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ABSTRACTS BOOK

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Content

Agent Based Modeling in the Fuzzy Cognitive Mapping Literature

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Abstract

Agent Based Modeling (ABM) and Fuzzy Cognitive Mapping (FCM) are two important techniques for helping researchers to overcome the complexities of the real life systems/problems. Although the structures of them differ from each other, they can provide beneficial solutions according to the problem contents and types in their own ways. The utilities of using these techniques in complex and dynamic problems have taken the interests of modelers and researchers since the first studies of them was appeared in the literature. These interests have yielded vast bodies of literature for both techniques separately. On the other hand, it is possible to find some studies that use these two techniques in the same study to obtain more advanced and useful way to solve problems. In this study, the FCM literature and FCM with ABM related literature were quantitatively examined in order to observe the current trends in the academic publications. In addition, the contents of FCM with ABM literature were reviewed to search the benefits of using both methodologies together. Thomson Reuters Web of Knowledge was used as the database of this study. A total of 896 publications related to FCM were found. However, only limited number of these publications used both ABM and FCM together. This study showed that there still may be an important gap on this topic in the literature.

Keywords: Agent Based Modeling, Fuzzy Cognitive Mapping, Quantitative Analysis

Application of Tree-Seed Algorithm to the P-Median Problem

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Abstract

This paper presents an application of tree-seed algorithm (TSA) which is based on the relation between trees and their seeds for the p-median problem. To the best knowledge of the authors, this is the first study which applies TSA to the p-median problem. Different p-median problem instances are generated to show the applicability of TSA. The experimental results are compared with the optimal results obtained by GAMS-CPLEX. The comparisons demonstrate that TSA can find optimal and near optimal values for small and medium size problems, respectively.

Keywords: Tree-seed algorithm, meta-heuristic, p-median problem.

An Overall Equipment Efficiency Study and Improvements in Ulus Metal Company

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Abstract

This paper presents a comparison of 2 different calculation methodology of OEE in a cold forming sheet metal manufacturer. The comparisons demonstrate that automatical data input systems which is working on cloud systems can determine the most realistic data for continuous improvement studies. The fourth stage of industrial revolutions, provides smart solutions and analysis to all enterprises. At the beginning of this revolution, the enterprises should aim to redesign their own system accordingly for being more competitive.

Keywords: OEE, Industry 4.0, cloud, continuous improvement

A Comparison of a Neo4j and Apache Cassandra

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Abstract

Today, the use of the Internet consists of many different purposes. These are business, commercial and social media applications. As a result of all this, a large amount of data is generated. Big data; social media shares, network logs, photos, video, log files, such as all the data recovered from different sources, is converted to a meaningful and processed form. The fact that large data can be processed and made meaningful is particularly important for many organizations, such as companies. Large data consists of non-structural data. These non-structural data are difficult to process in RDBMS. NoSQL (not only SQL system) systems have been developed as it is more efficient and logical to process non-structural data. NoSQL systems work on non-structural and semi-structural data. NoSQL systems can be divided into four categories. These can be listed as key-value storage, document storage, column-oriented storage and graph storage respectively. In this study, we aimed to compare and compare the Apache Cassandra database, which is one of the column-oriented database family, and the Neo4j database from the graph database family and to determine which one works more efficiently for different problems. Noe4j is an open source graphical database written in java. In Neo4j the data is represented as a node and the nodes are connected to each other. Neo4j offers a convenient and simple access. Apache Casandra is an open-source NoSQL database developed with java. It was developed based on Amazon's Dynamo and Google's BigTable databases. Briefly, Neo4j uses cypher as the query language. But Apache Cassandra uses CQL (Cassandra query language) as the query language. Another difference is that there is no relational nature at Neo4j. Apache Cassandra has relational nature. Consequently, it is much more efficient and effective to explain how Neo4j and data are linked to other data. Apache Cassandra is used when more reporting and modification are more significant.

Keyword(s): Neo4j, Cassandra, RDBMS, NoSQL, Key-value database, Document database, column-oriented database, graph database, Cypher, CQL

A Median-based Filter Method for Feature Selection of Text Categorization

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Abstract

Feature selection is the process of reducing the number of features to be used during the classification process to improve efficiency of the classifier. Feature selection techniques are often used when there are many features and comparatively few samples as in text data which can reach huge dimensions with the rapid growth of electronic documents like digital libraries, online news articles, e-mail messages, and Web pages. Feature selection methods are traditionally categorized as "wrapper" and "filter" techniques such that in wrapper approach, a classifier is used to evaluate the selected feature subset, in the filter approach on the other hand, feature subsets are evaluated according to their information content or some statistical measures. Filter methods are often preferred since they have lower computational cost, and they are independent from the classifier used in the evaluation process. The aim of this study is to propose a median-based filter method for feature selection of text categorization, and compare its performance with the well-known filter methods such as Information Gain, Gain Ratio, and ReliefF. In this study, we used 90 Articles, 270 Articles, and 140 Poems datasets from YTU Kemik Group to compare the proposed filter method with the existing ones with varying values of feature number such as 1% , 5%, and 20% of the number of all features. According to the experimental results, the proposed method achieves 58.3%, 57.1%, 80.5% of accuracies with the 1% of feature number of all features for the 270 Articles, 140 poems, and 90 Articles datasets respectively while Information Gain, Gain Ratio, and ReliefF reach 49%, 59%, 73.1% of accuracies for the same datasets. On the other hand, classification accuracies are 16.6%, 23.2%, and 11.1% without any feature selection process. Consequently, the proposed method performs better than Information Gain and Gain Ratio, and has similar performance to ReliefF.

Keyword(s): Feature selection, Filter methods, Text categorization.

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An Online Database Integration for Internet of Things

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Abstract

Web service is the common software that enables the communication of the client and server sides over internet. Web service integrated communication of sensors with internet of things (IoT) has a rising popularity in conjunction with the developments of wearable devices. The standardized network device in which physical objects is connected to each other or to larger systems. The main inadequacy of IoT is limitation on constructing a system, which provides a user-friendly encoded communication and data storing procedure for sensor data (Stergiou et al., 2018, Wang et al. 2018). The proposed web-based framework enables projecting IoT-based solutions by storing medical wearable device data on a cloud. The framework consists of authentication using a unique identification username and MD5 decrypted password, creating different projects with limitless sensor input, project specified API number, storing wearable sensor data with encryption model, analyzing modules at a range of date, and plotting daily charts.

Keyword(s):, Internet of things, database, sensors

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An Energy-based Zone Head Election for Increasing the Performance of Wireless Sensor Networks

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Abstract

Considering the limited resources of Wireless Sensor Networks (WSNs), energy efficient data transmission is a necessary for prolonging the lifetime of the network. Clustering has been proven to be an effective mechanism for decreasing the energy consumption of these networks. The nodes of the network cooperate to form clusters (zones) and a local coordinator, called zone head, is elected in each cluster for data transmission. Since the zone heads are responsible for transmitting the aggregated data collected from the members of their clusters, their batteries are consumed much faster than the other nodes in the network. Therefore, the remaining energies of the nodes should be the primary factor for zone head election for increasing the lifetime of the network. In this paper, an energy-based zone head election is used for both homogenous and heterogenous WSNs. The simulations are conducted for reporting the death round of the first, the half and the last nodes for a 100 and 200 node networks. The results show that up to 181% performance increase in gained.

Keyword(s): Wireless Sensor Networks, Clustering, Network Lifetime, Simulation

A Platform-Independent User and Programming Interface for Nao Robots

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Abstract

A platform-independent user and programming interfaces are developed for Nao humanoids to control them using any device that supports web browsing. The main idea is to request a non-existent page and inject codes into the response. Since the web server have to respond to all requests with valid responses, it is possible to inject codes to original responses so that browsers evaluate injected codes as they are sent by the web server inside Nao. In this way, QiMessaging API is made available without the need to pack the codes and install them into robots memory as an application.

