanization and the development of the food industry have changed the lifestyle and nutritional culture in the village. The food that was brought from the village to the city 25-30 years ago is now being fed by bringing it from the city to the village. As scientific research on wild plants and the health benefits of these plants become known, their nutritional components become a matter of curiosity, and in recent years, wild plants have become the subject of much scientific study. Viewing cultivated plants with suspicion due to their harmful effects on health, genetic modification and pesticide residues has led to an increase in the demand for wild plant consumption. Human beings are looking for solutions to a healthy and long life in natural, untouched plants, as in ancient times. Especially after the pandemic, the demand for wild plants has increased greatly. Wild vegetables that are the subject of our research: Smilax excelsa L., Trachystemon orientalis L., Ornithogalum umbellatum, Aegopodium podagraria L., Urtica dioica and mushrooms are both food and vegetables of the Giresun local people. These are the edible wild vegetables most consumed for their health benefits. These wild vegetables are used as a folk medicine for diseases, based on traditional knowledge among the local people. In this research, forgotten traditional knowledge was recorded as a result of interviews with 36 people aged 70 and over living in the village of Giresun and its districts, who know natural treatment practices in traditional knowledge.

Keywords: Wild plants in the Giresun region, edible wild plants, traditional knowledge, edible wild mushrooms, nutrition culture

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The Use of Bioactive Components Enriched Edible Films and Coatings in Meat and Meat Products

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Abstract

Meat and meat products are among the most widely consumed foods worldwide due to their high nutrient content. However, these foods also provide a favorable environment for the growth of pathogenic and spoilage microorganisms. In addition, lipid oxidation results in undesirable taste, color, odor and toxic compounds and reduce the nutritional value of meat and meat products. In order to prevent all these problems, natural or synthetic food additives are used in meat and meat products. However, given socioeconomic developments such as urbanization, globalization, changing professions and lifestyles, and rising incomes, consumer preferences are shifting towards high quality food that is free of chemical additives and with a long shelf life. In addition, the effectiveness of preservatives added to the product using traditional application methods decreases over time and there are problems in maintaining product quality. The use of natural and functional food additives in edible films and coatings to extend the storage life of food products has received increasing attention in recent years due to serious health problems associated with synthetic preservatives. The use of edible films and coatings containing natural bioactive components in meat and meat products has been the focus of many studies due to their potential to improve shelf life, quality, etc. In this study, the results of recent research on edible films and coatings prepared using natural antimicrobial and antioxidant components applied to meat and meat products have been reviewed.

Keywords: Bioactive component, edible films and coatings, antioxidant, antimicrobial, meat and meat product.

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Effects of Using Transglutaminase on Physicochemical, Microbiological and Sensorial Properties of Non-Fat Stirred Yoghurt

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Ahmet KÜÇÜKÇETİN[3]

Abstract

Yoghurt, one of the most nutritious fermented dairy products, is rich in proteins, fat, vitamins, and minerals. The milk fat improves the textural and sensory properties of yoghurt. However, interest in the production of yoghurt with reduced fat content or non-fat yoghurt is increasing day by day as a result of increasing consumer awareness about fat, which is related to some diseases (e.g., high blood pressure, and obesity). To enhance the physicochemical properties of non-fat yoghurt, the use of some fat substitutes (e.g., whey protein powders, prebiotics, enzymes) has been investigated. Transglutaminase is an enzyme that leads to the formation of cross-links in milk proteins, which results in improved gel firmness and decreased syneresis in yoghurt gel. The objective of this research was to investigate the effect of using transglutaminase at different levels (0.5U/g milk protein, 1U/g milk protein, and 2U/g milk protein) in the production of non-fat stirred yoghurt. Transglutaminase was not used in the production of the control group. The mean total solids, protein, and ash contents of stirred yoghurt samples ranged from 15.30 to 15.64%, from 5.65 to 5.77%, and from 1.23 to 1.64 %, respectively. The pH, titratable acidity, and syneresis values of the stirred yoghurt samples varied from 4.40 to 4.67, from 0.90 to 1.28%, and from 49.75 to 59.25%, respectively, during the storage period. The highest and lowest hardness values were determined in yoghurt samples produced using milk treated with 2U/g protein transglutaminase and the control group, respectively, on the first day of storage. The number and the mean perimeter of grains of the stirred yoghurt samples varied from 45.75 to 236.00 per 3 mL of the sample and from 3.52 to 3.99 mm, respectively. As a result of microbiological analysis, *S. thermophilus* and *L. delbrueckii subsp. bulgaricus* count in stirred yogurt samples determined as 7.52-8.96 log cfu/g and 6.27-7.16 log cfu/g, respectively. Sensory analyses showed that the most liked product was the yoghurt samples produced using milk treated with 2U/g protein transglutaminase. Consecutively, the use of transglutaminase may be preferred to produce more physiochemically and sensory-stable yoghurt.

