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PREDICTING STUDENT ACADEMIC PERFORMANCE IN BLENDED LEARNING USING ARTIFICIAL NEURAL NETWORKS

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ABSTRACT

Along with the spreading of online education, the importance of active support of students involved in online learning processes has grown. The application of artificial intelligence in education allows instructors to analyze data extracted from university servers, identify patterns of student behavior and develop interventions for struggling students. This study used student data stored in a Moodle server and predicted student success in course, based on four learning activities - communication via emails, collaborative content creation with wiki, content interaction measured by files viewed and self-evaluation through online quizzes. Next, a model based on the Multi-Layer Perceptron Neural Network was trained to predict student performance on a blended learning course environment. The model predicted the performance of students with correct classification rate, CCR, of 98.3%.

KEYWORDS

Artificial Neural Networks, Blended Learning, Student Achievement, Learning Analytics, Moodle Data

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HARDWARE DESIGN FOR MACHINE LEARNING

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ABSTRACT

Things like growing volumes and varieties of available data, cheaper and more powerful computational processing, data storage and large-value predictions that can guide better decisions and smart actions in real time without human intervention are playing critical role in this age. All of these require models that can automatically analyse large complex data and deliver quick accurate results – even on a very large scale. Machine learning plays a significant role in developing these models. The applications of machine learning range from speech and object recognition to analysis and prediction of finance markets. Artificial Neural Network is one of the important algorithms of machine learning that is inspired by the structure and functional aspects of the biological neural networks. In this paper, we discuss the purpose, representation and classification methods for developing hardware for machine learning with the main focus on neural networks. This paper also presents the requirements, design issues and optimization techniques for building hardware architecture of neural networks.

KEYWORDS

Artificial intelligence (AI), application specific integrated circuit (ASIC), artificial neural network (ANN), central processing unit (CPU), field programmable gate array (FPGA), graphics processing unit (GPU), machine learning (ML), neurochip

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FORGED CHARACTER DETECTION DATASETS: PASSPORTS, DRIVING LICENCES AND VISA STICKERS

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ABSTRACT

Forged documents specifically passport, driving licence and VISA stickers are used for fraud purposes including robbery, theft and many more. So detecting forged characters from documents is a significantly important and challenging task in digital forensic imaging. Forged characters detection has two big challenges. First challenge is, data for forged characters detection is extremely difficult to get due to several reasons including limited access of data, unlabeled data or work is done on private data. Second challenge is, deep learning (DL) algorithms require labeled data, which poses a further challenge as getting labeled is tedious, time-consuming, expensive and requires domain expertise. To end these issues, in this paper we propose a novel algorithm, which generates the three datasets namely forged characters detection for passport (FCD-P), forged characters detection for driving licence (FCD-D) and forged characters detection for VISA stickers (FCD-V). To the best of our knowledge, we are the first to release these datasets. The proposed algorithm starts by reading plain document images, simulates forging simulation tasks on five different countries' passports, driving licences and VISA stickers. Then it keeps the bounding boxes as a track of the forged characters as a labeling process. Furthermore, considering the real world scenario, we performed the selected data augmentation accordingly. Regarding the stats of datasets, each dataset consists of 15000 images having size of 950 x 550 of each. For further research purpose we release our algorithm code 1 and, datasets i.e. FCD-P 2 , FCD-D 3 and FCD-V 4 .

KEYWORDS

Character detection dataset, Deep learning forgery, Forged character detection

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AUTOMATIC TUNING OF PROPORTIONAL–INTEGRAL–DERIVATIVE (PID) CONTROLLER USING PARTICLE SWARM OPTIMIZATION (PSO) ALGORITHM

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ABSTRACT

The proportional-integral-derivative (PID) controllers are the most popular controllers used in industry because of their remarkable effectiveness, simplicity of implementation and broad applicability. However, manual tuning of these controllers is time consuming, tedious and generally lead to poor performance. This tuning which is application specific also deteriorates with time as a result of plant parameter changes. This paper presents an artificial intelligence (AI) method of particle swarm optimization (PSO) algorithm for tuning the optimal proportional-integral derivative (PID) controller parameters for industrial processes. This approach has superior features, including easy implementation, stable convergence characteristic and good computational efficiency over the conventional methods. Ziegler- Nichols, tuning method was applied in the PID tuning and results were compared with the PSO-Based PID for optimum control. Simulation results are presented to show that the PSO-Based optimized PID controller is capable of providing an improved closed-loop performance over the Ziegler- Nichols tuned PID controller Parameters. Compared to the heuristic PID tuning method of Ziegler-Nichols, the proposed method was more efficient in improving the step response characteristics such as, reducing the steady-states error; rise time, settling time and maximum overshoot in speed control of DC motor.

