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Credit Card Fraud Detection Using Simulation Annealing and Genetic Algorithm

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Abstract — Many researchers are using simulation annealing to guide artificial neural network in credit card fraud detection and also other researchers tried to prove genetic algorithm to reduce various frauds in credit card fraud detection, but it has not given the exact result in credit card fraud detection. Here we bring an emerging combination of genetic algorithm and simulation annealing to obtain the best result for credit card fraud detection

Keywords — Credit, Fraud, Simulation, Genetic, Internet, Operation, Mutations.

1 INTRODUCTION

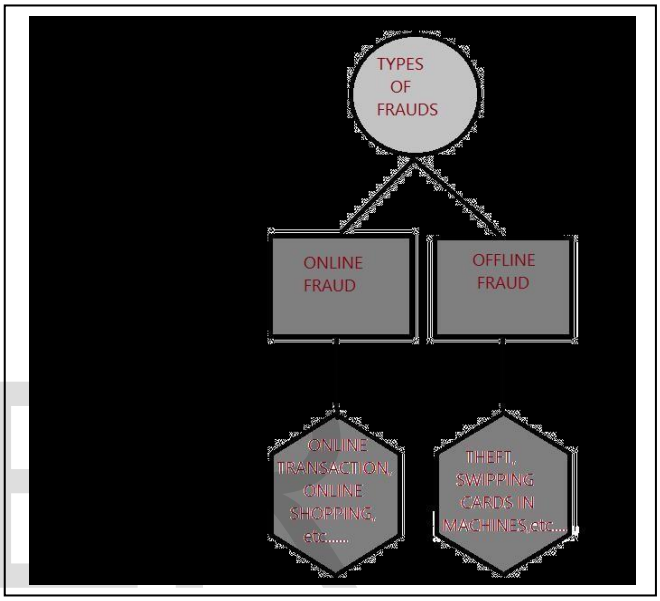
Credit card Fraud detection is the process of detecting unauthorized and illegal activities occurring in the field of credit cards by various means. The carelessness of victims during online transactions paves the way of many frauds to occur such as hacking of personal information and other details of the users. By gathering these information hackers misuse the credit card details of victims. As result victims have to face large problems by paying huge amount to banks. Simulation Annealing processes the credit card details of owner and passes it through the ANN network for detection but consumes a lot of time. This is time consuming process. Where as one millisecond is enough for frauds to occur. Genetic Algorithm uses the biological way to find the fittest solution from a group of solutions .Simulation Annealing has an effective algorithm which when combined with Genetic Algorithm can prove to much efficient in detecting credit card frauds.

2 TYPES OF FRAUD

Internet is not only source of knowledge but has also become a source for bringing about many new software applications and other facilities which helps consumers to buy or sell things in just a fraction of seconds. Frauds are increasing in every field. Frauds in credit card can be classified into two types

- Online Fraud
- Offline Fraud

Online fraud refers to frauds which occur through internet. As the Credit follows the policy of "BUY NOW PAYS LATER", many customers prefer using credit cards for online Purchases. Many applications such



as FLIPKART, AMAZON, OLX, EBAY, and MYNTRA.....make people Convenient by helping them buy and sell their products immediately. The Technologically developing world is succeeding in enabling the costumers to make their railways, roadways and airways booking by consuming a very less amount of time. The Second type of fraud is Offline fraud. Offline fraud does not occurs by means of internet. It therefore refers to the process of stealing someone credit card or extracting the card details by means of some malpractices such as by copying the card information in a piece of some plastic.

3 GENETIC ALGORITHMS

Genetic Algorithm is a derivation of Evolutionary Algorithm. The functioning of genetic algorithm is based on various biological operations such as selection operation, inheritance operation, mutation operation and crossing over operation.

3.1 Functions of Genetic Algorithm

- Selection of fittest chromosome from population of chromosomes.
- Crossing over and mutation operation is

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performed.

- Evolution of new off spring.

The first step involves the selection mechanism which is based on the principle of survival of the fittest. It selects the chromosomes randomly where each chromosome has its own fitness score. In second step crossing over process is carried out with the fittest chromosome we have selected. Mutation operations are performed. As a result the evolution of new population is obtained in Third step.

The successful implementation of genetic algorithm will help in obtaining better result to a problem. Since genetic algorithm selects the fittest chromosome from a population of solutions for crossing over it has the ability to provide a population of solutions. Genetic algorithm is finding is applications in the field of computer science by giving best results to Travelling Salesman Problem (TSP), Vehicle Routing Problem (VRP).Genetic algorithm is proving to be helpful in computer games, black box testing and data mining. TSP and VRP are the problems being faced by people all over the world. Genetic Algorithm is proving helpful in delivering high quality solution to TSP and VRP which reduces route cost.

4 Simulation annealing

Simulation Annealing approaches the best solution to a problem. Simulation Annealing involves sudden heating and immediately cooling the particular data. Which proves to be helpful in determining the proper solution to a problem. It iteratively heats the certain sustain by increasing the temperature to maximum level and it cools down suddenly.

5 Graphical representations

By reaching the certain point B in the graph we may think that it is the maximum value of peak. But simulation annealing guides us to go beyond one step and check all operators to confirm that the solution we have got is whether is an approximate solution or not. Thus by checking the operators we realize that there can be better solution than the previous solution. Simulation Annealing helps in finding the better solution which can be better than our current solution by checking various operators.

6 combinations of genetic algorithm and simulation annealing

In the above definitions we saw the concept of Simulation Annealing and Genetic Algorithm. Therefore the combination of Genetic Algorithm and Simulation Annealing can be described in be described in such a way that Genetic algorithm gives the population of solutions which are assigned to detect the credit card fraud. Simulation Annealing takes these solutions and modifies it by changing the temperature. Thereby with the help of hill-climbing method represented in the figure simulation annealing helps in finding whether the solution we have arrived to detect the fraud is an exact solution ornot.

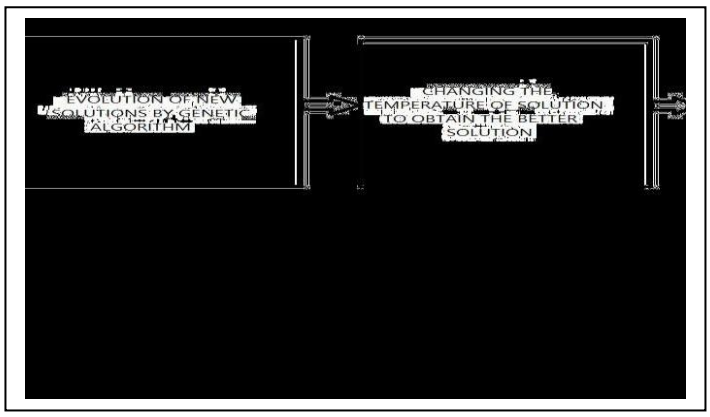

Fig 2: Flowchart

7 The basic combination of genetic algorithm and simulation annealing

Initialize a random population of individual compute fitness of each individual While NOT finished DO BEGIN/*procedure new generation*/ for population size DO BEGIN /*reproduce cycle*/ Select two individual from old generation, reproduce two individual to give two offspring

8 Pros

- It may be an efficient and time saving process.
- It proves to be helpful in guiding the proper way of solution we need to detect the frauds in credit card.
- It helps in modifying all the previous solutions of fraud detection to get a new solution.
- It provides a series of solution to detect fraud.

9 conclusion

Simulation annealing is a time consuming process but when combined with genetic algorithm it can give an effective result .they can applied to any field which has a lot of solutions but its algorithm is little confusing.

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