Keywords: graininess, sensory, stirred yoghurt, transglutaminase

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Cellulase Enzyme and Its Use in Oil Technology

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Abstract

Keywords:

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Determining Knowledge and Perception Levels of Students in Qualified High Schools Regarding Climate Change

Nur DİKTAŞ BULUT[1]

Abstract

In Turkey, measuring the knowledge and perceptions of the youth regarding climate change is crucial to establish standards for climate change education targeting young individuals and to rationally determine the objectives and policies of relevant public institutions. This study aims to determine the level of knowledge and perception of students in qualified high schools about climate change. Within the scope of this study, face-to-face surveys were conducted with 1,905 high school students who were enrolled in various types of high schools, such as Science High Schools, Anatolian High Schools, Imam Hatip High Schools, Social Sciences High Schools, Fine Arts High Schools, Sports High Schools, and Vocational and Technical Anatolian High Schools in Trabzon Province, which admit students through the High School Entrance Exam and Special Talent Exam. The survey forms consisted of two sections.The first section of the survey consisted of a series of statements related to high school students' knowledge and perceptions of climate change. The survey questions encompassed criteria such as the causes and effects of climate change, access to information, levels of concern, and daily attitudes toward climate change. In this section, a five-point Likert scale ranging from "strongly disagree" (1) to "strongly agree" (5) was employed to record responses. The second section consisted of closed-ended questions, both binary and multiple-choice, including information about students' gender, grade level, parental education, family income, frequency of outdoor activities, and participation in climate change-related coursework. Whether there were differences in knowledge and perception levels between the qualified high schools were tested with analysis of variance and different groups were determined with the Duncan test. As a result of the conducted analyses, it was determined that high school students' levels of knowledge and perception regarding climate change statistically varied depending on the quality of the schools they attended. In light of the study's findings, several recommendations were proposed to enhance high school students' awareness of climate change.

Keywords: Climate change, awareness, high school students, qualified high school

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Synthesis and Characterization of A Heterogeneous Catalyst Supported with Mesoporous SBA-15 and Investigation of its Catalytic Activity in Asymmetric Transfer Hydrogen Reactions in Various Aromatic Ketones

Osman Tayyar ARLI[1]
Yaşar GÖK[2]
Halil Zeki GÖK[3]

Abstract

While chemical substances commonly used for various purposes generally consist of racemic mixtures, especially pharmacological compounds appear as an enantiomer due to their various benefits and harms. Enantioselective catalysts are of great importance for the synthesis of such compounds. In addition, considering industrial scales, the recovery of high amounts of valuable catalysts is also very important in terms of both cost and sustainability. In addition to recyclability, various support materials with various surface properties, high surface areas and chemical components are used to make valuable catalysts heterogeneous. In this study, a mesoporous SBA-15 supported heterogeneous catalyst was synthesized for asymmetric transfer hydrogen reactions of various aromatic ketones. For this purpose, (1*R*,2*R*)-1,2-diphenylethane-1,2-diamine, a chiral urea-amine compound, was reacted by first 4-toluenesulfonyl chloride and then 3-chloropropyltriethoxysilane and supported with SBA-15 by grafting. The SBA-15 supported catalyst was characterized by various methods such as SEM, TEM, XRD, TGA and BET. The results obtained showed that the functionalized chiral urea-amine compound was successfully attached to mesoporous SBA-15. Determination of the catalytic activity of the obtained heterogeneous catalyst in ATH reactions of various aromatic ketones was examined in terms of base type, base amount, substrate/catalyst ratio and recyclability. Although the heterogeneous catalyst showed high conversion up to 97%, it did not exhibit enantioselectivity.

Keywords: Catalyst, chiral, heterogenous catalyst, mesoporous, SBA-15

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Evaluation of the Opinions of Representatives of the Automotive Sector on the Situation of Automotive Technicians

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Aytekin ERDAM[3]
Gürcan UZAL[4]

Abstract

The aim of this study is to evaluate the current situation of automotive technicians through the automotive sector. The research is in the survey model and the population of the study consists of business owners, managers and technical staff working in automotive enterprises operating in Tekirdağ province in 2023. 98 representatives working in 67 randomly selected automotive companies were determined as the sample of the research. Within the framework of the research, data were collected from the representatives of the sector using a five-point Likert scale. The data obtained were analysed using descriptive and predictive statistical techniques with the help of SPSS data analysis programme. According to the results of the descriptive statistical analysis, the opinions of the sector representatives are as follows: 1) Fault detection, informing customers, taking responsibility, preparing an environment suitable for occupational health and safety, 2) Repairing according to work plans, technical documents and customer request, 3) Preparing the workshop for use for problem detection and basic maintenance were categorised under the factors. The item of each factor with the highest level of agreement was determined as follows, in the order of the factor. The technician explains vehicle problems and repairs to customers, carries out work planned by supervisors, particularly engineers, and carries out basic maintenance, including changing oil, checking fluid levels and changing tyres. According to the results of the predictive statistical analysis, it was found that there was no significant difference between the opinions of the representatives of the automotive sector on the current situation of automotive technicians according to the variables of education, age and seniority. In line with the results obtained, it is suggested that various measures should be taken by vocational schools, automotive technicians and the enterprises employing them in order to increase the professional competence level of automotive technicians.

Keywords: Automotive sector, automotive technician, vocational school, automotive technician competences

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Greenhouse Gas Emissions of Cities: A Comparison of Three Inventory Results

