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RESEARCH STUDY ON APPLICATIONS OF ARTIFICIAL NEURAL NETWORKS AND E-LEARNING PERSONALIZATION

M.R.M. Veera Manickam
Computer Science Engineering Department,
Karpagam University, Coimbatore, India;
Trinity College of Engineering and Research,
Pune, India

M. Mohanapriya
Department of Computer Science Engineering & Information Technology
Coimbatore Institute of Technology, Coimbatore, India

S. A. Kale, Mithapalli Uday, Prashant Kulkarni, Yuvraj Khandagale
Trinity College of Engineering and Research, Pune, India

Suraj P Patil
Marathwada Mitra Mandal's College of Engineering, Pune, India

ABSTRACT

The artificial neural network may likely be the complete solution over the most recent decades which have been broadly utilized as a part of a huge variety of applications. This article focuses on vast artificial neural network applications and importance of e-Learning application. To assess the impact of personalized learning in neural network applications. It is a need to adapt in new smart eLearning system for individual learners personalization. Artificial Neural Networks methodology to the development of new neural network model with an appropriate way of problems formulation is presented in this paper. Student's performance prediction using neural system its impact is presented to understand the necessity of neural network in smart e-learning model. The outcome focused on the importance of using neural networks in possible applications and its influence on learner's progress with personalization system.

Key words: Artificial Neural Network, E-Learning, Personalization, Artificial Intelligence, Dragonfly Algorithms.

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1. INTRODUCTION

Artificial Neural Networks are quite simple replicas on the basis of human brain neural structure. Biological way of computing methods is a key innovation in the optimization computing technique.[1] Computers can't recognize and learn by comparing even simple patterns unlike small animal brains matching level[2]. Smart E-Learning helps us to use technology by enabling students to learn at any cost and anywhere [3]. E-Learning industry has huge investments signifies dynamic learning course contents and handy devices, to acquire new knowledge [4]. Personalized learning allows the learner to set their individuals goals as per need dynamically. As of now, E-Learning has turned into a dynamic field of research and experimentation, with wonderful research work from all parts of the world.[4] Neural networks are under implementation varied problems scopes, in that many are finding and prediction of new features using huge datasets. It's suited not for traditional computing architecture problems [5] New learning frameworks on basis of individual personalization can support the students to set their own particular learning objectives, deal with their own learning, speak with others during the time spent for learning, and accordingly to accomplish learning objectives[6]. The overall neural network is changing the future industry in terms of decision support model with optimization model.

In this review of neural network study, many application objectives and its features are listed out for a better understanding of ANN application in any domain and industry to utilize it. Keun Young Lee et al. (2016) author as study importance of using ANN in mosquito species is one of most essential scary crawly vectors of a few infections. Specifically, in recent years, as the quantity of individual who appreciate open air exercises in urban territories keeps on expanding about the mosquito. Moreover, mosquito movement expectation is essential for dealing with the well-being and the strength of people. [7]

A solid model for any Wastewater Treatment Plant WWTP is basic with a specific end goal to give an instrument to foreseeing its execution and to frame a reason for controlling the operation of the procedure, limit the operation costs and evaluate the soundness of environmental balance. Mahmoud S. Nasr et al (2012) concentrates on applying an Artificial Neural Network (ANN) approach with a Feed forward Back-Propagation to anticipate the execution of EL-AGAMY WWTP-Alexandria. [8] Sucheta V. Kolekar et al. (2010) customarily e-learning frameworks are accentuated on the online substance era and the greater part of them flop in considering the necessities and learning styles of end client while speaking to it. Therefore, shows up the requirement for adjustment to the client's learning. Adaptive e-learning alludes to an instructive framework that comprehends the learning content and the UI as per academic perspectives. [9]