There are two applications written using this approach; one in C# for Windows OS and the other one is in java for Android OS. The android app is written so that the user can writes his/her own commands and associates them with buttons he/her placed on the interface. Therefore the approach and the apps written using that approach make it possible to do everything that is made available by QiMessaging API, writing a few lines of code.

Keywords: humanoid robot, nao controller, script injection

Application of artificial intelligence for sinter production forecast (Poster)

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Abstract

Sintered material, which is the biggest input of blast furnace, which is one of the most important units of integrated iron and steel factories, is produced in sinter factory. It is extremely important to know the production to be produced at the sinter factory when planning for the production of liquid raw iron is required. In this study, in the Iskenderun Iron & Steel Works Company (ISDEMIR) sinter factory, hourly, daily and weekly time intervals production have been estimated. Thanks to the Level 2 system, the coke ratio, return fine ratio, humidity, machine speed, blending level, material band flow information, fan temperatures and oxygen content data were evaluated and applied to artificial intelligence methods. The simulation studies with multi-layer perceptron (MLP), support vector machine (SVM) and multiple linear regression (MLR) methods have achieved very high accuracy rates. According to the R^2 criteria, the MLR, MLP and SVM methods gave the accuracy results 92.4%, 95%, 92.1% for hourly estimation, 96.6%, 97.7%, 96.7% for daily estimation and 89.9%, 95.5%, 92.3% for weekly estimation respectively. It is expected that this study will perform an important task to achieve the planned production objectives in practice.

Keyword(s): Sinter plant, Artificial intelligence, Level 2 system.

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Artificial Neural Networks Method for Prediction of Rainfall - Runoff Relation: Regional Practice

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ABSTRACT

Rainfall and runoff relation is very important in efficient use of water resources and prevention of disasters. Nowadays, different methods of artificial intelligent techniques are applied to determine the rainfall - runoff relations. Artificial Neural Networks (ANN) is used for the present study. Also, Classical methods such as Multiple Linear Regression (MLR) are used. In this study, the data obtained from USA Waltham Massachusetts Stony Brook Reservoir basin was taken. 731 daily data of rainfall, runoff and temperature were used to generate input data in the Feed Forward Back Propagation Artificial Neural Network and Multiple Linear Regression models. The results obtained were compared with the actual results.

Keywords: Artificial intelligence, artificial neural networks, rainfall - runoff, multiple linear regressions

Boundary Control Algorithm for a Boussinesq System

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Abstract

In this presentation, optimal distributed boundary control of Boussinesq equation is considered. For this aim, existence and uniqueness of the weak solution to Boussinesq equation is discussed and also existence of optimal control function is investigated. Adopting the Dubovitskii and Milyutin approach to the system, maximum principle is obtained as a necessary condition for the optimality. Necessary optimality condition for the system is presented in the fixed final horizon case.

Keywords: Control, Nonlinearity, Maximum principle.

Brain Computer Interface Chess Game Platform

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Abstract

ALS patients who have a neural system-related disease, people without limbs, people who have lost their ability to move because of a particular accident or disease may not be treated but this study is aimed to be foundation for other studies to help them to continue their social lives. BMI systems are being developed as a tool / hardware to help individuals with reduced mobility capabilities. In this study, BBA based chess platform is designed. With this study it is desired both to develop a program to be able to support patients with disabilities so that they can play chess without any difficulty and to help people who do not have any disabilities or people who just want psychological treatment. The system designed in this context consists of three main structures: Chess module, BMI module and Robot arm module. These structures were evaluated separately. Later they will be used as a single system. The first structure consists of the GUI part, the interface that will be used to play chess. In this interface Chess Engine is also used, an interface is designed in which two people can play mutual or play with the Engine. The second structure consists of taking the EEG (Electroencephalography) signals of the people with the help of EMOTIV Epoc + device and separating the received signals by certain operations and classifications. Finally the robot arm module after specifying the desired motion according to the received information the joint angles are going to be calculated by inverse kinematic calculation techniques and it will be activated in a controlled way on the platform. With the platform that is going to be created, it is thought that disabled individuals can play chess with EEG signals without any obstacles and this can be implemented with the help of robot arm. Unlike previous studies, it is thought to examine the effect of EEG signals on performance in both silent and noisy environments. In a social environment like a chess tournament, it can not be expected to people to be quiet so it is desired to create a system that can work in such environments as well.

Keywords: BCI, BMI, Robot Arm, Chess, BCI Chess, EEG.

Comparison of Investment Options and an Application in Industry 4.0

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Abstract

Together with Industry 4.0, also known as the fourth industrial revolution, a change and revolution is developing that will affect all sectors and companies of all sizes. Intelligent technologies and factories stand at the center of this development It is known that all of the forward-looking strategies and policies of the institutions include innovations along with the previous technologies. Faster, higher quality with intelligent and self-managing factories and while an efficient system is taking its place in enterprises, the negative effects on employment are the most discussed issues. These changes and innovations have important changes on the investment and operating costs of the enterprise.

To have enough knowledge about digital technologies in order to make decisions about starting a digital transformation journey define their usage areas and make cost-benefit analysis.In this study, a cost-benefit analysis of a multi-functional positioner robot investment was made to accelerate the welding process in a cauldron production plant. The results of the analysis are indicated in the study.

Keywords: Industry 4.0, Cost-Benefit Analysis, Smart Systems

Competition in Statistical Software Market for 'AI' Studies

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Abstract

Open source programs are now having more attraction than license (with high price) required statistical package programs. However, the question is that do package programs lose their prestige because of economic reasons or because of being technically inadequate? This study is focusing on the advantages and disadvantages of both open source programs and licensed package programs. Because, Artificial Intelligence (AI) fully depends on critical thinking and reasoning for qualified "Quantitative Decision Making" which makes such computing tools valuable. This assertion's main aim is to give a perspective over the future of statistical software tools in terms of AI studies.

Keywords: Open Source Programs, Statistical Packages, Artificial Intelligence, Quantitative Decision Making

Computer-Aided Detection of Pneumonia Disease in Chest X-Rays Using Deep Convolutional Neural Networks

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Abstract

Chest X-Rays are most accessible medical imaging technique for diagnosing abnormalities in the heart and lung area. Automatically detecting these abnormalities with high accuracy could greatly enhance real world diagnosis processes. In this work we propose a computer aided diagnosis (CAD) system to identify pneumonia in chest radiography. We have created deep convolutional neural network architecture to detect pneumonia and we have used an advanced version of AlexNet model to compare our results. In this study we have used publicly available Mendeley dataset including of 5,232 chest X-ray images from children. The results indicated that, convolutional neural network model produced the best results with 93.80% accuracy. Convolutional neural network model is followed by AlexNet model with an accuracy of 93.48%. The results obtained here demonstrate that our CNN model and AlexNet model gave almost the same results.

Keywords: Chest radiographs, pneumonia, deep convolutional neural network

Convolutional Neural Network for Environmental Sound Event Classification

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Abstract

Automatic sound recognition (ASR) is a remarkable research area in recent years. It has a wide variety of subcategories. Environmental sound classification (ESC) is one of these categories. ESC is a challenging task because of environmental sounds have noise-like structure and also its created by so many different sources. In this study, we propose a model that uses spectrogram image features and convolutional neural networks for ESC task. In the proposed model, environmental sound events are converted to fixed-size spectrograms. After this step spectrograms are converted to linear greyscale images, and also reduced dimensions with image resizing. Three grayscale image are directly combined, without quantization to create RGB image. Finally feature extraction process and classification are performed via convolutional neural networks (CNN), which have very powerful performance in image classification. Proposed model are tested on the two publicly available dataset which is namely ESC-50. As a result %74.85 classification success are obtained.