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Abstract

Cities are responsible for a significant amount of greenhouse gas emissions from various sources such as energy production, transportation, industrial activities, buildings, waste and agriculture. In the 6th Assessment Report of the Intergovernmental Panel on Climate Change, greenhouse gas emissions (CO_2 ve CH_4) from urban activities are estimated as 25 Gt CO_2e and 29 Gt CO_2e in 2015 and 2020, respectively, accounting for 62% to 72% of global emissions. Greenhouse gas emissions can vary significantly depending on factors such as population size, economic structure, consumption habits and policy measures. Within the scope of this study, it is aimed to determine the greenhouse gas emission inventories for Tekirdağ, Çanakkale and Yalova cities located in the Marmara Region of Türkiye and to reveal their differences within the framework of these factors, as well as to evaluate the policies and measures that cities can implement to reduce these emissions. The preparation and calculation of cities' emission inventories is fundamental for the identification and implementation of mitigation actions and is critical in the fight against climate change. They are also mandatory in plans such as the Sustainable Energy and Climate Action Plan, and their true calculation is also important for accurate target setting and monitoring. In this context, greenhouse gas emission inventories of these three cities for 2019 were calculated to include stationary combustion, transportation, waste, industrial processes and product use, agriculture, forestry and other land use. The study is based on the GPC (Global Protocol for Community-Scale Greenhouse Gas Emission Inventories) Protocol and greenhouse gas emissions were obtained as 11,190, 6,546 and 1,430 kton CO_2e for Tekirdağ, Çanakkale and Yalova provinces, respectively. While the per capita emission amounts of 10.6 and 12.1 kg CO_2e for Tekirdağ and Çanakkale provinces are above the Türkiye average of 6.12 kg CO_2e, Yalova's per capita emissions are approximately 5.3 kg CO_2e. On the other hand, practices such as increasing energy performance in buildings and reducing coal consumption for heating, increasing the use of renewable energy sources, switching to electric vehicles in transportation and increasing the efficiency of public transportation are considered as prominent actions for mitigation.

Keywords: Climate change, GHG inventory, local policies, mitigation, city-level analysis

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Investigation of Organic Degradation Parameters in the Electrochemical Treatment of Ice Cream Production Wastewater

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Abstract

Keywords:

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Enhancing Collagen Bundle Structure Analysis: A Robust Approach through Crossing Density Analysis with Orientable Filters

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Cihan Bilge KAYASANDIK[2]

Abstract

The cornea is a transparent connective tissue that covers the front part of the eye and functions as the primary infectious and structural barrier. Along with the overlying tear film, it provides an adequate anterior refractive surface for the eye. Collagen, which occupies almost 90% of the entire thickness of the cornea, plays a crucial role in corneal health. Diseases that occur in the cornea are a leading cause of blindness worldwide, and early detection can increase the chances of proper treatment. In this project, we propose an automated analysis technique for corneal collagen that is strongly based on the orientation information of each collagen bundle. We combine crossing density intensity analysis of an image with a maximum filtering response technique to obtain pixel-wise information for each data and extract multiple features about collagen bundles. Our results show that this technique can differentiate between healthy and diseased corneas and has the potential to lead to personalized treatments.

Keywords: Biomedical Engineering, Collagen bundles, Image processing, Medical Imaging.

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Assessing PM10 Variations in Downtown Balıkesir during the Pandemic: A Spatial and Temporal Study

Atilla MUTLU[1]

Abstract

In this study, changes in particulate matter (PM_{10}) levels in downtown Balıkesir, located in the southern Marmara region, were examined through statistical and spatial analyses between 2019 and 2021 during the pandemic period. The analysis of PM_{10} and continuously measured meteorological parameters in Balıkesir resulted in the identification of 2021 as the period with the highest recorded PM_{10} levels. Importantly, the number of days that exceeded the legal limit in 2020 and 2021 consistently reported three-digit figures annually. The application of concentration-weighted trajectory (CWT) analysis determined that North African desert dust, rather than local sources, had a more significant influence on downtown Balıkesir when the highest daily PM_{10} levels were measured on January 21st, 2021. Cluster analysis further revealed that the high-concentration PM_{10} levels, as observed in the CWT analyses, were influenced by continental transport, particularly desert dust from North African desert regions over the Mediterranean Sea.
Additionally, cluster analysis detected transport patterns from Eastern Europe, specifically the southeastern region of Bulgaria, where coal-fired thermal power plants are densely located. These findings underscore the substantial impact of regional and international factors on air quality in downtown Balıkesir during the pandemic period.

Keywords: Balikesir, Cluster, CWT, HYSPLIT, PM_{10}, Theil-Sen

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Implicid Runge-kutta

Tuğba YILDIRIM ORMAN[1]
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Abstract

Differential equations are frequently encountered in the modeling of real worldproblems in many branches of science, especially inengineering, physics, mathematics, chemistry andbiology . Therefore, it becomes very important to find analytical or numerical solutions of these equations. With the analytical solution of a differential equation, the function is obtained in such a way that it gives a value at every point of the solution region. This is not always possible. The necessity of using numerical methods is inevitable, especially in cases where the differential equation is nonlinear, analy tical solution cannot be found or it is quite difficult. The numerical solution is based on the fact that the function f is calculated at discrete points, not continuous. The use of initial values to find the integration constants that emerge in the analyt ical solution of differential equations is also necessary to find numerica l solutions. In this work, the implici t Runge - Kutta methods, which is one of the numerical solution methods of initial value problems, will be emphasized. Runge - Kutta methods, which have a very high stability and approach, will be examined in detail according to their implicit situations, their advantages and disadvantages and differences will be revealed, and the claim will be supported with nu merical examples will support.
Keywords: Ordinary differential equations, numerical methods, explicit runge - kutta methods, i mplicit runge - kutta methods.

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On Integer Sequence A001612

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Abstract

The Handbook of Integer Sequences, first released in 1973 and updated in 1995, encompasses an extensive collection of sequences along with detailed information about each. Nowadays, the encyclopedia has been digitized and renamed as OEIS (the online encyclopedia of integer sequences). This study delves into the examination of an integer sequence identified as A001612, which can be named as shifted Lucas numbers. These numbers exhibit notable similarities with Fibonacci numbers, Lucas numbers and shifted Fibonacci numbers, the latter being cataloged under A001611. The literature already contains foundational identities and equations for shifted Lucas numbers, including the well-known Binet formula and generating function. These fundamental and essential equations serve as indispensable tools for extracting needed elements from the integer sequence. In our paper, we present additional identities for the shifted Lucas numbers, one of them is the Honsberger identity, which perfectly illustrates the interrelationships between the Lucas and the shifted Lucas numbers. The link between these two sequences comes from their characteristic equations, which involve the golden and silver ratios. The mentioned golden and silver ratios are the same famous ratios linked to the Fibonacci sequence. Additionally, we present identities involving the addition and subtraction of two consecutive elements of the shifted Lucas numbers.