Palukuru NAGENDRA et al (2010) investigated, the utilization of artificial neural system (ANN) based model, multilayer perceptron (MLP) organize, to figure the move capacities in a multi-territory control framework was investigated. The contribution for the ANN is stack status and the yields are the exchange capacity among the framework territories, voltage extends and voltage points at concerned transports of the regions under thought. [10] Tim Hill et al.as advocate ann systems as a best new features prediction for statistical forecasting and decision models; different authors are worried that neural network may be oversold or only a trend.[11] Artificial Neural Network (ANN) has risen all through recent times and has made an excellent

promise to the advancement of different fields of the attempt. The motivation behind this work is to analyze neural network and their developing applications in the field of designing, concentrating more on the neural network system. “ANN has additionally utilized as a part of the accompanying particular standards: diagnosis of hepatitis; undersea mine detection; texture analysis; three-dimensional object recognition; hand-written word recognition; and facial recognition.”[12]

ANN application used in controlling mosquito counts, water treatments plants, e-learning with Adaptive User Interface and its style, MLP with power energy load exchange, financials statistical analysis and so many.

2. APPLICATIONS OF ANN

The neural system is applicable to design other field application problems scope of preprocessing data collection matches the architecture of the neural network. The various domains are listed as below [13, 14, and 15]

Speech Recognition	College Students Application,
Character Recognition	Predict Student Performance
Signature Verification Application	Electrical Load Prediction,
Human Face Recognition	Energy Demand Prediction
Stock Market forecast	Weather Prediction,
Finger Print Scanning	Games Application Development,
Medical Diagnosis Detection	Optimization Problems,
Process Control Quality check	Routing Agricultural Production
Prediction sorting alteration	ANN application in Engines
Sales and Marketing: Sales Forecasting	Reactive Power allocation
Operational Analysis	Fuzzy intelligent system
Retail Inventories Optimization	Induction motors
Employee and Hiring retention	Kinematics for Serial Robot
Pattern Recognition method	Charge Estimation of Ni-MH battery
Chemical Formulation Optimization	Food and Fermentation Technology
Ecosystem estimation Polymer	Meat Production and Technology
Neural Network Research	Mechanical Properties of Materials

Mechanical Properties of Materials Neural Networks in practice given this depiction of the neural network and how they function, what true applications would they say they are suited for a new scope. The neural network has expensive appropriateness to genuine business issues. Actually, they have just been effectively connected in numerous ventures. Since neural network is best at distinguishing examples or patterns in information, they are appropriate for expectation or estimating needs including [16]

Sales forecasting

Industrial process control

Customer research

Data validation

Risk management analysis

Target marketing

Modeling and Diagnosing the Cardiovascular System

Electronic noses

Instant Physician

Neural Networks in business

Marketing

Credit Evaluation system

Business is a redirected field with a few general zones of specialization, for example, users accounting or financial examination study. The neural network in prescription Artificial Neural Networks (ANN) are as of now a "vital" research territory in solution and it is trusted that they will get the broad application of biomedical frameworks in the following couple of years. Right now, the exploration is for the most part on displaying parts of the human body and perceiving ailments from different sweeps on the off chance that the framework is to perform dependably and productively.[16]

3. ARTIFICIAL NEURAL NETWORK: METHOD AND TECHNIQUE

Design new neural network model with best-fit problems scope on basis of understanding methodology of artificial neural network. Section wise listed below to present way of the neural network can be utilized for another computing field. As listed here

3.1 Research Question: Design

3.2 Problems formulation for Applications

3.3 Problem analysis

3.4 Technique

3.5 Algorithms

3.1. Research Question: Design

ANN based domain new application is designed towards using sets of problems formulations factor to consider in terms of neural network model, design, datasets, learning, and prediction, improving network over the period of times…etc.

Is the immune unit cell (unwanted data) part of the nervous network system?

Can an artificial neuron model acquire inhibitory and excitatory sources of inputs?

Can we utilize general optimization techniques to resolve the weights of a neural network with a single nonlinear layer?

Does the utilization of neural network increment the speed of simple problems?

Should we have an approval datasets collection when we prepare and train neural network?