Keywords: Environmental Sound Classification, Convolutional Neural Network

Current Situation of Gaziantep Industry in the Perspective of Industry 4.0: Development of a Maturity Index

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Abstract

This paper presents maturity measurement model for determining the readiness level of Gaziantep/Turkey Industry, in the concept of Industry 4.0. Neccessity of implementing Industry 4.0 philosophy, to have a sustainable, competitive and leading economy, forces corporates and governments to assess themselves in the terms of Industry 4.0 principles, in order to prepare accurate road maps. Although there are many studies about measuring methods and organizational and/or national readiness studies for Industry 4.0 in all over the world, especially in Europe, our study motivated from the insufficients research for Turkey industry. Our study aims to complete this gap by investigating different maturity models and as a result, new model draft had been proposed. Results encouraged us to develop this draft into its final form and to conduct the model for evaluation of Gaziantep/Turkey Industry.

Keywords: Industry 4.0, Maturity Index, Maturity Modelling

Classification of Data Streams with Concept Drift: A Matched-Pair Comparative Study

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Abstract

Increasingly, the Internet of Things (IoT) realms, social media applications, hardware devices and etc. generate data at an astonishing rate. This continuously incoming data from heterogeneous sources is referred to as data stream. Data stream mining is not only an urgent trend topic but also complicated in each way. The dynamic, unbounded, high-dimensional and rapidly evolving structure of stream data rendered traditional data mining techniques insufficient. The real-world applications in an evolving environment are not restricted to static data but involve real-time streams, for example; network intrusion detection, weather prediction, spam e-mail filtering, credit card fraud detection, etc. Online/ Incremental learning derives information from the large volume of stream data, usually affected by the changes in the underlying distribution; often in unforeseen ways. This phenomenon, called as concept drift, makes formerly learned models from a training set insecure and imprecise in classification manner. Drift detection methods are software that mostly attempt to estimate the position of concept drift in data streams in order to substitute the base learner after drift has occurred and basically try to improve overall accuracy. Yet, there is no such a "best pair" of classifier and detector under every condition independently. This study propose a matched-pair comparison between 11 drift detectors [DDM, EDDM, ADWIN, CUSUM, GMA, PageHinkley, ECDD, HDDM$_A$, HDDM$_W$, SEQDRIFT2, and SEED] and 8 classifiers [Naive Bayes(NB), Hoeffding Tree(HT), Hoeffding Option Tree, Perceptron(PR), OzaBagASHT, OzaBagADWIN, Decision Stump(DS), and k-Nearest Neighbor(kNN)]. The aim is being able to recommend a classifier, with a better potential performance for a detector, to the researcher for further analysis. The experimental evaluation is carried out by using both synthetic and real datasets with drift on Massive Online Analysis (MOA) framework.

Keyword(s): Data Stream Mining, Concept Drift, Concept Drift Detection, Online learning, Classification.

Computer Aided Design and Geographic Information System Applications in Water Structure Projects: The Importance of CAD and GIS Integration

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Abstract

Water resources development and management activities are of great importance for the present and future generations to maintain their lives in healthy environments. The expert units carry out engineering services in the field of data management and analysis for complex river basin systems in order to solve engineering problems where hydrology, geology, soil and environmental factors have many variables in planning, project design and construction of water structures. Historical observations and field surveys can be evaluated together in a digital environment by using computer-aided applications. The analysis of big data on water resources planning and development works is of high importance in terms of providing expected benefits from the projects. Computer aided design (CAD) and geographic information systems (GIS) are effectively used in engineering services in planning and project design applications. Location plans of water structures can be mapped by some computer software. And, three-dimensional models can be created on digital maps by using computer-aided design based software; technical details of water structures can be determined on three-dimensional models, profiles and cross-sections of the structures can be obtained, excavation-fill volumes can be calculated in short periods. The use of visual elements and three-dimensional models enables the evaluation of projects in digital environment while the project is in design stage before construction works. In addition to CAD data provided, spatial data and attribute information can be stored in GIS database by using GIS technique.

In this study, the importance of CAD and GIS integration is evaluated and presented in order to emphasize the importance of developments related to the use of computer aided design and geographic information systems techniques in water structure engineering applications.

Keyword(s): Computer Aided Design, Geographic Information System, Engineering Applications

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(Invited Paper)
Data Security and Privacy Issues of Implantable Medical Devices

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Abstract

Implantable medical devices (IMDs) have a great improvement over the last decade. They have access to human health data at any time. They also regulate the problems in the human body. The most common IMDs are namely, insulin pumps, cardiac pacemakers, and so on. Since IMDs are directly affect human health, the primary design criterion of such devices includes the effectiveness of the human health. On the other hand, there is a strong trend in using the Internet of Things (IoT) based Industry 4.0 principles in medical devices. However, the data security and privacy issues of those devices are not adequately addressed yet. In this work, we will summarize the related literature and show the state-of-art situation.

Keywords: Implantable medical device, Security, Privacy, Cryptographic systems

Demands in Wireless Power Transfer of both Artificial Intelligence and Industry 4.0 for Greater Autonomy

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Abstract

There are many autonomous applications in daily life and they are limited only by our engineering. It is critical barrier for Industry 4.0 to make efficient communication between all physical objects to transfer of information and power in today's technology. This paper presents the efficient wireless energy transfer methods for different applications which is already used and will be widely used for Artificial Intelligence technology. After the review of historical background, mostly used inductive coupling and capacitive coupling methods in Artificial Intelligence and their importance related with Industry 4.0 applications are demonstrated. Energy transfer demands for radio frequency identification (RFID) application are discussed with the definition of backscatter coupling. Finally, using wireless communication and power transfer methods for greater autonomy is investigated.

Keywords: Capacitive Coupling, Energy, Inductive Coupling, Industry 4.0, Power Transfer, RFID, Wireless

Design and Development of a 3-Electrode ECG Signal Data Acquisition System

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Abstract

Electrocardiogram (ECG) is a process that records the electrical activities of the heart by using electrodes locating to the different parts of the body. ECG is used to diagnose the heart and vascular illnesses that are often encountered. In a standard ECG, the only contraction and relaxation process of the heart is defined by the phases which are called P, Q, R, S and T. However, many internal and external noise sources cause the distortion on these phases. The aim of the study is to design a three-electrode ECG circuit that eliminates the noise from the ECG signal. In this context, firstly, the ECG signal that relatively has very low amplitude was amplified by using an instrumentation amplifier. For this amplifier circuit, an integrated circuit amplifier that has built-in four operational amplifiers in instrumentation amplifier configuration, was used instead of the discrete operational amplifiers. The noises caused by the power supply and line voltage on the ECG signal that obtained from the output of the amplifier were eliminated by designing a band-reject filter circuit. Then the signal that was isolated from the noises was bounded between a suitable frequency band according to the electrical activity of the heart, by using a band-pass filter. To realize this, firstly, a high-pass filter, then a low-pass filter was designed. In the design of these filters, to increase the roll-off rate of the filters, the fourth order filter circuits were used instead of the second order that are often used. In addition to this, for its maximally-flat pass-band response, the Butterworth approximation and Sallen-Key topology were used. According to the measurements done with the designed circuit, the time between the PR, QRS, QT and RR phases were determined. Lastly, the results provided by the designed circuit were compared to a standard ECG system that uses 12-electrode, and it was observed that the designed circuit works successfully and has similar results to the 12-electrode ECG system.

Keyword(s): Electrocardiogram, ECG implementation, Filtering

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Detection and 3D Modeling of Brain Tumors Using Image Segmentation Methods and Volume Rendering

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Abstract

This paper is on detecting brain tumors using MRI images, and obtaining a 3D model of the detected tumor. With the developed software, image segmentation algorithms were applied to MRI images to separate tumor from healthy brain tissues. In the development phase, various image segmentation algorithms were tried, and high success rates were aimed. After obtaining an algorithm with a high success rate, a 3-dimensional image of the detected tumor will be generated using volume rendering. With this image, features of the tumor such as its location, shape and how it spreads in the brain can be observed.

