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Design of Credit Approval System using Artificial Neural Network: A Case Study

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Abstract:- **An enormous amount of images or videos are collected from laptops, mobiles, storage devices during the investigation by Police or intelligence agencies or digital forensic team. These collected images/videos to be analyzed to ascertain the source device that was used to capture these during the investigation. An every camera has its fingerprint in the form of Photo Response Non-Uniformity (PRNU) noise. Because it has universality and generality nature, it is unique and hence plays a very vital role in the source camera identification. PRNU is a sensor pattern noise which contains noise components, and other information hence many techniques have been proposed for the extraction of the PRNU. In this paper, a Discrete Cosine Transform (DCT) method is used for extracting the noise, and Weighted Averaging technique for PRNU estimation. Finally, the distance function is used for comparing g the difference between the Query image PRNU and the stored image PRNU. We conducted the experiments its results are verified against the different cameras, and it is giving 93% accuracy.**

***Index Terms*—PRNU noise, DCT, Camera, Identification**

1. INTRODUCTION

A. Introduction to Classification System

Classification is the categorization of potential answers, and in machine learning, we automate this process [1]. Classification is a supervised learning technique in which machines learn and gain the capability to predict the unknown, based on historical data. We define some jargons related to the classification models for better understanding of the rest of the paper.

Definition-1 (Classification)
"Classification is the automation of the decision-making process that learns from examples of the past and emulates those decisions automatically."

Definition-2 (Explanatory Variable)
"An explanatory variable is an informative variable using which we can reduce the uncertainty and categorize something."

Definition-3 (Target Variable)
"Target variables represent the final resultant categories of the classification."

Definition-4 (Training dataset)
"Training dataset is a portion of data from the given dataset that is used to build the classifier. All the feature sets are used in this dataset."

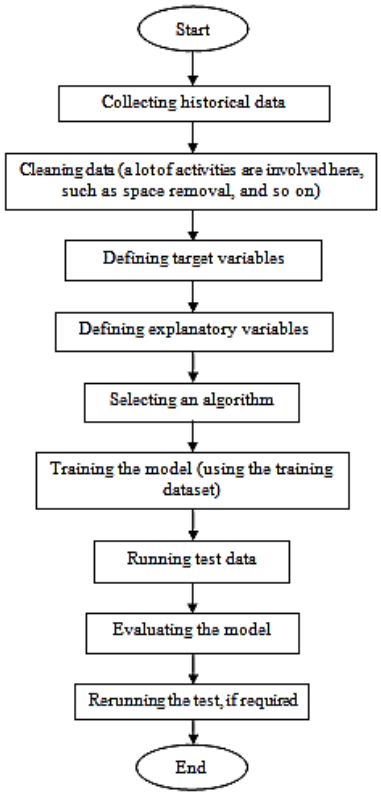

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Fig1: Working of a Classifier System

Definition-5 (Testing dataset)
"Testing dataset is used to test the created model. It is the dataset that is left after the training dataset."

Definition-6 (Model)
"A model helps us to understand the algorithm used to generate the target variables."
The steps involved in the process of classification are represented by figure-1.

B. Introduction to methods of Classification

Some of the major methods of classification as available in the literature are represented by figure-2 as given below:

Logic Based Methods use algorithms based on certain logic to classify data on the basis of feature values. Decision Trees are a famous example of logic based methods. Artificial Neural Networks (ANNs) try to simulate the functioning of human brain to some extent, to learn and classify the data, and have been used in various applications [2]. Statistical Approaches use various techniques based on statistics for the purpose of classification. Naive Bayesian Classification is one of the popular types of Statistical Approaches for classification

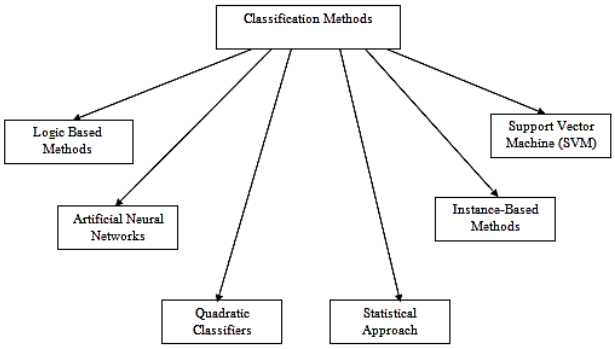

Fig2 Categorization of the Classification Algorithms

A Quadratic Classifier separates the measurements of two or more classes of objects by a quadric surface. Support vector machines (SVMs) are a set of supervised learning methods which could be easily used for classification. Several hybrid techniques (by combining any of these methods) have also been used for the purpose of classification.