Keywords: Shifted Lucas numbers, recurrence relations, Honsberger identity

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Numerical Analysis of Measles Transmission Dynamics

Mehmet KOCABIYIK[1]

Abstract

Measles is a highly contagious disease caused by a virus. Although there is an effective vaccine against the disease, mortality rates still remain high. Measles can be transmitted between people in different ways. That's why the rate of spread is high. For these reasons, it is very important to understand the dynamics of the disease. By interpreting the dynamics, important factors such as the course of the disease, its effect, transmission rate and mortality rate can be determined in advance. In this study, a mathematical model that includes measles components is considered to determine these dynamics. Unlike other studies, in this study the finite difference method is used to determine the dynamics. The analysis of equilibrium points is also investigated in the system obtained with the help of this method. In the analysis of equilibrium points section, stability situations are examined by finding eigenvalues with the help of points. After determining the dynamics, numerical simulations necessary to provide information about the suitability of the method and the accuracy of the analysis are included. The obtained information and graphics and the results showed that the dynamics of the measles virus could be obtained quickly and effectively by the finite difference method.

Keywords: Measles Dynamics, Numerical Analysis, Finite Difference Scheme.

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Uniqueness of Coupled Common Fixed Point under a Symmetric Contraction in Ordered GV-FMS

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Abstract

Coupled Coincidence and Coupled Common Fixed Point plays an important role in nonlinear analysis. Now-a-days, the theory of fixed points is not only receiving attention of authors in metric spaces but in abstract spaces too, especially in fuzzy metric spaces. Fuzzy metric spaces are in fact the generalization of the metric spaces, where the fuzzification of the notion of distance is done. Fuzzy terminology consists of the uncertainty phenomenon. There are several inequivalent terminology of fuzzy metric spaces. Over the years, the authors are trying to establish the relationship between the ordinary fixed point and coupled fixed point results. Apart it, there are many fuzzy metric spaces. Among them two are of great interest of authors, viz, KM-FMS and GV-FMS. An important feature of GV-FMS over KM-FMS is that the former establishes the Hausdorff topology as compared to the later. Further, coupled fixed point results in GV-FMS cannot be followed directly from the ordinary fixed point results. Present work deals with the investigation of existence and uniqueness of coupled coincidence and coupled common fixed points under a symmetric contractive condition for the mixed monotone mappings in setting of GV-FMS endowed with Hadzic type t-norm. The work is supported with suitable illustrations. Further, as an application, a corresponding result in the metric space is also obtained. Certain existing results in the literature are also generalized.

Keywords: Partially ordered set; Hadzic type t-norm; coupled coincidence points; coupled common fixed points; GV-FMS.

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Effect on Deformation of Layer Numbers of Steel Fiber Reinforced Angled Composite Plates Under in-Plane Force

Emre YILMAZ[1]

Abstract

Appropriate material selection is made before the production phase of a designed product. Determining the needs during the design implementation process and selecting the materials to meet the necessary requirements are extremely critical elements in terms of ideal cost and safety. Nowadays, single type materials have been replaced by composite materials consisting of a combination of more than one material. Composite materials find use in many industries, especially the automotive and aerospace industries, and provide high fatigue resistance, high specific strength, high corrosion resistance and high hardness compared to uniform materials. Selection of the ideal matrix-fiber combination, macroscopic production techniques and optimization processes are extremely important. In order to bring all these features together, experimental studies are carried out along with analytical solutions. The results of these studies are compared to determine the appropriate matrix-fiber combination and production technique. Deformation in a material under the influence of force is an undesirable result. Determining the material dimensions to be applied is as important as the selection of the material type in terms of deformation safety. In this study, deformation analyzes of steel fiber epoxy matrix composite plates were performed. Plates under planar force were investigated using computer simulations based on the finite element method for different steel fiber angles and different numbers of fiber layers, keeping the plate size and matrix element constant. The effect of fiber angles and fiber layer numbers on deformation in the composite plate was investigated.

Keywords: Steel fiber composite plate, Angled composite plate, Composite layer number, Deformation analysis, In plane load.

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Design Configuration Management of Tactical Wheeled Armored Heavy-Duty Vehicles: Modular Approaches and Adaptation Strategies

Emre UYAR[1]

Abstract

The defense industry is a vital sector at the heart of national security and military operations. This sector undertakes the development and production of vehicles and equipment that provide protection against enemy threats. Tactical wheeled armored heavy-duty vehicles hold a particular significance among this equipment. These vehicles are renowned for their operational flexibility, transport capacities, and levels of protection, thus representing versatility on modern battlefields.

This study addresses the design configuration management of tactical wheeled armored heavy-duty vehicles, which are critically important for the defense industry. In today's world where operational needs change rapidly, increasing the flexibility and adaptability of these vehicles through modular design and configuration management is a vital necessity.

The study highlights the advantages of modular design and configuration management, examining in detail how these approaches can be integrated into the design processes of tactical wheeled armored heavy-duty vehicles. Key topics include modular design involving the use of standardized components and subsystems, adaptation strategies targeting specific mission and region-specific needs, and the importance of cost and efficiency considerations in managing the design effectively.