Keywords: tumor, mri, image segmentation, volume rendering

Developing a Smart System for Setup Execution in Weaving

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Abstract

Weaving is the bottleneck operation in typical textile mills. Overall efficiency of weaving shop floors is about 90% in general. Setup operations in weaving (e.g., knotting and weavingdraft) cause long machine down-time. Knotting, a type of setup in weaving includes different interrelated tasks, and it is executed by a team including coordinated sub-teams. Although, expected average time is about 90 minutes for this operation, observed value is about 120 minutes in practice when corresponding records (obtained from a middle-scale textile mill) are examined. A real-time monitoring support for this operation and managing sub-teams with a smart system that is dynamic and adaptive can reduce the time of this setup operation, substantially. This paper presents a smart system that is specific to this setup operation, as a new module of a manufacturing execution system (known as CoralReef).

Keyword(s): Smart manufacturing, Manufacturing execution system, Setup reduction

Determination of Groundwater Level Fluctuations by Artificial Neural Networks

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Abstract

Groundwater level change is important in the determination of the efficient use of water resources and plant water needs. Groundwater level fluctuations were investigated using the variable of groundwater level, precipitation, temperature in the present study. The daily data of the precipitation, temperature and groundwater level are used which is taken from PI98-14 observation well station in Minnesota, United States of America. These data, which include information on rainfall, temperature and groundwater level of 2025 daily, were used as input in ANN method. The results were also compared with Multiple Linear Regression (MLR) method. According to this comparison, it was observed that the ANN and MLR method gave similar results for observation. The results show that ANN model will be useful for estimation of groundwater level to monitor possible changes in the future.

Keyword(s): Ground water level, Artificial neural networks, Multiple linear regression, Modeling

Determination of The 25th Frame With The Eeg Signals Stored in The Videos

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Nowadays, the videos that come across every part of our lives are a set of images resulting from sequential sequencing of a series of image files. The number of images displayed in 1 second of a video is called frame per second (fps) [1]. A viewer can create a fluent and natural image in the brain by resembling the 24 frames of a one-second video; He does not perceive the 25th frame at the level of consciousness and operates in his subconscious [2]. In this study, animal plant and nature-themed videos with 25th square effect were prepared and displayed in a suitable environment by volunteers. While viewing videos, a research-oriented wireless headset, Emotiv EPOC +, was installed to record 14-channel Electroencephalogram (EEG) signals on the scalp of the participants. While the 24 frames of the picture frame come one after the other, the images that are hidden in the frames and called the 25th square effect are seen as difficult by the human eye in the video [3,4]. By analyzing the EEG signals formed as a result of this process, it is aimed to determine whether the brain perceives the 25th square effect that the person has difficulty in seeing with the eye. In the study, the participants were first shown their pure state and then the 25th square effect.

The generated EEG signals were separated into the frequency band alpha, beta, gamma and separate filtering methods were used for each band interval. These filtering methods are the Fourier (FFT) transformation, the Wavelet transform transformation and the Hilbert Huang transformations [5,6,7]. The results of each filtering method were subjected to statistical feature extraction algorithms, such as maximum and minimum difference, mean, median value and standard deviation [8]. The results are normalized and the signals generated while watching the pure video and videos containing the 25th square effect are displayed. Then, the difference between the signals formed was expected to be a non-zero value. In case of no success on processing all the signals, it is considered as an alternative way of processing the signals on the seconds when the hidden pictures are added.

Keywords: Electroencephalography Signals, Brain Computer Interface, 25. Square Effect

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Developing a Smart Attendance System with Deep Learning Techniques

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Abstract

Computer vision has started to be used in many field that with developing technology. Intelligent systems have been developed in many areas especially by combining image processing techniques and artificial intelligence. It has been used for many different purposes such as industry, robotics, health care and security. Considering the development of artificial intelligence algorithms with technology, recently, Deep learning algorithms are one of the most important models. In this study, facial recognition system will be developed by using image processing and artificial intelligence techniques. It will make smart *attendance control* in the class easier, faster and more reliable and intelligent. For this purpose, a database will be prepared with students images. The faces of the students in these images will be found and labeled as name, surname of the students. An artificial intelligent model will be created by using deep learning techniques. By using this model, an application will be developed for face recognition and smart *attendance control*. It will be possible to use for identification of foreign persons within the school, identification of people who act against the rules, prevention of unauthorized access to exams, determination of students who do not follow the rules as a feature works.

Keyword(s): Deep Learning, Face Recognition, Artificial Intelligence

Diagnosis of Chronic Obstructive Pulmonary Disease using Empirical Wavelet Transform Analysis from Auscultation Sounds

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Abstract

In this study, a method was proposed to filter the signals obtained using the lung auscultation method, which is one of the most effective methods for the diagnosis of Chronic Obstructive Pulmonary Disease (COBD), which is a chronic disease, which causes obstruction of air pockets in the lung with long-term inhalation of harmful air. For analysis, the RespiratoryDatabase@TR database consisting of 12-channel lung sounds and 4-channel heart sounds was used. Empirical wavelet transform, which has a wide range of applications, has been used for a signal separation method that has been used for a long time. This method was compared with other signal decomposition methods and performance analysis was performed and the success of the method was determined. After the conversion, statistical parameters were obtained by using the parameters derived. Artificial intelligence techniques are used in artificial neural networks and classification of sounds as a result of the diagnosis and comparison of techniques is aimed.

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Distance Measurement using a Single Camera on NAO Robots

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Abstract

In this study, distance between an object and a robot is measured using a single camera. NAO which is a humanoid robot is used as a subject to measure distance between itself and another object. An object of which real size is known is placed in front of the robot and its size in pixel are calculated for regularly increasing distances. Then a polynomial function is derived for the data that consist of sizes in pixel as input and real distances between the object and the robot as output. Since the polynomial mapping function is derived from an object of which size is greater than one, its input should be normalized. Therefore, input of the function is divided to real size of the object which is used to form the polynomial function and then multiplied with real size of the object of which distance is intended to be measured. The results show that, distances are calculated with small errors, successfully, although the resolution of the camera is set to very low values (320x240).

Keyword(s): distance measurement, single camera, nao robots

Do Industrial Engineering Curriculums cover the core components in Industry 4.0?

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Abstract

The fourth industrial revolution, also known as Industry 4.0, comes into view with the need for new concepts, skills and qualifications. The higher education is on its way to "4.0" to cope with these breakthroughs of the new era. Therefore, the existing strengths and weaknesses of the engineering disciplines are needed to examine. This paper presents a text mining method for evaluating the curriculums of Industrial Engineering (IE) in Turkey, regarding the core components in Industry 4.0. At the first step, the curriculums of IE are analyzed using text mining tool in RapidMiner Studio software. The literature related to Industry 4.0 that was published between 2011 and 2018 is also analyzed with the same tool in the second step. For this purpose, the ISI Web of Science database is selected. The keywords used for the database search are "Industry 4.0" and its synonyms such as "fourth industrial revolution", "the next wave of manufacturing", etc. Finally, the results of the text mining; in "curriculums of IE" and "literature related to Industry 4.0" are compared. It has been observed that the word groups, detected by the text-mining tool, are similar at 73%. It means that the focus points of Industry 4.0 and IE discipline are quite similar. In other words, the existing curriculums of IE already cover the most of the new concepts coming with Industry 4.0. This new era presents an excellent opportunity to IE discipline.

Keywords: Industry 4.0, Curriculums of Industrial Engineering, Text Mining.

Dynamic model and fuzzy logic control of single degree of freedom teleoperation system

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Abstract

Teleoperation systems are defined as systems that provide human-robot interaction. It is important to carry out the control of these systems in the simulation environment, to determine the damages that may occur during the experiments in the real environment and to prevent errors detected during the algorithm development stages. In this study, bilateral (position and force) control of a teleoperation system was aimed. Linear single degree of freedom robot models were obtained. A visual interface is designed in a virtual environment to visualize the movements of the slave robot. Fuzzy Logic control method was used to control the position of the system. PID (Proportional-Integral-Derivative) control method is used for force control. As a result, visual interface was formed in this study and bilateral control was performed, applied in simulation environment and performance results were examined.