Now, we focus on the details of the ANN. The ANNs have an excellent capability to learn [3]. They can easily learn large amount of data. Due to this characteristic, they give precise results whenever the data repeats. ANNs are popular machine learning tools [1]. They have the ability to solve even very complex problems easily, due to which they are widely used in different types of problems across various domains [4–13]. Over the past few decades, various variants of the basic ANN architecture have been proposed to solve the complex problems in a better way [14]. ANNs have also been applied to solve different classification problems [15]. The architecture of a simple ANN is represented by figure-3.

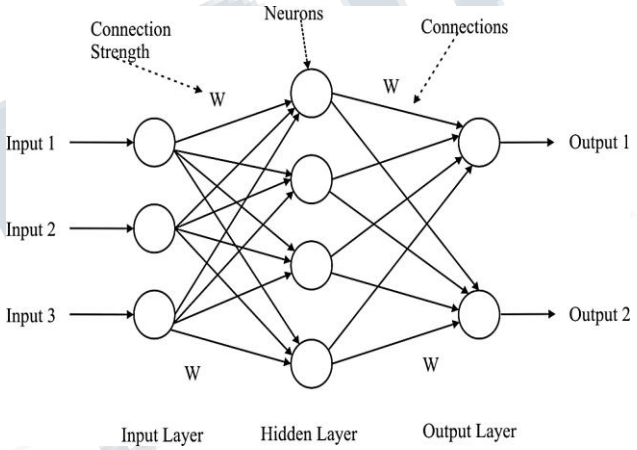

Fig3: Architecture of the Artificial Neural Network

C. Objectives and Organization of the Paper

In this paper, we discuss a case study of an Australian credit approval dataset. The aim is to decide whether to issue the credit card or to reject the application. We use artificial neural network model as a classifier to decide whether the credit card should be issued or not.

The remainder of the paper is organized as follows: Section-2 describes the methodology that is being adopted (using ANN) for deciding whether to issue a credit card or not. In section-3, simulation results obtained by applying the ANN model to the Australian Credit Card Dataset are represented. Section-4 concludes the findings of this case study and discusses the scope for future enhancement.

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II. METHODOLOGY

We use ANN as a classification tool that helps in deciding which request for credit card should be approved and which should be rejected. A standard Australian Credit Approval dataset is used. Fifteen attributes of input data are considered as basis for classification. The following two target classes are considered:

a. Request for Credit Card *Accepted.*

b. Request for Credit Card *Rejected.*

The overall methodology is described in the form of a flow chart as represented by figure4.

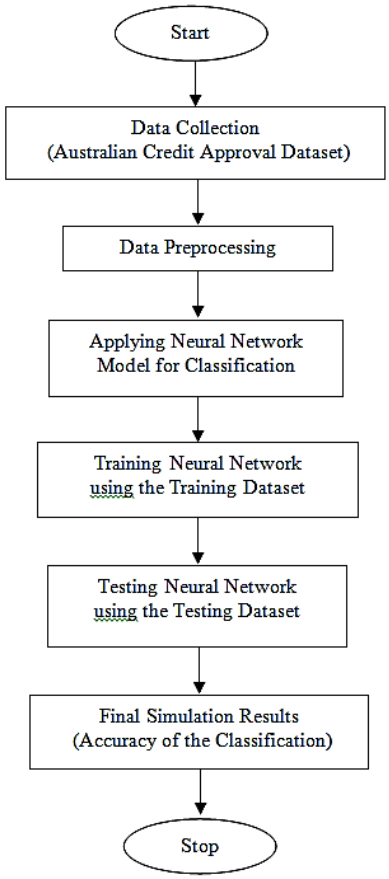

Fig 4: Methodology for Classification using ANN

A. Dataset Description

• Source: https://archive.ics.uci.edu/ml/datasets/Statlog+%28Australian+Credit+Approval%29

• Number of Attributes = 14 + 1 class attribute; so total 15 attributes have been used.

