Research Report

Traditional methods of data analysis have long been used to **detect fraud**. They require complex and time-consuming investigations that deal with different domains of knowledge like financial, economics, business practices and law. Fraud often consists of many instances or incidents involving repeated transgressions using the same method. Fraud instances can be similar in content and appearance but usually are not identical.
Fraud that involves cell phones, insurance claims, tax return claims, credit card transactions etc. represent significant problems for governments and businesses, but yet detecting and preventing fraud is not a simple task. Fraud is an adaptive crime, so it needs special methods of intelligent data analysis to detect and prevent it. These methods exist in the areas of Knowledge Discovery in Databases (KDD), Data Mining, Machine Learning and Statistics. They offer applicable and successful solutions in different areas of fraud crimes.

Online Transaction Fraud Detection Techniques:A Review of Data Mining Approaches
The companies and financial institution lose billions of dollars as a result of fraud every year and fraudsters continuously try to find new gambit to commit illegal actions. To overcome this, various data mining techniques are developed.
The commonly used fraud detection methods are decision trees, Neural Network (NN), fuzzy system, rule-induction techniques, K-Nearest Neighbour,Support Vector Machines (SVM), Artificial Immune System (AIS), genetic algorithms. These techniques can be used alone or in collaboration to build classifiers using meta-learning approaches.

Data mining Approaches used in fraud detection:
1.Neural Networks:
Neural network is used as the most popular and successful approach for fraud detection. Because they are fast, trustworthy and easy method for obtaining good outcomes as they have a long history in variety of applications.
2. Deep learning and deep belief network:
Deep learning is slightly new approach of machine learning and is known for its fast learning capability which is one of the best learning methods that uses automatic multiple levels of latent
variables, through which it senses various types of data such as text, sound, image, etc. Not used widely.
3. KNN:
KNN comes under top 10 data mining algorithms. It classifies occurrence of every new instance out of all available instance based on a likeness measure, by comparing it with the existing ones using a distance metric method which results in assigning a class to every new instance through closest existing class. It is found to be effective in fraud detection.
4. Bayesian Network:
In practice it was found that Bayesian networks are slower when applied to new instances.
5. Decision Tree:
In the latest research and knowledge discovery and data mining decision trees have become one of the most powerful and popularly used approaches.
6.Random Forest:

It is the most is a fast algorithm and can effectively handle unbalanced and large databases with thousands of features.

7.Logistic Regression:

Binary choice models have been mostly used in studying fraud to predict the probability of claim being fraudulent. Identifying deceitful claim is also expected to be similar in nature with real world problems.

8.Support Vector Machine:

Support vector machines are found to be very effective in various classification techniques. This is statistical learning technique which uses non-linear classifiers (SVMs) that work in high-dimensional feature space for non-linear mapping of
the input space vectors, separating them into two distinct classes in a hyper plane. SVM is used for hybrid approach with
other data mining techniques in fraud detection problems

9.Association Rule:

It overcomes the difficulties of minimum support and confidence, optimizes the execution times, reduces the excessive generation of rules thus helps in making the results more spontaneous, thereby easing the work of fraud analysts.

10.Outlier Detection:

It is also known as Anomaly detection it is the process of identifying data which is unusual. Outlier detection can be used
to give advanced warning of a mechanical component failing in order to perform predictive maintenance and improve safety.

Thus, it gives a comparison between different techniques.

References:

[1] B. B. Sagar, P. Singh and S. Mallika, "Online transaction fraud detection techniques: A review of data mining approaches," *2016 3rd International Conference on Computing for Sustainable Global Development (INDIACom)*, New Delhi, 2016, pp. 3756-3761.