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PREDICTING STUDENT ACADEMIC PERFORMANCE IN BLENDED LEARNING USING ARTIFICIAL NEURAL NETWORKS

Nick Z. Zacharis

Department of Computer Systems Engineering, Technological Educational Institute of Piraeus, Athens, Greece

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

Pooja Jawandhiya

School of Electrical and Electronic Engineering, Nanyang Technological University, Singapore

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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AUTHOR

Pooja Jawandhiya was born in Nagpur, India on May 2, 1995. She received the Bachelor of Engineering degree in Electronics and Telecommunication from University of Mumbai in June, 2017. Currently, she is a student in Nanyang Technological University, Singapore and is pursuing Master of Science (Electronics) from the School of Electrical and Electronic Engineering.

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

S. J. Bassi[1], M. K. Mishra[2] and E. E. Omizegba[3]

[1]Department of Computer Engineering, University of Maiduguri, Borno State, Nigeria

[2]Department of Computer Engineering, University of Maiduguri, Borno State, Nigeria

[3]Electrical and Electronics Engineering Programme, Abubakar Tafawa Balewa University, P.M.B 0248, Bauchi, Bauchi State, Nigeria

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

Teerath Kumar[1] , Muhammad Turab2 , Shahnawaz Talpur[2] , Rob Brennan[1] and Malika Bendechache[1]

[1]CRT AI and ADAPT, School of Computing, Dublin City University, Ireland
[2]Department of Computer Systems Engineering, Mehran University of Engineering and Technology, Jamshoro, Pakistan

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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AUTHORS

Teerath kumar received his Bachelor's degree in Computer Science with distinction from National University of Computer and Emerging Science (NUCES), Islamabad, Pakistan, in 2018. Currently, he is pursuing PhD from Dublin City University, Ireland. His research interests include advanced data augmentation, deep learning for medical imaging, generative adversarial networks and semi-supervised learning.

Muhammad Turab is an undergraduate final year student at Computer Systems Engineering MUET, Jamshoro. He has done 60+ projects with java and python, all projects can be found on GitHub. His research interests include deep learning, computer vision and data augmentation for medical imaging.

Shahnawaz Talpur is the chairman of Computer Systems Engineering Department at Muet Jamshoro. He has done his masters from MUET and PhD from Beijing Institute of Technology, China. His research interests include high performance computing, computer architecture and big data.

R. Brennan is an Assistant Professor in the School of Computing, Dublin City University, founding Chair of the DCU MA in Data Protection and Privacy Law and a Funded investigator in the Science Foundation Ireland ADAPT Centre for Digital Content Technology which is funded under the SFI Research Centres Programme (Grant 13/RC/2106) and is co-funded under the European Regional Development Fund, His main research interests are data protection, data value, data quality, data privacy, data/AI governance and semantics.

M. Bendechache is an Assistant Professor in the School of Computing at Dublin City University, Ireland. She obtained her Ph.D. degree from University College Dublin, Ireland in 2018. Malika's research interests span the areas of Big data Analytics, Machine Learning, Data Governance, Cloud Computing, Blockchain, Security, and Privacy. She is an academic member and a Funded

Investigator of ADAPT and Lero research centres.

USING SENTIMENT ANALYSIS FOR STOCK EXCHANGE PREDICTION

Milson L. Lima1 , Thiago P. Nascimento1 , Sofiane Labidi1 , Nadson S. Timbó1 , Marcos V. L. Batista1 , Gilberto N. Neto1,2, Eraldo A. M. Costa1 and Sonia R. S. Sousa

Post-Graduation Program in Electrical Engineering, Federal University of Maranhão,MA, Brazil

2Department of Information and Communication, Federal Education Institute of Piauí –Campus Picos, PI, Brazil

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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A CASE STUDY OF INNOVATION OF AN INFORMATION COMMUNICATION SYSTEM AND UPGRADE OF THE KNOWLEDGE BASE IN INDUSTRY BY ESB, ARTIFICIAL INTELLIGENCE, AND BIG DATA SYSTEM INTEGRATION

Alessandro Massaro[1,*], Angelo Calicchio[1], Vincenzo Maritati[1], Angelo Galiano[1], Vitangelo Birardi[1], Leonardo Pellicani[1], Maria Gutierrez Millan[2], Barbara Dalla Tezza[2], Mauro Bianchi[2], Guido Vertua[2], Antonello Puggioni[2]

[1]Dyrecta Lab, IT Research Laboratory, Via Vescovo Simplicio, 45, 70014 Conversano (BA), Italy.
[2]Performance in Lighting S.p.A., Viale del Lavoro 9/11 - 37030 Colognola ai Colli (VR), Italy.

ABSTRACT

In this paper, a case study is analyzed. This case study is about an upgrade of an industry communication system developed by following Frascati research guidelines. The knowledge Base (KB) of the industry is gained by means of different tools that are able to provide data and information having different formats and structures into an unique bus system connected to a Big Data. The initial part of the research is focused on the implementation of strategic tools, which can able to upgrade the KB. The second part of the proposed study is related to the implementation of innovative algorithms based on a KNIME (Konstanz Information Miner) Gradient Boosted Trees workflow processing data of the communication system which travel into an Enterprise Service Bus (ESB) infrastructure. The goal of the paper is to prove that all the new KB collected into a Cassandra big data system could be processed through the ESB by predictive algorithms solving possible conflicts between hardware and software. The conflicts are due to the integration of different database technologies and data structures. In order to check the outputs of the Gradient Boosted Trees algorithm an experimental dataset suitable for machine learning testing has been tested. The test has been performed on a prototype network system modeling a part of the whole communication system. The paper shows how to validate industrial research by following a complete design and development of a whole communication system network improving business intelligence (BI).