B. Procedure for Classification using ANN

The following steps are taken in Matlab 2013a environment for classification using ANN.

a. Load the files containing input data and target data in the workspace (using commands: Load inputdata.txt & Load targetdata.txt)

b. Calculate the transpose of those data files (using input=inputdata' and target=targetdata')

c. Use 'nntool' to train as well as test the dataset.

C. Internal Working of the ANN

In a basic ANN model, Back Propagation Algorithm (BPA) calculates the error and propagates it back to the previous layers, which modify their weights and biases according to the value of the error being propagated and the configuration is thus changed[15]. The detailed working of the ANN using BPA is represented by figure 5

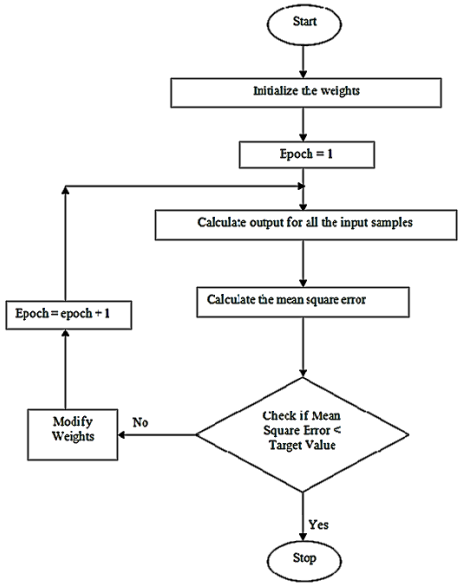

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Fig. 5 Working of the ANN using Back Propagation Algorithm

III. SIMULATION RESULTS

The simulation results obtained by using 'nntool' for classifying the credit approval problem are represented by figure-6 and figure-7. Figure-6 represents the performance plot, which indicates that the best validation performance is obtained at epoch 4. Figure-7 represents the regression graph for best performance, and it is clear from this graph that the accuracy of 88.671 % is being achieved

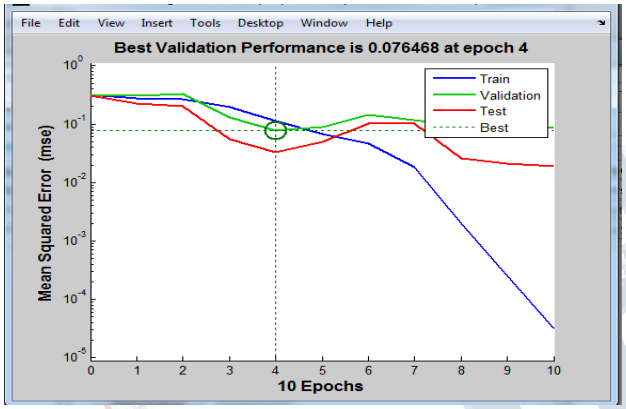

Fig 6: Performance Plot

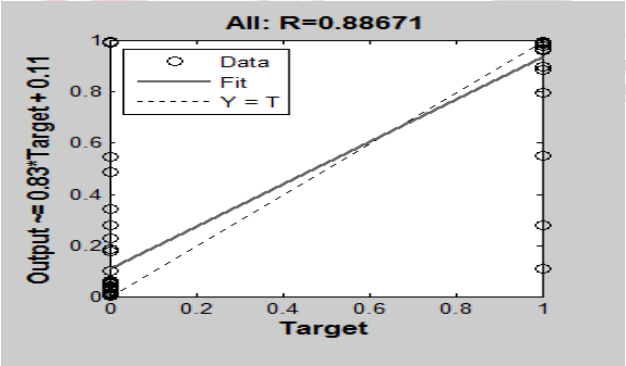

Fig 7: Regression graph for highest performance

IV. CONCLUDING REMARKS & FUTURE SCOPE

In this paper, an ANN based classification system is used to classify the applications for issuing credit cards into one of the following two target classes: approved or rejected. Back Propagation Algorithm is used internally within the Artificial Neural Network Model. It is clear from the simulation results that the Neural Network Model has achieved 88.67 % accuracy while classifying the 'Australian Credit Approval Dataset'.