In conclusion, this study provides essential perspectives to defense industry companies to embrace modular design and configuration management for achieving a more flexible, efficient, and cost-effective design of tactical wheeled armored heavy-duty vehicles. These approaches can enable defense industry vehicles to quickly adapt and better tailor to different missions.

Keywords: Modular Design, Configuration Management, Tactical Wheeled Armored Vehicles, Design Flexibility, Defence Industry

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Architectural Value AnalysAis for Boutique Hotels

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Abstract

The rapid development of technology, differentiating living conditions and the fact that touristic services do not satisfy the new generation of consumers cause accommodation businesses to update themselves. In these facilities, there is a competition in the field of service, product and product diversity. Innovation and change is an important phenomenon for businesses that want to turn this competition into a positive one. With applications for the renovation of buildings, innovative projects are produced for changing demands, aiming to make a difference in the market, arouse curiosity and impress the tourist user. Hotel businesses in the tourism sector also include innovative projects in order to impress consumers, respond to their requests and provide various benefits. Thus, boutique hotels that are renovated in the light of user requests and contemporary requirements become advantageous compared to others. The aim of the study is to analyze the interior and exterior spaces of renovated boutique hotels and to determine their architectural status. Another aim is to determine in which area and how much innovation has been made in the architectural structure. In this context, Hich Hotel located in Konya Mevlana Region was examined and evaluated. The determination of the values for the renovated architectural structure and the extent to which it was done were analyzed through the selected sample hotel. In the light of the data obtained, the innovation analysis of the renovated boutique hotel was processed into graphs in line with the data. According to the results obtained, Hich Hotel is a boutique hotel with the highest renovation value. The hotel, which intensively applies product / service renewal in its interiors, draws attention especially with its approaches to sustainability.

Keywords: Boutique Hotel, Konya, Tourism, Innovation, Architectural Value.

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EvAdaptive Re-use of Industrial Heritage as a Catalyst for Thriving Public Spaces: The Case of Hasanpaşa Gasworks

Seren ÖZDEMİR[1]
Ebru ERBAŞ GÜRLER[2]

Abstract

Cities have been changing in response to the changing dynamics of people over time. After post-industrialization, these changes have been started to be observed dramatically within the effects of globalization and rapid urbanization. Especially, it has been observed cities that neo-liberal policies have been applied dramatically. This process has been usually linked with the commodification and privatization of urban space as well as the decreasing number of public spaces. İstanbul has become the one of the greatest examples of where public spaces has started to diminish due to adopted policies. Adaptive re-use of abandoned industrial heritage complexes have been a prominent strategy to create public space since they have distinct architectural features to foster place identity, heritage value to support the creation of collective memory, and usually have open spaces within it to foster social engagement. Within this context, adaptive re-use of industrial heritage complexes as public spaces has been more crucial for cities like İstanbul where urban spaces are contested dominantly by the flow of capital. This study aims to evaluate creation of public spaces re-using of industrial heritage complexes in contemporary cities under the influence of neo-liberal policies. Hasanpaşa Gasworks has been selected as a case study in İstanbul since it is the first and only case of re-use of industrial heritage complex as public space and has been operating for a while to be able to conduct research. Under the scope of this research, social dimension, spatial configuration, cultural value, and environmental compatibility have been assessed to reveal the quality of new uses. The result of the study reveals the importance of adapting abandoned spaces into a public space considering social, spatial, cultural, and environmental aspects of the space. Further recommendations will be provided to industrial re-use projects based on results of this study.

Keywords: adaptive reuse, industrial heritage, public space, placemaking, Hasanpaşa Gasworks

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Obtaining Thymoquinone-rich Extract from Nigella sativa by Ultrasound-assisted Extraction

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Abstract

Plants have an effective role for treatment of various diseases since they contain bioactive molecules that are known as phytochemicals. Phytochemicals have high antioxidant activity and assist the regulating intestinal flora and pH. They protect the cell from external factors by protecting the structure of the intracellular matrix. *Nigella sativa* (black cumin) is an important therapeutic plant containing bioactive molecules and having therapeutic properties as antioxidant, antimicrobial, anti-inflammatory. *Nigella sativa* obtains these therapeutic properties with bioactive molecules that are present in its structure. Thymoquinone is a bioactive molecule that is abundant in black cumin oil and provides therapeutic properties to plant. For obtaining therapeutically active plant components, various extraction methods can be applied with suitable conditions and techniques. The extraction method plays an important role in extraction efficiency. Ultrasound-assisted extraction method is a useful tool for obtaining bioactive molecules from plants. This method has advantages such as short extraction time, high extraction efficiency and quality. Ultrasound-assisted extraction disrupts the structure of cell wall and provides the release of bioactive components from plant. The extraction efficiency depends on the parameters such as solvent type, solid to liquid ratio, temperature and extraction time. In this study, ultrasound-assisted extraction was carried out to *Nigella sativa* seeds to obtain thymoquinone-rich extract. Response Surface Methodology (RSM) was applied to determine the effect of temperature (30℃-50℃-70℃), time (15-30-45 minute) and ethanol concentration (40% 70% 100%) and optimum conditions were elicited as 70°C, 29 min and 40% ethanol concentration.