3.2. Problems formulation for Applications

- The arrangement of an issue objective must be the Simple straightforward.
- Online neural network arrangements must be exceptionally simple one.
- Utilizing many layer neural networks must be maintained a strategic distance from, if feasible. Complex learning algorithms must stay away from.
- All the accessible data must be gathered about the issue.
- Having excess information is typically a little issue than not having the essential information.
- The information must be made sub parts for in terms of training, evaluation and testing information.
- The neural network arrangement of an issue must be chosen from a sufficiently substantial pool of potential sequence.

- As a result of the idea of the neural network model, it is likely that if a solitary arrangement is a work than that won't be the ideal one.
- On the off chance that a pool of potential solutions created and prepared, it is more probable that one which is near the ideal one is found.[17]

3.3. Problem analysis

This fishbone structure typically represents the important factors to be considered while analyzing neural network model problems. An essential way of understanding the objectives subs problems, to train the network for improving its learning by iteration.

Every applicant arrangement is tried with the approval information and the best performing system is chosen [17]

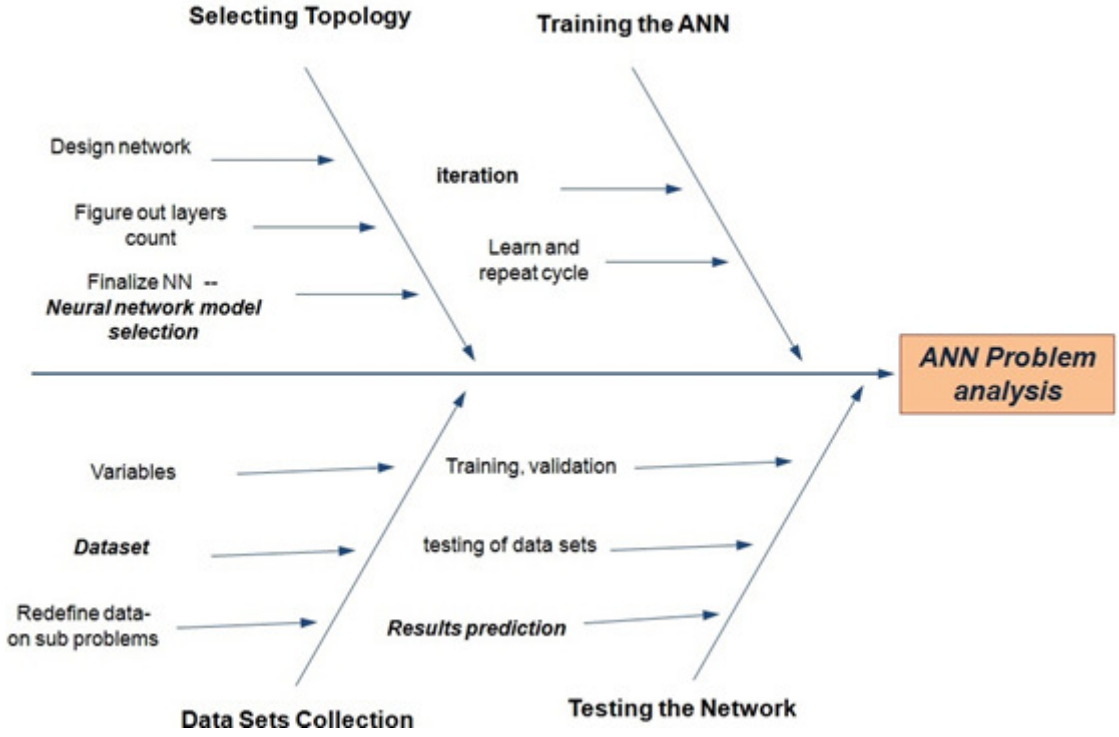

Figure 1 ANN –Fishbone Structure: Problem analysis

The research question is on the basis of formation problems objective in a simple manner towards better-proposing datasets to gain knowledge from your records, so it's just to understand the importance appropriate data inputs with sub module problems, and network design features on basis of a number of the layer in inputs, hidden, output.

