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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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# 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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# 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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# TRANSFER LEARNING BASED IMAGE VISUALIZATION USING CNN

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## 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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# SUGARCANE YIELD FORECASTING USING ARTIFICIAL NEURAL NETWORK MODELS

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## ABSTRACT

Neural networks have gained a great deal of importance in the area of soft computing and are widely used in making predictions. The work presented in this paper is about the development of Artificial Neural Network (ANN) based models for the prediction of sugarcane yield in India. The ANN models have been experimented using different partitions of training patterns and different combinations of ANN parameters. Experiments have also been conducted for different number of neurons in hidden layer and the algorithms for ANN training. For this work, data has been obtained from the website of Directorate of Economics and Statistics, Ministry of Agriculture, Government of India. In this work, the experiments have been conducted for 2160 different ANN models. The least Root Mean Square Error (RMSE) value that could be achieved on test data was 4.03%. This has been achieved when the data was partitioned in such a way that there were 10% records in the test data, 10 neurons in hidden layer, learning rate was 0.001, the error goal was set to 0.01 and traincgb algorithm in MATLAB was used for ANN training.

## KEYWORDS

ANN, BPNN, RMSE, Sugarcane yield, Forecasting

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# DIFFERENT MACHINE LEARNING ALGORITHMS FOR BREAST CANCER DIAGNOSIS

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## ABSTRACT

Breast cancer affects many people at the present time. The factors that cause this disease are many and cannot be easily determined. Additionally, the diagnosis process which determines whether the cancer is benign or malignant also requires a great deal of effort from a doctors and physicians . When several tests are involved in the diagnosis of breast cancer, such as clump thickness, uniformity of cell size, uniformity of cell shape,…etc, the ultimate result may be difficult to obtain, even for medical experts. This has given a rise in the last few years to the use of machine learning and Artificial Intelligence in general as diagnostic tools. We aimed from this study to compare different classification learning algorithms significantly to predict a benign from malignant cancer in Wisconsin breast cancer dataset. We used the Wisconsin breast cancer dataset to compare five different learning algorithms , Bayesian Network, Naïve Bayes, Decision trees J4.8 , ADTree, and Multi-layer Neural Network along with t-test for the best algorithm in terms of prediction accuracy. The experiment, has shown that Bayesian Network is significantly better than the other algorithms.

## KEYWORDS

reastcancer , Bayesian Network , K2 algorithm

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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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# A COMPARATIVE STUDY OF LSTM AND PHASED LSTM FOR GAIT PREDICTION

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## 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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# SOLVING CAPACITY PROBLEMS AS ASYMMETRIC TRAVELLING SALESMAN PROBLEMS

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## ABSTRACT

The railway capacity optimization problem deals with the maximization of the number of trains running on a given network per unit time. In this study, we frame this problem as a typical asymmetrical Travelling Salesman Problem (ATSP), with the ATSP nodes representing the train arrival /departure events and the ATSP total cost representing the total time-interval of the schedule. The application problem is then optimized using the standard Ant Colony Optimization (ACO) algorithm. The simulation experiments validate the formulation of the railway capacity problem as an ATSP and the ACO algorithm produces optimal solutions superior to those produced by the domain experts.

## KEYWORDS

Capacity Problems, Travelling Salesman Problem, Ant Colony Optimization, Swarm Intelligence, Soft Computing.

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# ARTIFICIAL NEURAL NETWORK CONTROLLER FOR PERFORMANCE OPTIMIZATION OF SINGLE PHASE INVERTER

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## ABSTRACT

Thyristorised Power control provides high efficiency. However, generated harmonics cause a nuisance in power system operation. The work presented here, deals with reduction of harmonics (3rd-11th) by using Multiple Pulse Modulation technique. Traditional numerical methods do not yield accurate pulse-positions as non-linearity is involved in computation. In this paper, a continuous Hopfiled Neural Network is designed for Harmonic minimization in a 1Φ inverter output voltage. Results show considerable improvement in voltage spectrum if trigger pulses are generated at the ANN positions as harmonic contents are reduced with significant improvement in fundamental voltage resulting in reduction in device ratings. The ANN controlled voltage is used to drive a 1Φ Induction motor in MATLAB simulation and is compared with SPWM controlled VSI driving the same motor load. The quantitative analysis is given in tabular form. This shows feasibility of design of a controller for optimized performance of a single phase VSI.

## KEYWORDS

Neural Network controller, Harmonic minimization, Performance optimization, Inverter, Motor control

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