Keywords: Phytochemicals, *Nigella sativa*, Optimization, Thymoquinone, Ultrasound-assisted extraction

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Stress Analyzing for Investigating Ethmoid Bone Crack Propagation

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Abstract

Ethmoid bone is a single, small and light bone in the skull that separates the nasal cavity from the brain. This bone is located in the front of the skull and between the eye sockets and is not visible from outside the body.
The periosteum is located in the anterior part of the base of the skull, under the frontal bone and in front of the butterfly bone, and it has a perforated plate called the periosteum, a vertical blade and two lateral masses. The projection plate forms part of the roof of the nasal cavity, and the lateral masses are involved in the formation of the outer wall of the nasal cavity and the inner wall of the eye socket. If the vertical plane deviates to one side, the air will not pass through the nasal cavity easily. This causes dryness in the environment of one cavity and swelling and hyperemia in the mucous membrane of the other cavity
Creating stress after trauma in the skull can lead to cracks in the ethmoid bone. In this study, the way of crack formation and its growth in the ethmoid bone has been investigated. For this purpose, the finite element model of the ethmoid bone was designed in ANSSYS program package.
This research and similar studies can be a good guide for medical and biomechanical research in the future. It can be especially effective in the field of examining the disease before surgery or creating medical implants.
Keywords: Ethmoid Bone, Stress, Crack, FEM, Biomechanics

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Comparative Strength Analysis of PLA, ABS, PETG, TPU, and ASA Filaments through Tensile Testing: Influence of Nozzle Size and Filling Parameters

Sedat ÇELİK[1]
Mehmet Masum TÜNÇAY[2]
Görkem YUMUŞAK[3]

Abstract

Fused deposition modeling is used to melt thermoplastic filament and create 3D structures via a heated nozzle. It's known as a rather cheap and easy method; that's why it has a good reputation in terms of feasibility. However, while processing with this method, some defects, inclusions, or shrinkage may be encountered due to the necessity of high temperature fluctuations. There are many different types of filaments, and individually, each of them has an effect on the quality of the printed model. The operator is obliged to work with different parameters for every filament type. In this study, different types of filaments were compared in terms of their tensile properties. The experiments were to investigate how the nozzle size and infill density affected the tensile strength and elongation of specimens produced through 3D printing using a variety of materials, including PLA, ABS, ASA, PETG, and TPU. The findings demonstrated that, for a 0.4 mm nozzle size, increasing the infill density from 50% to 100% considerably increased the tensile strength of all specimens, with PLA exhibiting the greatest difference. Although there were differences in the elongation across the different materials, PLA and PETG showed an increase, while ABS and ASA showed a decline. Similar results were obtained with a 1.0 mm nozzle size when the infill density was increased from 50% to 100%. PETG and ABS had a decrease in elongation, but PLA and ASA showed a rise. Comparing the impacts of nozzle size, it was found that raising the nozzle size while keeping the infill density constant greatly increased the materials' tensile strength but did not always raise elongation. Overall, the results of the experiments show that these effects depend on the material and shed light on how nozzle size and infill density affect the mechanical properties of 3D-printed objects.

Keywords: FDM, PLA, ABS, ASA, PETG, TPU, tensile strength

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Mammalian Fauna of 'Poyraz Wind Power Plant' Area in Kepsut (Balıkesir)

Pınar ÇAM[1]

Abstract

The aim of this study was to determine the mammal species distributed in and around Poyraz Wind Power Plant area in Kepsut district of Balıkesir province. Field studies were carried out in a two-year period between 2014 and 2016. Sherman live animal traps, mist-nets, bat detectors and camera traps were used to determine species. A total of 25 mammal species included in Chiroptera, Carnivora, Rodentia, Cetartiodactyla, Lagomorpha and Eulipotyphla orders were identified in and around Poyraz Wind Power Plant area. Of the bat species distributed in the area, *Myotis capaccinii* (Long-fingered Bat), *Miniopterus schreibersii* (Common Bentwing Bat) and *Rhinolophus mehelyi* (Mehely's Horseshoe Bat) are listed in VU (vulnerable) category and *Rhinolophus euryale* (Mediterranean horseshoe bat) is listed in NT (near threatened) based on the IUCN Red List of Threatened Species. Predatory mammal (Order: Carnivora) *Vormela peregusna* is listed in 'VU' category. Other mammals living in the power plant area are listed in the LC (low risk, widely distributed) category. There are no endemic mammalian species in this area.

Keywords: Mammalian fauna, Wind power plant, Kepsut, Balıkesir

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Mammalian Fauna of 'Yaylaköy Wind Power Plant' Area in Çeşme Peninsula (İzmir)

Pınar ÇAM[1]

Abstract

This study aimed to identify mammalian species diversity in Yaylaköy Wind Power Plant area in Çeşme (İzmir). Field and observational study was conducted in 2015 (January) - 2017 (December), in different habitats in the wind power plant area. During the fieldwork, Sherman live capture traps, mist-nets, bat detectors and camera traps were used to determine species. Animals captured were released back to nature after species identification. Tracks, faeces and food remains were used to detect large mammals in addition to direct observations This research resulted in the terrestrial biotopes at regions around the wind turbines, is likely to spread 20 mammal species were identified. This mammal species belong to the following orders; Chiroptera (7 species), Carnivora (3 species), Rodentia (7 species), Cetartiodactyla (1 species), Lagomorpha (1 species) and Eulipotyphla (1 species). Three Chiroptera species (*Myotis capaccinii*- Long-fingered Bat, *Miniopterus schreibersii*- Common Bentwing Bat and *Rhinolophus mehelyi*- Mehely's Horseshoe Bat) are listed in VU (vulnerable) category and one Chiroptera species (*Rhinolophus euryale*- Mediterranean horseshoe bat) is listed in NT (near threatened) based on the IUCN Red List of Threatened Species. Other mammals lives in plant area are listed in the LC (least concern, widely distributed) category. There are no endemic mammalian species in this area. Determination of the mammal species diversity will allow the monitoring of adverse effects of wind power plant and a plurality of turbine on the wild life.