Keyword(s): Linear models, Fuzzy Logic, Single Degree of Freedom, Teleoperation system

Dynamic Scheduling in Flexible Manufacturing Processes and an Application

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Abstract

Flexible manufacturing systems need sub-systems that can be controlled, inspected and traced. Industry 4.0 (the Fourth Industrial Revolution) plays a major role in the creation of smart factory systems. With Industry 4.0 concept and technological improvements, collecting and analyzing each data in the production environment in a proper way enables rapidity in working processes and by this way the use of resources, raw materials, energy will decrease and productivity will increase. Manufacturing with machines communicating among each other and unmanned factories working with operational artificial intelligence that can make the right decisions for production efficiency. In this study, instant automatic data collection is realized by the objects in the system talking to each other in order to solve the daily operating difficulties encountered in the dynamic production processes efficiently. Thus, a system has been created with UHF-RFID (Ultra High Frequency-Radio Frequency Identification) technology to establish a system that can take operational decisions simultaneously on its own.

Keywords: Industry 4.0, Dynamic Scheduling, Simulation, RFID

Estimation of Daily and Monthly Global Solar Radiation with Regression and Multi Regression Analysis for Iskenderun Region

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Abstract

In this study, statistical analysis of monthly and daily meteorological data such as global solar radiation, relative humidity, cloudiness, soil temperature, sunshine duration and air temperature taken from the General Directorate of Meteorology Stations for Iskenderun region have been performed. Solar radiation estimation models have been obtained by using regression and multi regression analysis. Solar radiation estimation models such as linear, quadratic, cubic and multi type have been formed as a result of these analyses. However, multi type regression analysis has been applied only monthly average data. The performance of these new models have been compared with other solar radiation models exist in the literature and have been examined with statistical error analyses As a result, cubic type model gives better performance with a little difference to linear, quadratic and other type model for both monthly and daily estimation models. But multi type model (multi 2) show the best performance with big difference for monthly estimation models. Because multi type of model include much more meteorological parameters than other, it has better estimation capacity. In addition, meteorological parameters have great impact to estimation of solar radiation.

Keywords: Global Solar Radiation, Regression Analysis, Meteorological Data

Fuzzy Functions for Big Data

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Abstract

In the information era, various areas such as business, healthcare, government, and management have very large data produced by online and offline transactions and devices. When these large data are processed with various innovative approaches, companies can be made informative, intelligent and relevant decisions. New novel analytical methods and devices have been used to capture and handle big data more efficiently. But, it is need a further long-term innovative research. Fuzzy inference systems can be employed to process big data due to their abilities to represent and quantify situations of uncertainty. Fuzzy functions use an alternative representation and reasoning mechanism of the fuzzy inference systems. Clustering is also used to recognize the patterns in the big data. Fuzzy Clustering Algorithms such as Fuzzy C-Means (FCM) and its variations are used to obtain membership values of input vectors for fuzzy functions. In this study, it would be assessed classical FCM and extended FCM clustering algorithms that provide approximations based on sampling to big data. Then, fuzzy functions with least squares' estimates and with support vector machines to be determined for each cluster identified by FCM how used to model the systems with big data would be discussed.

Keywords: Fuzzy C-Means, Fuzzy functions, Big data.

Gender Estimation from Iris Images Using Tissue Analysis Techniques

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Abstract

Due to the increasing number of people in recent years, the determination of the gender of the person sought when searching in the database means reducing the number of data in the database by half, which will provide us with great convenience in terms of time. In addition, the gender detection system can be used in the creation of marketing strategies that address only a specific gender group in security applications that require gender-based access control. When we look at these, it is seen that the gender detection system has a wide range of applications. Many biometric features such as fingerprint, face, voice and signature are used in person identification systems. However, due to the unique structure of iris, it is thought to be a more reliable system than other biometric properties. Therefore, in this study, gender prediction is tried to be made by using iris structure. The iris images used for gender estimation were taken from the ND_GFI database. 750 women and 750 men, a total of 1500 images were applied on the application. Feature extraction were made with general texture, regional texture and partial texture analysis methods from the iris images. These attributes were classified using the K-Near Neighbor, Naive Bayes, Decision Tree, Multilayer Perceptron classifiers and classification with a performance ratio of 70%.

Keywords: Iris, Gender Estimation, Texture Analysis

Increasing Performance of Autopilot with Active Morphing Fixed Wing UAV

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Abstract

In this study an autonomous performance maximization active morphing of a Fixed Wing UAVs have been investigated. Some geometric and PID parameters of an UAV, controlled with PID based autopilot systems, are defined with a random optimization method in order to catch the best performance faster. For this purpose, equations describing longitudinal and lateral motions have been derived, designed active morphing UAV's characteristics are given, and then autopilot system is presented. By using an adaptive random optimization method, an objective function helped to provide the optimum parameters. These parameters have been defined through an iterative task such that for a given up and down limits of parameters, the minimum cost function have been corresponded to the necessary parameters of the UAVs autopilot control system. Finally, Performance of our UAV and autopilot system has been simulated with Von Karman Turbulence modelling.

Keyword(s): Fixed Wing UAVs, Von Karman Turbulence modelling

Insulated Glass Unit Production Technology in the Age of Industry 4.0

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Abstract

Glass is the main building element in the construction of residential and commercial buildings. In the past few decades, the use of glass in buildings has remarkably increased. Although, it accounts for a higher conductance coefficient than other building enclosures. Hence, it is mandatory to improve thermal comfort and energy saving performance of Insulated Glass Unit (IGU). Also, a flexible and highly automated production as well as an easier and architecturally more appealing integration into the building envelope is expected. This requires, advancing both manufacturing and solar performance of IGU at the same speed as technology. This study presents information about R&D project for a new flexible and expandable IGU production system due to the modular line construction in the CMS Glass Machinery Co. to combine all development and industry needs on an affordable system. The main goal is to achieve minimized user involvement as well as increased monitorability on IGU production systems. So that, the project is focused on harmonization of picture and signal processing, remote axes, cloud, motion control and servo drives, receipt algorithms with float glass technology and current know-how of IGU production systems.

Keywords: Insulated Glass Units (IGU), IGU Production, Multi Glazed Window, Glass in Building

Intelligent Performance Estimation of Cartesian Type Industrial Robots

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Abstract

Automation systems play significant roles not only in optimization of energy costs, raw material usage, labor cost, safety and environmental states but also improvement of production performances, equipment reliabilities and innovative shop floor implementations. Servo driven cartesian robots are most common types through industrial applications for material handling, mechanical assembly, material selection and separation purposes. Gantry type is most leading type within servo driven ones with the aid of economical and uncomplicated design advantages.

In this study, gantry type cartesian robots which are often used in industries are analyzed by using Failure Mode and Effect Analysis (FMEA). The data is collected from experienced typical failures and their effects on the systems. Most critical equipment and their reliability predictions are studied with Artificial Neural Network (ANN) and feed-forward backpropagation algorithm. Different number of hidden layers are tested and compared to each other to make decision the reach most reliable prediction model.

Keyword(s): ANN, Feed-forward Backpropagation, FMEA, Cartesian Robots, Equipment Reliability

Interactive Temporal Erasable Itemset Mining

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Abstract

Mining erasable itemset is one of the popular extension of frequent itemset mining. In time several algorithms have been presented to solve the problem of mining erasable itemset, efficiently. However, all these studies does not take into account the time information of the erasable itemsets. In this study, the concept of the temporal erasable itemset mining is first introduced. Then two algorithms named ITEMETA and ITEVME algorithms are proposed to discover a complete set of temporal erasable itemsets, interactively. The comparison of these two algorithms in terms of running time is also presented.