KEYWORDS

PID Controller, Particle swarm optimization algorithm, Ziegler- Nichols method, Simulation

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USING SENTIMENT ANALYSIS FOR STOCK EXCHANGE PREDICTION

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ABSTRACT

The economic growth is a consensus in any country. To grow economically, it is necessary to channel the revenues for investment. One way of raising is the capital market and the stock exchanges. In this context, predicting the behavior of shares in the stock exchange is not a simple task, as itinvolves variables not always known and can undergo various influences, from the collective emotion to high-profile news. Such volatility can represent considerable financial losses for investors. In order to anticipate such changes in the market, it has been proposed various mechanisms trying to predict the behavior of an asset in the stock market, based on previously existing information. Such mechanisms include statistical data only, without considering the collective feeling. This paper is going to use natural language processing algorithms (LPN) to determine the collective mood on assets and later with the help of the SVM algorithm to extract patterns in an attempt to predict the active behaviour.

KEYWORDS

Sentiment Analysis, Machine Learning, Stock Exchange, Petrobras, Artificial Intelligence

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Reviewing Process Mining Applications and Techniques in Education

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ABSTRACT

Process Mining (PM) emerged from business process management but has recently been applied to educational data and has been found to facilitate the understanding of the educational process. Educational Process Mining (EPM) bridges the gap between process analysis and data analysis, based on the techniques of model discovery, conformance checking and extension of existing process models. We present a systematic review of the recent and current status of research in the EPM domain, focusing on application domains, techniques, tools and models, to highlight the use of EPM in comprehending and improving educational processes.

KEYWORDS

Process Mining, Educational Process Mining, educational applications, process model.

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Stochastic Modeling Technology for Grain Crops Storage Application : Review

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ABSTRACT

Stochastic modeling is a key technique in event prediction and forecasting applications. Recently, stochastic models such as the Artificial Neural Network, Hidden Markov, and Markov Chain have received a significant attention in agricultural application. These techniques are capable of predicting the actions for the better planning and management in various fields. This work comprehensively summarizes and compares their applications such as their processing techniques, performance, as well as their strengths and limitations with regard to event prediction and forecasting. The work ends with recommendations on the appropriate techniques for cereal grain storage application.

KEYWORDS

Grain storage condition, Hidden markov model, Artificial Neural Network, Markov chain & Forecasting

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WAYPOINT FLIGHT PARAMETER COMPARISON OF AN AUTONOMOUS UAV

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ABSTRACT

The present paper compares the effect of different waypoint parameters on the flight performance of a special autonomous indoor UAV (unmanned aerial vehicle) fusing ultrasonic, inertial, pressure and optical sensors for 3D positioning and controlling. The investigated parameters are the acceptance threshold for reaching a waypoint as well as the maximal waypoint step size or block size. The effect of these parameters on the flight time and accuracy of the flight path is investigated. Therefore the paper addresses how the acceptance threshold and step size influence the speed and accuracy of the autonomous flight and thus influence the performance of the presented autonomous quadrocopter under real indoor navigation circumstances. Furthermore the paper demonstrates a drawback of the standard potential field method for navigation of such autonomous quadrocopters and points to an improvement.

KEYWORDS

Autonomous UAV, Quadrocopter, Quadrotor, Waypoint Parameter, Navigation

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AGENT-BASED MODELING IN SUPPLY CHAIN MANAGEMENT: A GENETIC ALGORITHM AND FUZZY LOGIC APPROACH

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ABSTRACT

In today's global market, reaching a competitive advantage by integrating firms in a supply chain management strategy becomes a key success for any firm seeking to survive in a complex environment. However, as interactions among agents in the supply chain management (SCM) remain unpredictable, simulation appears as a powerful tool aiming to predict market behavior and agents' performance levels. This paper discusses the issues of supply chain management and the requirements for supply chain simulation modeling. It reviews the relationships amongArtificial Intelligence (AI) and SCM and concludes that under some conditions, SCM models exhibit some inadequacies that may be enriched by the use of AI tools. This approach aims to test the supply chain activities of nine companies in the crude oil market. The objective is to tackle the issues under which agents can coexist in a competitive environment. Furthermore, we will specify the supply chain management trading interaction amongagents by using an optimization approach based on a Genetic Algorithm (AG), Clustering and Fuzzy Logic (FL).Results support the view that the structured model provides a good tool for modeling the supply chain activities using AI methodology.

KEYWORDS

Supply Chain Management, Genetic Algorithm, Fuzzy Logic, Clustering, Optimization.

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Multi-Objective Optimization using Genetic Algorithms in MOTSP (Co2 Emissions)

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ABSTRACT

In recent years, consumers and legislation have been pushing companies to optimize their activities in such a way as to reduce negative environmental and social impacts more and more. In the other side, companies must keep their total supply chain costs as low as possible to remain competitive. This work aims to develop a model to traveling salesman problem including environmental impacts and to identify, as far as possible, the contribution of genetic operator's tuning and setting in the success and efficiency of genetic algorithms for solving this problem with consideration of CO2 emission due to transport. This efficiency is calculated in terms of CPU time consumption and convergence of the solution. The best transportation policy is determined by finding a balance between financial and environmental criteria. Empirically, we have demonstrated that the performance of the genetic algorithm undergo relevant improvements during some combinations of parameters and operators which we present in our results part.

KEYWORDS

Multi-objective optimization, Meta heuristic, Environnemental impact, CO2 emissions, traveling salesman problem, transport

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