Keywords: Mammalian fauna, Wind power plant, Yaylaköy, Çeşme, İzmir.

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Noisy Electronic Component Images Classification

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Şafak ALTAY AÇAR[2]

Abstract

Studies using information obtained from images are gaining importance and becoming widespread. In this study, seven different types of electronic components are classified. Two different electronic component image datasets are used being combined. First one has resistor, integrated circuit, capacitor and transistor images. Second one has resistor, diode, integrated circuit, jumper, capacitor, light emitting diode and transistor images. Classification process is applied to both original images and noisy images using a convolutional neural network (CNN) model with three convolutional layers, three max pooling layers and two dense layers. Noisy images are created by adding Gaussian noise to original dataset images. The results obtained from images with different noise levels are compared. It is seen that results are affected by noise level. Also, the used CNN model is compared with other CNN architectures and obtained results are evaluated according to the number of parameters and training times of the architectures.
Keywords: Electronic component, noise, classification, convolutional neural network

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Bibliometric Analysis: Harvesting Wind Energy

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Cemil KÖZKURT[2]

Abstract

Wind harvesting refers to the process of capturing and utilizing wind energy. In this process, wind energy is converted from kinetic energy to electrical energy using wind turbines or wind generators. Wind energy harvesting and accompanying energy production methods are environmentally friendly and sustainable energy production methods. However, the variable nature of wind and the challenges of energy storage can make it difficult to ensure a stable energy supply in some cases. However, with technological developments and improvements, the wind energy sector is becoming increasingly efficient. The more optimized this process is, the higher the efficiency achieved. In this study, quantitative results and mapped images of the literature studies and bibliometric analyses of all studies conducted in previous years for scientific and industrial workers and companies that want to benefit from such wind energy harvesting systems in the coming years were obtained by using the Web of Science (WOS) database and VOSviewer program. As of October 23, 2023, 3893 data were obtained and analyzed from the WOS database on the subject by entering the "wind energy harvest" literature. In this analysis method, statistical results were obtained by making many matching and comparisons such as author, citation, keyword, country, research areas, distribution of publications over the years, publishing organizations, frequency of words in the abstract, and an important data analysis was presented for future studies on wind energy harvesting.
Keywords: wind energy, energy harvesting, bibliometric analysis, VOSviewer, energy scavenging

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Production and Characterization of Microcapsules Containing Thermochromic System with Chitosan/sodium alginate Walls Capable of Temperature-sensitive Reversible Color Change

Sena DEMİRBAĞ GENÇ [1]
Müyesser Selda TÖZÜM [2]
Sennur ALAY AKSOY [3]

Abstract

In this study, it was aimed to produce microcapsules capable of temperature sensitive reversible color change and energy storage as textile additive. For this aim, three-component thermochromic system consisting of crystal violet lactone dye (as a colorant), phenolphthalein (as a color developer) and 1-tetradecanol (as a solvent component) was encapsulated into the chitosan/sodium alginate wall structure through the complex coacervation method. These microcapsules, thanks to the core material they contain, would have the ability to store/release latent heat energy during the reversible color change from color to colorless depending on the temperature change. The heat storage/releasing temperatures and capacities, morphology and chemical structures of the produced microcapsules were studied by differential scanning calorimetry (DSC), scanning electron microscope (SEM), and Fourier Transform Infrared (FT-IR) spectroscopy, respectively. According to SEM images, they had spherical shape. DSC analysis results showed that they stored latent heat of 120.9 j/g and had melting temperature of 35.9 °C. FT-IR analysis proved that three-component thermochromic system was successfully encapsulated within the sodium alginate/chitosan wall structure. Besides, the visible color changes of the microcapsules were investigated by photographic images taken with a digital camera at two different temperatures (25 °C and 50 °C). The results showed that the microcapsules reversibly change from blue to colorless in heating and cooling cycle.

Keywords: Chitosan, sodium alginate, thermochromic microcapsule, complex coacervation
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Codon Usage Bias in The Metalloprotease Gene of Invertebrate Iridescent Virus 6

Yeşim AKTÜRK DİZMAN[1]

Abstract

Invertebrate iridescent virus 6 (IIV6) serves as the representative species within the *Iridovirus* genus, which belongs to the *Iridoviridae* family. Invertebrate iridescent virus 6 (IIV6) is a nucleocytoplasmic virus with a linear double-stranded DNA genome of approximately 212 kilobases, containing 215 potential open reading frames (ORFs). Within the genome of IIV6, there is an open reading frame (ORF 136R) that encodes a metalloprotease. Matrix metalloproteases (MMPs) have a pivotal function in processes such as tissue restructuring, cellular and tissue specialization, the mending of wounds, embryonic growth, and the transformation during metamorphosis. In this study, the codon usage bias (CUB) in the metalloprotease genes of IIV6 and 10 reference invertebrate iridescent viruses was analyzed by comparing nucleotide content, relative synonymous codon usage (RSCU), effective number of codons (ENC), codon adaptation index (CAI), dinucleotide content, and other indices. Codon usage analysis showed that IIVs metalloprotease genes exhibited low codon usage bias. The ENC plot, neutrality plot, and parity rule 2 plot have revealed that both mutation pressure and natural selection influence the codon usage bias in the metalloprotease genes of IIV6 and reference iridoviruses. Codon adaptation index analysis has demonstrated a strong adaptation of the IIV6 metalloprotease gene to its host. Furthermore, correspondence analysis (COA) and correlation analyses have indicated that nucleotide compositions, dinucleotide content, mutation pressure, and natural selection shape the codon usage bias in the metalloprotease genes. These findings will contribute to our understanding of the codon usage bias in the IIV6 metalloprotease gene and reference genes, providing essential information for the fundamental evolutionary analysis of these genes.