Keywords: erasable itemset mining, itemset mining, temporal mining, interactive mining

Improving Autonomous Performance of a Passive Morphing UAV Whose Wing And Tail Can Move

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Abstract

In this study, it is examined that simultaneous flight control system and lateral and longitudional state-space model of a Unmanned Aerial Vehicle (UAV) and real time application. For this purpose an UAV whose wing and tail unit can be assembled to fuselage from different points in a prescribed interval and whose wing and tail can move forward and backward independently in tail to nose direction is manufactured. Following this, an autopilot is purchased and it lets change of P, I, D coefficients in certain intervals. First, dynamic model, and longitudinal and lateral state space models of UAV are obtained and then simulation model of UAV is reached. At the same time block diagram of autopilot system and modeling of it in MATLAB/Simulink environment are found. After these, using these two models and also benefiting and adaptive stochastic optimization method namely SPSA, simultaneous design of UAV and autopilot is done in order to minimize a cost function consisting of rise time, settling time and maximum overshoot. Therefore, primarily autonomous performance is maximized in computer environment. Moreover, high performance is observed by looking at simulation responses and real-time flights.

Keyword(s): UAV (Unmanned Aerial Vehicle), Dynamic Model, State Space Model

Image compression with deep autoencoders on bird images

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Abstract

High-performance deep learning structures are successfully used in many fields of science. Convolutional layers within these structures are very successful in terms of feature extraction. The pooling layers, which are another layer type within deep structures, allow these features to be represented in a smaller dimension. Auto-encoder structures consist of two parts, the encoder, and the decoder. The encoder utilizes convolutional layers and pooling layers to compress the data while the decoder reconstruct the original data with deconvolutional and upsampling layers. In some applications, auto-encoders has also been used for image compression. It was reported that auto-encoders may exceed the performance of image compression algorithms, jpeg and jpeg2000. A deep auto-encoder able to compress all kind of images may require a very large structure. However, a smaller structure can be used to compress pictures in a particular class. In this article, bird images are compressed with an auto-encoder structure consisting of an 8-layer encoder and an 8-layer decoder. There are five convolution and three pooling layers in the encoder, while decoded is composed of five deconvolutional layer and three upsampling layers. The test results showed that the used encoder structure can compress bird images with a mean square error value of 0.0016 per pixel. The development of deep learning structures can achieve higher compression rates in the near future.

Keyword(s): Deep Learning, image compression, deep auto-encoders

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Jute Yarn Consumption Prediction by Artificial Neural Network and Multilinear Regression

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Abstract

In today's increasing competitive market conditions, the companies operating in the production and service sectors should meet the demand of the customers in a timely and completely manner. Therefore, all resources (raw materials, semi-finished products, energy sources, etc.) should be planned and supplied at the right time, at the right place and at sufficient quantity based on an accurate forecast of the demand. In the literature, there have been few studies about forecasting of raw material consumption in a production sector. In this study, ANN method was employed to predict the raw material consumption of a carpet production company. The relevant variables of the actual data belonging to 2015-2016 and 2017 were used. In addition, a multiple linear regression (MLR) model was also established to compare the performance of ANN method. The results show that ANN method produces more accurate forecasts when compared to MLR method.

Keywords: Artificial Neural Network (ANN), Multiple Linear Regression (MLR), Raw Material Consumption

Latest Trends in Textile-Based IoT Applications

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Abstract

Internet of Things (IoT) can be basically defined as the connection of any devices with each other or to the Internet. It can be used for remote sensing, data collection, control and processing, etc. There are many applications in this area from agriculture, energy and healthcare industry to architecture and textile industry.

In this study, textile based IoT applications, which have recently become a technological trend, have been examined and advantages and disadvantages of these applications are summarized. Then, the required aspects of textile based IoT applications are indicated.

Keywords: Internet of Things, IoT, wearables, smart textiles, textile sensors, textile antennas

Localization and Point Cloud Based 3D Mapping With Autonomous Robots

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Technology is progressing in line with the ever-increasing needs of people and expanding to different areas. Robotic, which is one of these fields and has become the indispensable part of technology, serves many purposes such as saving human power, minimizing errors in production, working in microscopic or gigantic dimensions, saving time and cost. The most important part of the robotics area is intelligent autonomous robots that have the ability to detect and make decisions. Space science, industry, health, mining and many other sectors are benefited from autonomous robots.

Intelligent autonomous robots are also used in mapping and modeling. Direction and location, obstacle detection, and environment map subtraction must be synchronized with sensors integrated in them to enable them to perform autonomously. Simultaneous localization and mapping problems are known in the literature as SLAM (Simultaneous Localization and Mapping) [1,2]. SLAM problems can be examined in two dimensions or in three dimensions. In addition, mapping solutions; it can be studied under two headings as indoor mapping and outdoor mapping [3]. The most important part of the mapping and modeling robots is distance sensors or scanners.

In this study, three-dimensional modeling of an environment and the location of the intelligent autonomous robot are monitored. For modeling, a lidar sensor, Lidar Lite V3, is used. The Lidar Lite V3 has a range of 40 meters and a wavelength of 905 nm [4]. Ultrasonic distance sensors are used to ensure that the vehicle travels without hitting obstacles. Ultrasonic distance sensors measure the distance with sonar waves. The encoder motors and the compass sensor are used to determine the movement of the vehicle. In this way, both the rotation angles and the position changes of the vehicle can be detected. The data obtained from the autonomous vehicle and the environment modeling and vehicle location tracking are performed in a three-dimensional virtual environment designed using OpenGL Library. The image is created based on the point cloud. All lines consist of dots, while planes consist of lines. In this context, as many points as possible in a point cloud provide more understandable objects[5,6]. Moving Average Filter is used to eliminate noise caused by measurement errors. The Moving Averages Filter is a random noise reduction algorithm that takes the average of the number of elements as per the number of elements determined by the principle of first-in, first-out, working via a continuous average [7]. Intelligent autonomous robot moved to three different points of the environment and obtained data from different perspectives and these data were combined with algorithms and three-dimensional modeling of the environment was performed.

Keywords: Mapping, localization, SLAM, Moving Average Filter, Lidar

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On Multidimensional Interval Type 2 Fuzzy Sets

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Abstract

This paper offers an original type of multi-dimensional arithmetic of interval, type 2 fuzzy numbers with decomposition of calculations called decomposition-interval type 2-relative distance measure-fuzzy arithmetic.

That arithmetic is based on the proven, multidimensional, relative distance measure-fuzzy arithmetic of type 1 fuzzy numbers. The suggested decomposition-interval type 2-relative distance measure-fuzzy arithmetic control such important mathematical characteristics which the standard and most commonly practiced, 1-dimensional arithmetic of type 2 fuzzy numbers does not have. Using these characteristics it presents accurate solution sets that are underestimated and is able to solve such problems which cannot be solved by the 1-dimensional arithmetic of type 2 fuzzy numbers.

This paper includes comparison of both arithmetic classes employed to solving a few granular problems.

Keywords: Multidimensional Interval Type 2 Fuzzy Numbers, Fuzzy arithmetic, Granular Computing

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Optimization of Transport Vehicles based on Logistic 4.0 in Production Companies

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Abstract

There are many production stations in the manufacturing companies such as cutting parts, painting and assembly. These stations are located at different points in the production area. The semi-finished product in a station is transported to the next station by the transport pallet, forklift or roof crane. The uncertainty of the processing times in the stations causes overlapping of the transport needs of the stations. This causes difficulties in optimizing the number of transport vehicles required in the production lines.