3.4. Technique

AI strategies and systems empower computer projects and programming applications to think and act brilliantly and judiciously. To accomplish this objective, AI uses strategies and systems, as Neural Networks, Genetic Algorithms, Reinforcement Learning, and Fuzzy Logic [18]. Neural Networks don't depend on ruled-based programming for their execution. Rather, the neural network utilizes learning algorithm to "tune" yields to inputs. The innovation discovers use in circumstances in which rules are not unequivocally accessible, and in which "tuning" contributions to yields are simpler than examining the inside thinking process. At present, information mining utilizes a neural network to examine the vast volumes of information [18, 21].

Essentially Computers are great in computations that fundamentally takes inputs process at that point and after that gives the outcome on the premise of figurines which are done at specific Algorithm which is modified in the product's, however, ANN enhance their own tenets, the more choices they make, the better choices may progress toward becoming.[22] Target results always produced on the basis of weights adjusting factor among neurons and its corresponding inputs neurons for every cycle in training structure of any neural network design model. This following listed technique classify about the way of relating features among input and outputs features for producing results in the Fig.2 ANN model.

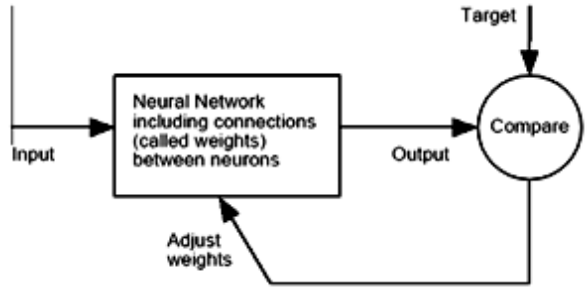

Figure 2 ANN –Training Structure

"The Learning Process the memorization of patterns and the following subsequent response of the system can be classified into two general standards: Associative mapping, Auto-association, Hetero-association. [16]

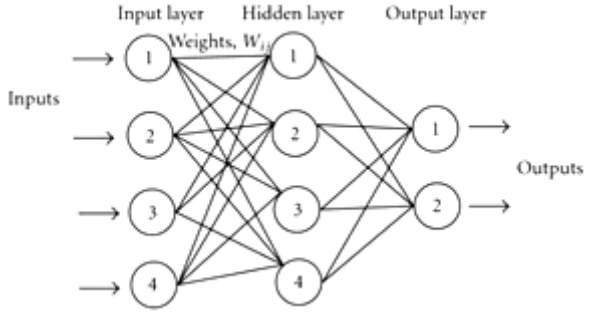

Figure 3 Feed forward Neural Network

Feed forward neural networks are a very customary frontward technique, NN network with input four neurons, output two cells, as depicted simple FNN in Fig. 3.

3.5. Algorithms

Training Algorithm for Single Output

Training Algorithm for Multiple Output

Adaptive Linear Neuron

Multiple Adaptive Linear Neurons

Back Propagation Neural Networks

Generalized Delta Learning Rule

Dragonfly neural network

Pulsed neural networks

Hardware specialized for neural networks [23]

All three layers of ANN are important factors which resemble arc architecture of problems scope in implementation. Fig. 3 represents ANN framework working functionalities: [24] with

step by step procedure to build, train and validate, test your ANN model with features and functionalities.