KEYWORDS

Frascati Guideline, ESB, Data Mining, KNIME, Gradient Boosted Tree Algorithm, Big Data.

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Corresponding Author

Alessandro Massaro: Research & Development Chief of Dyrecta Lab s.r.l.

TRANSFER LEARNING BASED IMAGE VISUALIZATION USING CNN

Santosh Giri1 and Basanta Joshi2

1Department of Computer & Electronics Engineering, Kathford Int'l College ofEngineering and Management, IOE, TU, Nepal
2Department of Electronics & Computer Engineering, Pulchowk Campus, IOE, TU,Nepal

ABSTRACT

Image classification is a popular machine learning based applications of deep learning. Deep learning techniques are very popular because they can be effectively used in performing operations on image data in large-scale. In this paper CNN model was designed to better classify images. We make use of feature extraction part of inception v3 model for feature vector calculation and retrained the classification layer with these feature vector. By using the transfer learning mechanism the classification layer of the CNN model was trained with 20 classes of Caltech101 image dataset and 17 classes of Oxford 17 flower image dataset. After training, network was evaluated with testing dataset images from Oxford 17 flower dataset and Caltech101 image dataset. The mean testing precision of the neural network architecture with Caltech101 dataset was 98 % and with Oxford 17 Flower image dataset was 92.27 %.

KEYWORDS

Image Classification, CNN, Deep Learning, Transfer Learning.

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

1Meriem DJENNAS, 2Mohamed BENBOUZIANE and3Mustapha DJENNAS

1Department of Economics, Amiens University, Amiens, France
2Department of Economics, TlemcenUniversity, Tlemcen, Algeria
3Department of Economics, TlemcenUniversity, Tlemcen, Algeria

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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HOME APPLIANCE IDENTIFICATION FOR NILM SYSTEMS BASED ON DEEP NEURAL NETWORKS

Deyvison de Paiva Penha1 and Adriana Rosa Garcez Castro2

1 Institute of Technology, Federal University of Para, Belém, Brazil
2 Institute of Technology, Federal University of Para, Belém, Brazil

ABSTRACT

This paper presents the proposal for the identification of residential equipment in non-intrusive load monitoring systems. The system is based on a Convolutional Neural Network to classify residential equipment. As inputs to the system, transient power signal data obtained at the time an equipment is connected in a residence is used. The methodology was developed using data from a public database (REED) that presents data collected at a low frequency (1 Hz). The results obtained in the test database indicate that the proposed system is able to carry out the identification task, and presented satisfactory results when compared with the results already presented in the literature for the problem in question.

KEYWORDS

Convolutional Neural Networks, identification of residential equipment, non-intrusive load monitoring, NILM.

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AUTHORS

B. Sc. **Deyvison de Paiva** Penha is a Master Student in the Electrical Engineering Graduate Program in Federal University of Pará. He received his bachelor degree in 2009 at the Federal University of Pará. Prof. Dr. Adriana Rosa Garcez Castro has a Master's degree in Electrical Engineering from the Federal University of Pará in 1995 and a PhD in Electrical Engineering from the Faculty of Engineering of the University of Porto in 2004. She is currently a Professor at the Federal University of Pará. His areas of interest are: Control of Electronic Processes and Computational Intelligence applied to Energy Systems.

A COMPARATIVE STUDY OF LSTM AND PHASED LSTM FOR GAIT PREDICTION

Qili Chen1,2,3 ,Bofan Liang2 and Jiuhe Wang2

1Faculty of Information Technology, Beijing University of Technology, Beijing, 100124, China
2Department of Automation, Beijing Information Science and Technology University, Beijing, 100192, China
3Beijing Key Laboratory of Computational Intelligence and Intelligent System, Beijing, 100124, China

ABSTRACT

With an aging population that continues to grow, the protection and assistance of the older persons has become a very important issue. Fallsare the main safety problems of the elderly people, so it is very important to predict the falls. In this paper, a gait prediction method is proposed based on two kinds of LSTM. Firstly, the lumbar posture of the human body is measured by the acceleration gyroscope as the gait feature, and then the gait is predicted by the LSTM network. The experimental results show that the RMSE between the gait trend predicted by the method and the actual gait trend can be reached a level of 0.06 ± 0.01. And the Phased LSTM has a shorter training time. The proposed method can predict the gait trend well.

KEYWORDS

Elderly people fall, Acceleration gyro, Lumbar posture, Gait prediction, LSTM

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AUTHORS

Qili Chen was born in YuXian, ShanXi Province, China in 1985. She received the B.S degrees in automation from Chongqing University of Posts and Telecommunications in 2007, M.S and Ph.D. degrees in pattern recognition and intelligent system from Beijing University of Technology in 2010 and 2014. From Sep. 2012 to Aug.2013, she visited University of Wisconsin, Milwaukee (USA) in Department of Mathematical Sciences. Since 2014, She has been a Lecture with Automation College, Beijing Information Science and

Technology University. Her research interests include deep neural network, Modeling and optimal control.

Bofan liang was born in WuZhou, Guangxi Zhuang Autonomous Region, china in 1997.He is an undergraduate at Beijing Information Science and Technology University.