In this study, a simulation model based on the integration of Logistics 4.0 applications has been created in a production line of a large company. The optimization model based on simulation were carried out and the optimum number of vehicles and types of transportation vehicles were determined in order to minimize the waiting time of the stations of considered production line. New facility plans have been proposed with scenario analyzes on the simulation model

Keywords: Logistic 4.0, transportation, simulation

Prediction of Changes in Economic Confidence Index (ECI) Using an Artificial Neural Network (ANN)

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Abstract

Economic confidence index (ECI) is a comprehensive index, which aims to measure the current situation evaluations and future period expectations of both consumers and producers on general economy. The index is weighted aggregation of sub-indices. The sub-indices are consumer confidence index, seasonally adjusted real sector (manufacturing industry), services, and retail trade and construction sectors confidence indices. The consumer and business tendency survey is conducted to measure these sub- indices and net balances of questions are constructed as the difference between the percentages of respondents giving positive and negative replies.

The high value of ECI is an indicator of good economic performance. For this reason, the prediction of the changes in the ECI is helpful for making correct spending and saving decisions. This study presents the Artificial Neural Network (ANN) method to predict the increasing or decreasing rate of the ECI for next months. The predictive variables are net balances of the 20 questions in consumer and business tendency survey. Data span cover from February 2012 to May 2018. Alyuda NeuroIntelligence software is employed for analysis. Correct Classifying Rates (CCR, %), which give the ratio of correctly classified examples to the total number of examples, are considered to decide appropriate network properties such as the number of hidden layers, the number of neurons, training algorithm and an activation function. The best algorithm and architecture is also tested by changing the training, test, and validation sets. The result of the analysis shows a good diagnostic ability. In other words, ANN offers a high performance to predict the expected change in ECI.

Keywords: Economic confidence index, Artificial neural network.

Prediction of Novel Manufacturing Materials using Artificial Intelligent

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Abstract

It is inevitable to seek new markets while developing technology. Sometimes a company has to change its production depending on the decreasing market or increasing product variety. For this purpose, a robust prediction system is meaningful for the company by using real market's data such as material demand in production and consumption in markets like relation of supply and demand. In particular, a system used in decisions that determine the production of the factory allows the products to be terminated in an early period while decreasing the market share. Along with today's technologies, artificial intelligence techniques have improved very well, especially deep learning, big data analysis techniques that have made such systems could be possible to realize like this prediction. In the near future these systems will start to be used. Therefore, companies should also include artificial intelligence in their R & D.

Keyword(s): Artificial Intelligent, Big data, Prediction, Manufacturing

Problems in Missile Modeling and Control

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Abstract

Field of missile systems, which constitute an important part of the defense industries in the 21st century, is changing rapidly in parallel with the technological developments. A missile system is typically very complex and expensive. Its goal is to reach the target quickly and at the same time hit the target with minimum possible error. From the beginning to the present, missile systems are being studied extensively and many methods have been tried to ensure that they work at the desired performance levels. Generally, the studies in missile systems are focused on two structures: guidance and autopilot. Firstly, conventional guidance methods, such as the proportional navigation law and pursuit guidance, have been developed as guidance algorithms for missile systems. After that, various feedback control and artificial intelligence methods have been developed to increase the efficiency of these approaches. The other critical avenue for the missile systems is the autopilot design phase. For this stage, the aim is to design a feedback controller to control missiles against any target with or without maneuvering movements and many methods are used for this purpose. This article is a brief overview of the key advances in the field of design, implementation, and control of the missile systems, and a description of where the current development is at in the field.

Keywords: missile system, guided missile, autopilot, control methods

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Quality Control of Materials using Artificial Intelligence Techniques on Electroscopic Images

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Abstract

Artificial intelligence (AI) is still the focus point of the most engineering problems. Especially, the high number of sample for quality analysis that is a problem and necessity of deep assays on materials are long time processes for researchers on material science. Achieving a standardized and quick assessment on the quality is possible using computerized techniques on image processing. The pattern-based dispersion of the material on electroscopic images carries significant and deterministic meaning on the quality and the type of the material. The computerized analysis of electroscopic images using AI techniques is a new approach for quality detection. The common techniques are traditional image analyzing methods and the recent deep learning techniques. Whereas the traditional image processing techniques are comprised of filtering and feature extraction stages for generating classifier models, deep learning technique is a one-step analysis including feature extraction and feature learning with many hidden layers. Using many hidden layers and high number of neurons in each layer could provide detailed analysis of materials. In as much as the AI-based model is powerful and convenient on electroscopic images for quality control of the materials, it also has capability on integration into chemical phases tracking and microscopic biological cell assessment processes.

Keyword(s): Quality control, artificial intelligence, image processing, materials, electroscopic images

Response of Twitter Users to Earthquakes in Turkey

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Abstract

Response of people to disasters may be different and it can vary from region to region. The expectations of individuals and their response to events can be shaped by their demographic structure. Twitter has an increasing popularity and people show their reactions to disasters on twitter. Can discourses related to disasters differ regionally on twitter? Are people more fatalistic according to their region or not? Twitter raises situational awareness and draws attention to these questions. In this work, major earthquakes and the places with frequent earthquakes in Turkey are studied. Turkish has been used as the search language, since Turkey is chosen as the studied area. "Van, deprem", "Samsat, deprem", "17 Ağustos, deprem", "Gölcük, deprem", "Çanakkale, deprem", and "Marmara, deprem" are used for searching under six main titles. All of the searches are created in the word clouds by data visualization. Latent Dirichlet Allocation (LDA model) and Bag of Ngram words methods are used to obtain important subjects. The results show that people are talking about spiritual subjects rather than concrete subjects, but this is changing regionally. It is seen that the level of earthquake awareness of the society is not a sufficient level.

Keywords: Bag of Ngram, Earthquake, LDA Model, Turkey, Twitter

Review of Trust Parameters in Secure Wireless Sensor Networks

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Abstract

Since Wireless Sensor Networks (WSNs) are commonly used in military applications for monitoring hostile environment, the information collected from the network has to be trustworthy. However, unguarded nature of wireless medium and limitation of the resources of WSN nodes necessitate of developing security solutions for these networks. Routing attacks are among the most dangerous attacks on WSNs that disrupt the flow of data originating from the sensor nodes and are routed to a central station, called the base station. The studies in literature on routing attacks are divided into two groups based on intrusion detection or trust-based schemes. The focal point of intrusion detection systems is finding the resource of the attacker and hence, recover the network. However, designing such a system is an energy consuming solution and is not suitable for sensor nodes with limited battery power. On the other hand, trust-based schemes enable data of the sensor nodes to by-pass the attacked area by using safety paths. Since the purpose of this approach is not to detect the attack but to discover the safe routes around it, it is considered to be an energy effective solution. For carrying out a safe transmission, data needs to be transmitted through trustworthy nodes. The trust value of a node can be calculated by various ways. In this study, the trust parameters, including social (intimacy and honesty) and QoS (energy and unselfishness) trust [1]; sending rate factor, consistency factor and packet loss rate factor [2], used in secure WSNs are investigated. In future work, various trust values will be modelled and compared in cluster based WSNs.

Keywords: Wireless Sensor Networks, Trust-based Routing, Survey, Security

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Speed control of DC motor using PID and SMC

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Abstract

In this paper, sliding mode control (SMC) and proportional integral derivative (PID) control are preferred. SMC has always been considered as an efficient approach in control system due to its high accuracy and robustness against disturbances. PID control is preferred because of easy handling and simple dynamics. Sliding mode control and proportional integral derivative control are designed for control of DC Motor. Simulation results are given to confirm that the effectiveness of the proposed approaches.