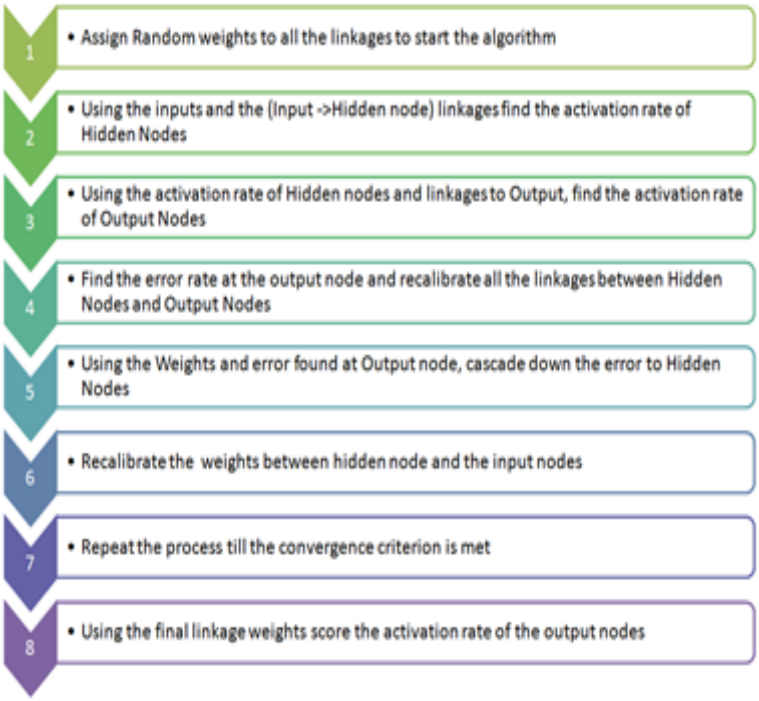

Figure 4 Artificial Neural Network Frameworks [24]

4. PERSONALIZED E-LEARNING APPLICATION

E-Learning is a conveyance of picking up, preparing or instruction programs by electronic means. It includes the utilization of a computer or electronic gadget somehow to give preparing, instructive or learning material. The accompanying seven incredible motivations to utilize E-Learning are: Scalable/Efficient and Fast, Capacity and consistency, Higher Learning Retention than conventional learning, E-Learning spares you time and cash, Measuring learning action and demonstrating the rate of profitability, Reduce your carbon impression, Flexibility and discovering hard to contact individuals[25].

The fundamental preferred standpoint of E-Learning is the utilization of innovation to empower individuals to learn whenever and anyplace. E-Learning is savvier than customary learning in light of the fact that less time and no travel costs. The different sorts of E-Learning are methods for correspondence, plan, E-Learning class structure, Technologies utilized [25]. AI uses programming algorithm to reproduce points of view and thinking that create conduct like people. An effective usage of AI could be tried utilizing a Turing Test approach, in which a human communicates with an interface that could have either a human or computer on the flip side. The utilizations of AI inside E-Learning can deliver the capability of making sensible conditions with which understudies can cooperate.[18,19] Current learning advances can help make prepared fledglings all the more effectively, yet they are truly not capable of making genuine specialists [18].

Authors proposed a structure for program online personalization through suggestion process and they connected some datasets on a few simulated neural system strategies [29] Authors proposed a mining system connected to e-Learner's route conduct, to find designs in the route of E-Learning sites. The creators increased high precise outcomes about conveying the students

their customized necessities and requirements [30]. Authors proposed a customized multi-agent E-Learning framework in light of thing reaction hypothesis (IRT) and ANN which displayed adaptive tests (in light of IRT) and customized suggestions. These specialists add adaptively and intelligence to the learning condition and go about as a human teacher which directs the students in a well-disposed and customized instructing condition. [31] Authors presented LSID-ANN, an artificial neural network approach for recognizing understudies' learning styles in light of the Felder-Silverman learning style show. [32] Author veeramanickam et al. (2017) presented Modified DA model used for evaluating student's marks performance to learn scoring from old dataset to predict new features using a neural network. In this swarms weight factors in dragonfly swarms to particles analysis going to obtain new weights for every new iteration cycles. [33]

