### SCHOOL OF COMPUTER AND ENGINEERING

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### CSI3901-Technical Answers for Real World Problems(TARP)

### Credit Card Fraud Detection using Machine Learning models

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### Abstract:

### As the world moves faster and faster toward online and card-based payment systems, the market for digital payments is increasing dramatically.So, It is important to identify fraudulent credit card transactions in real time users because for known fraud patterns helps detect suspicious activity.To come across the fraudulent activities credit card fraud detection machine changed into brought. Such issues can be overcomed with the help of machine learning . The algorithms used for this method are comes under supervised and unsupervised learning techniques.The outcomes of the the algorithms are based totally on accuracy and precision. The ROC curve is plotted based on the confusion matrix. The algorithms are compared along with the set of rules set of rules that has the best accuracy, precision and confusion matrix is considered as the best algorithm that is used to identify  the fraudulent transactions.Our aim is to identify all fraudulent transactions while reducing false positives for fraud with the aid of growing the accuracy in real time.

**Keywords:**fraudulent activities**,** machine learning,supervisedlearning, unsupervisedlearning,accuracy , precision,confusion matrix .

**Introduction:**

Machine Learning is widely used to solve the problems that occur in our day to day life. To detect the fraudulent transaction Machine Learning algorithms can be used. Machine Learning Algorithms can be used to train the model. To achieve a more accurate model Multiple experiments have been performed to achieve an optimal solution, but it seems that still the fraud continues, and we need to keep trying to improve the results as the efforts till now are not enough to stop the stealing.

Some of the achievements of techniques involved are **Unsupervised Learning** - Machine Learning Algorithms such as SVM, Logsistic regression, etc., do not require labeled data for training the model. They identify patterns in the data and try to group the data points based on observed similarities in patterns.  **Supervised Learning** - Machine Learning Algorithms such as [Ensemble Models](https://www.projectpro.io/article/a-comprehensive-guide-to-ensemble-learning-methods/432)(RandomForest, .), KNN,  etc. These algorithms are trained on labeled data, and the model learns to predict the labels for the unseen data. Labeled data can be expensive to gather.

Some notable achievements of machine learning technology in credit card fraud detection.It can quickly detect fraudulent transactions in real time.Ability to identify previously unknown patterns can improve the accuracy of fraud detection.Asaadaptive learning capability allows financial institutions to stay ahead of the ever-changing fraud landscape. These techniques can detect complex fraud patterns that might be missed by traditional fraud detection systems.

Literature Survey:

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| S.No | RESEARCH PAPER | AUTHORS | YEAR | RESULTS |
| 1 | Credit Card Fraud Detection– Machine learning methods | DejanVarmedja, Mirjana Karanovic, SrdjanSladojevic, Marko Arsenovic, Andras Anderla | 20-22 March 2019 | SMOTE technique was used to perform credit card detection better for imbalanced data which improve the results |
| 2 | Detection of Credit Card Fraud Transactions Using Machine Learning Algorithms and Neural Networks: A Comparative Study | Raneemquaddoura,mariamM.biltawi | 02 March 2023 | Performed comparative analysis for machine learning algorithms and neural network and evaluated the best model based on accuracy metrics. |
| 3 | Credit Card Fraud Detection Using Various Classification and Sampling Techniques: A Comparative Study | J.V.V.sriramsasank,G.ramsahith,k.abhinav,Meenabelwal | 20 February 2020 | Performed a comparative analysis to investigate among k-nearest neighbor, logistic regression, naïve Bayes classifier, SVM and used sampling techniques like oversampling, undersampling, ROSE, SMOTE |
| 4 | Comparative Evaluation of credit card fraud detection using machine learning techniques | Olawale adepoju,Juliuswosowei,shiwanilawte,hemaintjaim | 3 February  2020 | Comparing three algorithms i.e. Logistic Regression, KNN, Support Vector Machine. The evaluation is performed on the basis on accuracy, sensitivity, precision, specificity |
| 5 | Analysis of Machine Learning Techniques for Credit Card Fraud Detection | Abrar hayatNadim,Ibrahimmohammadsayem, aapanmustuddy,mohmadsanaullahchowdury | 13 February  2020 | Comparing ML algorithms i.e. Logistic Regression, Random Forest, Support Vector Machine, decision tree. The evaluation is performed on the basis on accuracy, sensitivity, precision, specificity |
| 6 | A Research Paper on Credit Card Fraud Detection | BORA MEHAR SRI SATYA TEJA1, BOOMIREDDY MUNENDRA2, Mr. S. GOKULKRISHNAN3 | 3 march  2020 | Using machine learning algorithms to predict the fraud transactions on the dataset and also addressed the class imbalance issue of the dataset and used oversampling to finally use Random Forest classifier that got a good accuracy score. |
| 7 | Fraudulent Detection in Credit Card System Using SVM & Decision Tree | Vijayshree B. Nipane, 2Poonam S. Kalinge, 3Dipali Vidhate, 4Kunal War, 5Bhagyashree P. Deshpande | May 2016 | clustering and outlier detection techniques are used, further data is made accurate by usage of SVM and behaviour bases SVM .in this system the rate of accuracy reaches to 59%. |
| 8 | Credit Card Fraud Detection Using Support Vector Machine | Sheo Kumar, Vinit Kumar Gunjan, Mohd Dilshad Ansari, and Rashmi Patha | January 2020 | The Results shows that SVM Kernel methods shows great performance for all three performancemetrics like sensitivity, accuracy and specificity over traditional techniques. It is analyzed and observed that RBF kernel function outperforms and gives 96% accuracy and 96% sensitivity compared with other techniques. Linear kernel function gives 90% as highest sensitivity in comparison with other techniques |