Keywords: Sliding mode control, PID control, DC motor

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Superiorities of Deep Extreme Learning Machines against Convolutional Neural Networks

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Abstract

Deep Learning (DL) is a machine learning procedure for artificial intelligence that analyzes the input data in detail by increasing neuron sizes and number of the hidden layers. DL has a popularity with the common improvements on the graphical processing unit capabilities. Increasing number of the neuron sizes at each layer and hidden layers is directly related to the computation time and training speed of the classifier models. The classification parameters including neuron weights, output weights, and biases need to be optimized for obtaining an optimum model. Convolutional neural network (CNN) is a main and frequently used type of DL for image-based approaches. Advantages of the CNN are standing feature learning with convolutional processes with iterated filters and sizes, and extracting the most significant bits at a specified range on the image using pooling process. The feature-learning phase of the CNN stands for the unsupervised stage of the model. The extracted pooling inputs are fed into the fully connected neural network model. The CNN needs long time processes. The main improvements on DL routes the researchers to compose fast training methods. Deep Extreme Learning Machine (Deep ELM) was proposed to advance the training capabilities for reducing time and generalization capabilities. Deep ELM model consists of autoencoder models which are fast and effective models for generating different representations of the input data. The ELM, which is a single layer neural network model, is formed to the many hidden layer using autoencoder kernels unsupervised ways.

The proposed ELM autoencoder kernels including lower-upper triangularization and Hessenberg decomposition have improved the generalization capability of the DL approaches. The Deep ELM provides reducing fast training with simplest mathematical solutions.

Keywords: Deep Learning, Deep ELM, fast training, LUELM-AE, Hessenberg, autoencoder

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The Effect Of Different Stimulus On Emotion Estimation With Deep Learning

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Abstract

Emotion recognition system from brain signals is important for human-computer and human-machine interaction. There are many different methods to extract important attributes from these signals. Some of these methods are classification by machine learning, classification by artificial neural networks and classification by deep neural networks. In this study, the effects of these 3 different stimuli (Audio, Video, Audio and Video) on the effect on emotion estimation were investigated.

For this study, 1125 samples (375 Audio, 375 Video, 375 Audio-Video) EEG signals were recorded from 14 channels with a sampling frequency of 128 Hz. In this experiment, signals indicating brain activation for 10 different emotions were recorded by considering the emotion evaluations of the participants. The participants were primarily played back emotionally with audio recordings, then the video was played without audio and finally, video and audio were watched together.

In the preprocessing step MARA method and Independent component analysis (ICA) were used to eliminate the artifact in the signals. A specific model was created by using deep learning for feature extraction.

The effect of different stimuli on performance was investigated for emotion recognition.

Keywords: EEG, Deep Learning, Audio stimuli, Video stimuli, Audio-Video stimuli, Convulutional Neural Network

The Effects of Sodium Nitrite on Corrosion Resistance Ofsteel Reinforcement in Concreta

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Abstract

This study describes a laboratory investigation of the influence of 0.1 M nitrite ions on the corrosion of reinforcing steel and on the compressive strength of concrete. The effect of 0.1 M nitrite ions on the corrosion resistance of steel reinforced concrete was evaluated by electrochemical tests in distilled water, 3.5% NaCl and 3.5% NaCl + 0.1 M $Ca(NO_2)_2$ solutions for 90 days. In the presence of 0.1 M nitrite ions polarization resistance (R_p) values of reinforced concrete were higher than those without calcium nitrite. AC impedance spectra revealed the similar results with R_p measurements. The compressive strength of concrete specimens containing 0.1 M nitrite ions was measured and an increase of 14.7-38.9% was observed.

Keywords: Reinforcing steel, Concrete, Corrosion, Inhibition, Free Energy (ΔG).

The Evaluation and Comparison of Daily Reference Evapotranspiration with ANN and Empirical Methods

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Abstract

Evapotranspiration is an important parameter in hydrological and meteorological studies, and accurate estimation of evaporation is important for various purposes such as the development and management of water resources. In this study, daily reference evapotranspiration (ET0) is calculated by using Penman-Monteith equation, which is accepted as standard equation by FAO (Food and Agriculture Organization). ET0 is tried to be estimated by using Hargreaves-Samani and Turc traditional equations and results are compared with Artificial Neural Network (ANN) model performance. A station which is stated near to the Hartwell Lake (South Carolina, USA) was chosen as the study area. Average daily air temperature (T), highest (Tmax) and lowest daily air temperatures (Tmin), wind speed (U), sunshine duration (SD) and relative humidity (RH) were used for daily average evapotranspiration estimation. Feedforward-back-propagation ANN method is used for model creation. Comparison between empirical equations and ANN model shows that ANN model performance for daily ET0 estimation is better than others.

Keywords: Evapotranspiration, Penman-Monteith equation, Hargreaves-Samani equation, Turc equation, Artificial Neural Network

The Changing ERP System Requirements in Industry 4.0 Environment: Enterprise Resource Planning 4.0

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Abstract

Fourth Industrial revolution: Industry 4.0 represents the fourth industrial revolution in industrial markets with smart manufacturing environment. It is considered as a revolution that carries manufacturing processes to a new industrial level by introducing more flexible, more efficient and faster technologies to achieve higher industrial performance. Industry 4.0 refers to a transformation that focuses heavily on virtualization, interconnectivity, integration, machine learning and real-time data to create a more compact and better-integrated ecosystem for companies that concentrate on production and supply chain management. Industry 4.0 affects all business processes and functions; therefore, the entire IT infrastructure is obliged to be redesigned. This involves the systems: material handling, production planning and control, sales management and logistics. ERP (Enterprise Resource Planning) is a system that enables enterprises to use the labor force, machines and materials they need to produce their products or services efficiently. ERP systems play a critical role to execute business processes by taking the advantages of using common and defined data structure from one system. ERP systems provides access to corporate data through multiple activities using common structures, definitions and common user experiences. Industry 4.0 aims to manage complexity and improve connectivity through the communication channels of each element involved in the manufacturing. Industry 4.0 will not change the definition of ERP systems, but it will change the role of ERP systems. This paper provides an insight into the ERP systems, which will be used in Industry 4.0 environment. The managerial, technical and process based requirements and ERP related Industry 4.0 concepts are also discussed in this study.

Keyword(s): Industry 4.0, ERP

The Investigation of The Wind Energy Potential of The Belen Region and The Comparison of The Wind Turbine with The Production Values

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Abstract

In this study, the potential of wind energy has been investigated in Belen region of Hatay province between 2013-2016. As a result of the study, it was aimed to compare the real field conditions with the predicted values and to enlighten the error analysis of the pre-feasibility reports of the investors who will invest in the region. In the research area, the annual production values are based on a known reference wind turbine. This wind turbine, which is already installed, has been analyzed with computer aided software considering environmental factors. Wind speed, temperature and pressure data were obtained from Belen Meteorology station, which is very close to the area where the turbine is located. The topographical data of the turbine and meteorological station were evaluated by using the WaSP (Wind Atlas Analysis and Application) program using the vector elevation maps of Hatay region. A wind atlas map of the region was created with the WaSP program. Considering the classification requirements of the European Wind Energy Association, it was evaluated that, Belen region could be included in the classes rated as good and very good.

Keywords: WAsP, Belen, Wind, Energy, Weibull Distribution

The Importance of Business Intelligence Solutions in The Industry 4.0 Concept

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Abstract

Industry 4.0, as the name suggests, is the fourth phase of industrialization, which aims at high level of automation in the manufacturing industry by adopting information and communication technologies. Information systems have become more important at this fourth phase. In this study, the relationship between Industry 4.0 and information systems is reviewed and it is discussed how intelligent business systems can be effectively addressed through the Industry 4.0 revolution and how it can help to reveal the production potential.

Keywords: Business intelligence, industry 4.0, information system

Turkish Abusive Message Detection with Methods of Classification Algorithms

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Abstract

The era in which we live is the era of technology. With the use of Internet Access to the smart phone, people started to spend more time the internet. More data is available as social media is used more often. This huge data accumulated in social media is a very important resource for researchers and analysts.

Sentiment and Opinion Analysis examines whether the data contains emotions and basically examines their positive-negative-neutral states. In this study, the data obtained from Turkish social media were analyzed by using classification algorithms such as Linear SVC, Logistic Regression (LR) and Random Forest (RF). As a result of the analyzes, the results were observed and it was explained which classification method gave better results. Which method gives better results is indicated in the experimental results part. Recommendations for better results are indicated in the conclusion part.

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