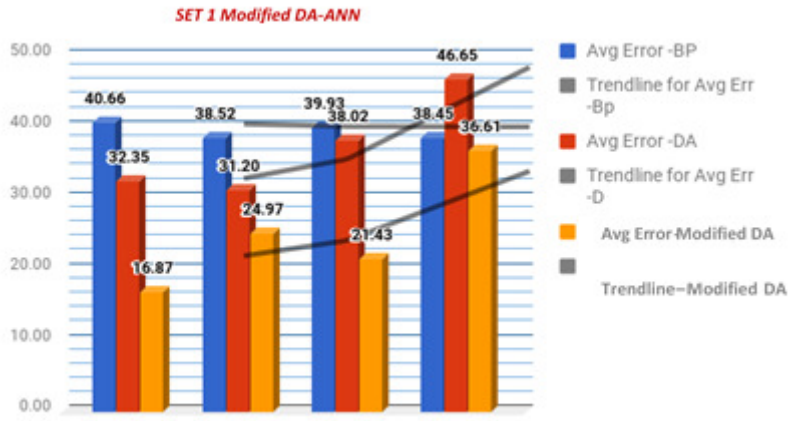

Figure 5 DA Results - Neural Network [33]

Alyuda Forecaster Application: Study Case

Forecaster Application is listed here to explain ANN implementation in real estate financial analysis and its results, its simple neural network training graph and summary results of ANN real-estate problem. In their datasets are taken from ready-made sample unit as input with defining NN layers to train and predict its results. [34].

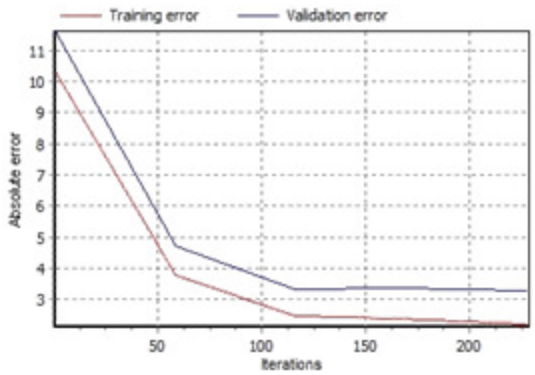

Figure 6a. Real-estate Alyuda forecaster

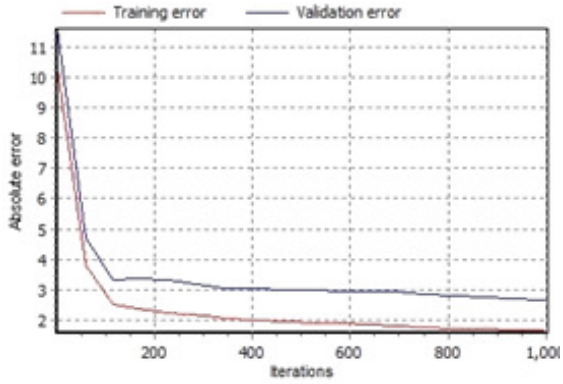

Figure 6b. Real-estate Alyuda forecaster

From Alyuda Forecaster NN designed for given dataset to validate, train network, learning from datasets, prediction of new results with those old data inputs to acquire knowledge. So new forecasting possible because learning from the history of datasets with help of supervised learning technique. Neural system used in real estate price rate prediction in terms of financial figures [34]

5. FUTURE APPLICATIONS SYSTEM - ANN

NNs might, in the future

- Allow: robots that can see, feel, and foresee their general surroundings enhanced stock expectation regular utilization of self-driving autos
- The composition of music written by hand reports to be consequently changed into organized word preparing archives patterns found in the human genome to help in the comprehension of the information. [3]

6. CONCLUSION

Application of neural system design technique is highlighted in this article. Students learning progresses is vital to improve their performance. This personalization features towards improving student's performance possible by using neural network model. Dragonfly algorithms produced 16.87% of MSE error which comparatively better results in terms of other two techniques. This article addressed to understand neural network system towards using in e-learning adopted to improve student's progress in prediction with increasing results. ANN supports application scope to implements to utilize the neural model for personalization level. Smart e-Learning applications must require neural system design features for learning behaviors analysis to utilize for betterments of Academic teaching and learning processes.

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