In future, this work could be enhanced to improve the classification accuracy of the model by using a neuro-fuzzy classifier or using Genetic Algorithm to find the optimal weights of the neural network connection so as to maximize the accuracy. This model could also be applied to other datasets in future.

REFERENCES

[1] C. Bishop, Pattern Recognition and Machine Learning, http: //www. springer. com /in/ book/ 9780387310732; ISBN: 978-0-387-31073-2

[2] S. Sharma, R. Tiwari, A. Shukla, V. Singh, Identification of People Using Gait Biometrics, International Journal of Machine Learning and Computing 1 (2011) 409–415.

[3] G. Vinodhini, R.M. Chandrasekaran, A comparative performance evaluation of neural network based approach for sentiment classification of online reviews, J. King Saud Univ. - Comput. Inf. Sci. 28 (2016) 2–12. doi:10.1016/j.jksuci.2014.03.024.

[4] M. Paliwal, U. a. Kumar, Neural networks and statistical techniques: A review of applications, Expert Syst. Appl. 36 (2009) 2–17. doi:10.1016/j.eswa.2007.10.005.

[5] L.M. Mina, N.O.R. Ashidi, M. a T. Isa, Breast Abnormality Detection in Mammograms Using Artificial Neural Network, (2015) 258–263. doi:10.1109/I4CT.2015.7219577.

[6] P. Li, Y. Wang, J. He, L. Wang, Y. Tian, T.-S. Zhou, et al., High performance personality heartbeat classification model for long-term ECG signal., IEEE Trans. Biomed. Eng. 9294 (2016). doi:10.1109/TBME.2016.2539421.

[7] E.P. Ijjina, C. Krishna Mohan, Hybrid deep neural network model for human action recognition, Appl. Soft Comput. 46 (2015) 936–952. doi:10.1016/j.asoc.2015.08.025.

[8] H.K. Lam, U. Ekong, H. Liu, B. Xiao, H. Araujo, S.H. Ling, et al., A study of neural-network-based

classifiers for material classification, Neurocomputing. 144 (2014) 367–377. doi:10.1016/j.neucom.2014.05.019.

[9] A. Nazemi, M. Dehghan, A neural network method for solving support vector classification problems, Neurocomputing. 152 (2015) 369–376. doi:10.1016/j.neucom.2014.10.054.

[10] Q. Nie, L. Jin, S. Fei, J. Ma, Neural network for multi-class classification by boosting composite stumps, Neurocomputing. 149 (2015) 949–956. doi:10.1016/j.neucom.2014.07.039.

[11] P. Szymczyk, M. Szymczyk, Classification of geological structure using ground penetrating radar and Laplace transform artificial neural networks, Neurocomputing. 148 (2015) 354–362. doi:10.1016/j.neucom.2014.06.025.

[12] S.T. Sarkar, A.P. Bhondekar, M. Macaš, R. Kumar, R. Kaur, A. Sharma, et al., Towards biological plausibility of electronic noses: A spiking neural network based approach for tea odour classification, Neural Networks. 71 (2015) 142–149. doi:10.1016/j.neunet.2015.07.014.

[13] A. Bahrammirzaee, A comparative survey of artificial intelligence applications in finance: Artificial neural networks, expert system and hybrid intelligent systems, Neural Comput. Appl. 19 (2010) 1165–1195. doi:10.1007/s00521-010-0362-z.

[14] D.O. Cardoso, D.S. Carvalho, D.S.F. Alves, D.F.P. Souza, H.C.C. Carneiro, C.E. Pedreira, et al., Financial credit analysis via a clustering weightless neural classifier, Neurocomputing. 183 (2016) 70–78. doi:10.1016/j.neucom.2015.06.105.

[15] A. Shukla, R. Tiwari, R. Kala, Real Life Applications of Soft Computing, 2010, CRC Press, Taylor and Francis Group, LLC; ISBN: 978-1-4398-2287-6