Credit Card Fraud Detection Using State-of-the-Art Machine Learning and Deep Learning Algorithms

ABSTRACT

People can use credit cards for online transactions as it provides an efficient and easy-to-use facility.With the increase in usage of credit cards, the capacity of credit card misuse has also enhanced. Credit card frauds cause significant financial losses for both credit card holders and financial companies. In this research study, the main aim is to detect such frauds, including the accessibility of public data, high-class imbalance data, the changes in fraud nature, and high rates of false alarm. The relevant literature presents many machines learning based approaches for credit card detection, such as Extreme Learning Method, Decision Tree, Random Forest, Support Vector Machine, Logistic Regression and XG Boost. However, due to low accuracy, there is still a need to apply state of the art deep learning algorithms to reduce fraud losses. The main focus has been to apply the recent development of deep learning algorithms for this purpose. Comparative analysis of both machine learning and deep learning algorithms was performed to find efficient outcomes. The detailed empirical analysis is carried out using the European card benchmark

dataset for fraud detection. A machine learning algorithm was first applied to the dataset, which improved the accuracy of detection of the frauds to some extent. Later, three architectures based on a convolutional neural network are applied to improve fraud detection performance. Further addition of layers further increased the

accuracy of detection. A comprehensive empirical analysis has been carried out by applying variations in the number of hidden layers, epochs and applying the latest models. The evaluation of research work shows the improved results achieved, such as accuracy, f1-score, precision and AUC Curves having optimized

values of 99.9%,85.71%,93%, and 98%, respectively. The proposed model outperforms the state-of-the-art machine learning and deep learning algorithms for credit card detection problems. In addition, we have performed experiments by balancing the data and applying deep learning algorithms to minimize the false negative rate. The proposed approaches can be implemented effectively for the real-world detection of credit card fraud.

**EXISTING SYSTEM**

ML has many branches, and each branch can deal with different learning tasks. However, ML learning has different framework types. The ML approach provides a solution for CCF, such as random forest (RF). The ensemble of the decision tree is the random forest [3]. Most researchers use the RF approach. To combine the model, we can use (RF) along with network analysis. This method is called APATE [1]. Researchers can use different ML techniques, such as supervised learning and unsupervised techniques. ML algorithms, such as LR, ANN, DT, SVM and NB, are commonly used for CCF detection.

The researcher can combine these techniques with ensemble techniques to construct solid detection classifiers [3]. The linking of multiple neurons and nodes is known as an artificial neural network. A feed-forward perceptron multilayer is built up of numerous layers: an input layer, an output layer and one or more hidden layers. For the representation of the exploratory variables, the first layer contains the input nodes. With a precise weight, these input layers are multiplied, and each of the hidden layer nodes is transferred with a certain bias, and they are added together.

An activation function is then applied to create the output of each neuron for this summation, which is then transferred to the next layer. Finally, the algorithm's reply is provided by the output layer. The first set randomly used weights and formerly used the training set to minimise the error. All these weights were adjusted by detailed algorithms such as backpropagation [2], [6]. The graphic model for contingency relationships between a set of variables is called the Bayesian belief network. The independence assumption in naïve Bayes is that it was developed to relax and allow for dependencies among variables.

**Disadvantages**

* The system is not implemented Classification on Imbalanced Data.
* The system is not implemented CONVOLUTIONAL NEURAL NETWORK (CNN) for test and train the datasets.

Proposed System

• \_ Feature selection algorithms are used to rank the top features from the CCF transaction dataset, which help in class label predictions.

\_ The deep learning model is proposed by adding a number of additional layers that are then used to extract the features and classification from the credit card farad detection dataset.

\_ To analyse the performance CNN model, apply different architecture of CNN layers.

\_ To perform a comparative analysis between ML with DL algorithms and proposed CNN with baseline model, the results prove that the proposed approach outperforms existing approaches.

\_ To assess the accuracy of the classifiers, performance evaluation measures, accuracy, precision, and recall are used. Experiments are performed on the latest credit cards dataset.

**Advantages**

* The proposed system uses SUPERVISED MACHINE LEARNING APPROACHES which are effective for testing and training datasets.
* The proposed system implemented CNN is to minimise processing without losing key features by reducing the image to make predictions

**SYSTEM REQUIREMENTS**

➢ **H/W System Configuration:-**

➢ Processor - Pentium –IV

➢ RAM - 4 GB (min)

➢ Hard Disk - 20 GB

➢ Key Board - Standard Windows Keyboard

➢ Mouse - Two or Three Button Mouse

➢ Monitor - SVGA

**SOFTWARE REQUIREMENTS:**

* **Operating system :** Windows 7 Ultimate.
* **Coding Language :** Python.
* **Front-End :** Python.
* **Back-End :** Django-ORM
* **Designing :** Html, css, javascript.
* **Data Base :** MySQL (WAMP Server).