Keywords: Invertebrate iridescent virus 6, codon usage, metalloprotease gene, mutation pressure, natural selection

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Investigation of Fe_xMn_y (x=1-3, y=1-4) Small Nano Clusters by Density Functional Theory

Ayşe DEMİRKIRAN[1]

Abstract

The electronic properties of iron-manganese atom clusters were studied by generalized gradient approach using density functional theory (DFT). Iron-manganese (FexMny) atom clusters were examined in different geometries, possible configurations were shown, and stable structures were determined according to their energy values. In different spin states and geometries of iron-manganese atom clusters; Binding energies, magnetizations and bond lengths were calculated. How these values change in stable geometries is shown with graphics. By examining the differences between the stable structures in these different geometries, the changes in the magnetization values were observed. Changes in the magnetic properties of the atoms were observed due to the new bond states formed in the structures due to the increase in the number of atoms.

Keywords: Density functional theory, electronic structure, FexMny clusters, magnetic propert

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Adhesive Bonding of Composite Closures on Cabin Steel Structure with Triangle Method in Vehicles

İbrahim Kerem KOYUNCUOĞLU[1]

Abstract

The use of composite materials in the automotive industry is increasing due to the pressure of global warming and the need for fuel efficiency. Composite materials are lighter and stronger than metals. This can improve fuel efficiency and performance. Additionally, composite materials are easier to shape and produce than metals. This makes them a more suitable option for low-volume production. Composite materials are obtained by combining two or more materials in a specific ratio. These materials can exhibit superior performance by combining the properties of the materials used. There are various methods used to join composite materials. These methods are selected according to the properties of the materials used, production conditions, and the requirements of the application. In the automotive industry, the joining of composite materials with adhesives is becoming increasingly common. Adhesive bonding is a versatile joining method that can be used to join a variety of materials, including metals, plastics, and composites. Adhesive bonding offers a number of advantages over traditional joining methods (such as welding and riveting).

Keywords : Automotive, composite, joining, bonding

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The Evaluation of Acetylene Gas Explosion Risk By CAM Approaching - A Truth Case Analysis

Ferdi ÇALIK[1]
Agah AYHAN[2]

Abstract

This study is based on a truth acetylene gas explosion event that occurred in a confined space in the auto-repairing industry at Çanakkale City in Turkey. Acetylene gas is a colorless and easily combustible gas that is used for welding and oxygen-cutting processes. Also, Acetylene(C_2H_2) is the world's most efficient and hottest burning standard welding gas. So, to produce acetylene gas, the reaction of calcium carbide (CaC_2) with water (H_2O) in a confined metal chamber is used widely in the automotive repair industries. Although the acetylene gas has an important role in heavy industry, it can cause gas explosions that may lead to fatal consequences.

In this study, "consequence analysis modeling" (CAM) for an acetylene gas explosion event was carried out that is based on witness statements and the estimated amount of acetylene gas that caused the explosion. Approximately 0,4 kg acetylene gas ($V_{acetylene}$: 0.376 m^3 for 298.15 K^o and $P_{atm.}$) is produced from the reaction between 1 kg calcium carbide and water. According to CAM study results; this amount of acetylene gas is equal to 0,2 kg TNT (trinitrotoluene) explosive ($M_{acetylene}$ x 0,5 ≈ M_{TNT}). 0,2 kg TNT Equivalence explosion generated 4155 kPa and 113 kPa overpressure for 0,25 m and 1 m target distances, respectively. The overpressure values expected to occur as a result of an acetylene gas explosion equivalent to 0,2 kg and 0,5 kg TNT can lead to fatal consequences. The blast was created by a 0,5 kg TNT-Equivalent explosive charge, detonated at the location (x, y, z) = (1.5, 1.5, 1.0). According to ANSYS Autodyn CFD results, the pressure contours on the surface of the surrogate rigid person after t=0.002s from the detonation instant, with the leading blast wave partially engulfing the person's body.

Keywords: Acetylene gas explosions, Consequence modelling, Vulnerability level

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Degradation of Thymol Blue Textile Dye by Production of Anatase Structure Showing Photocatalytic Properties

Cenk TÜRKOĞLU[1]
Oğuzhan AVCIATA[2]

Abstract

TiO_2 is known for its crystal phases consisting of anatase, brucite and rutile. TiO_2 powders in nano-sized anatase form are one of the photocatalysts that play an important role in environmental purification by breaking down harmful chemicals in wastewater. The anatase form is prominent in various applications as a photocatalyst in environmental purification, as a gas sensor, pigment and catalyst. Titanium dioxide is one of the semiconductor oxides that has attracted great attention in technological advances in environmental purification and energy production. It has a wide range of uses as a photocatalyst in various applications such as removing organic impurities in air and water, decomposing water into ions and producing hydrogen. Compared to other similar materials, it is preferred due to its lower cost, low toxicity and high temperature/chemical resistance. In this study, nanosized powders of TiO_2 in anatase form were synthesized by hydrothermal method without using acid at 200 °C for 2 hours. The physical and chemical properties of the synthesized material were characterized by XRD, EDS and SEM analyses. Additionally, the photocatalytic properties of nanocrystalline TiO_2 powder and the degradation of thymol blue textile dye solution under UV light were examined by exposing the samples taken at certain time intervals to UV light.

Keywords:

wastewater, thymol blue, textile dyestuff, anatase, production

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