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Prediction of Bank's Customer Retaining Rate Using Neural Networks

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***Abstract*-These days banks face fierce competition of providing financial services to customer. Most importantly they try to acquire a loyal customer base and provide new offers to retain their customer base. Large banking corporations make use of previous data to predict a similarity in data and use it to enhance customer service. This project encompasses the same problem and provides a competent solution for it. The project consists of analysis of data of a number of customers in numerous fields and checks the retainability for each and every customers. Use of a complex neural network is advocated to check past conditions of financial services provided to a customer and a common retainability indexed is produced which is used to predict the retainability rate of a new set of users.**

***Index Terms*— Customer Retaining Rate, Neural Networks**

I. Problem Statement

Total assets of commercial bank in India contribute to 40,900,000 million rupees and a combined gdp of 65% as of 2017. Banking corporations make up the structural foundation of a country's economic growth. Thus it implicates that the banks need to be updated with the latest technologies and marketing services to retain a loyal customer base. State Bank of India lost 4.16 million customers in the fiscal year of 2017-2018 thus facing a huge loss in terms of share price. Such problems usually arise due to inability of a bank to comply with the customer's needs and expectations. Since most of the banks profit largely only on the basis of a loyal customer base, losing their customers would result in futile outcomes.

II. EXISTING SYSTEM

Banks Employ third party companies which market their products and encourage customers into buying new policies. A lot of money and resources are spent on advertising which is mostly directed towards an untargeted audience. A lot of new marketing and analysing techniques are employed for customer satisfaction but there are a very few techniques which are used to analyse the current customer base to enhance the services and products. A need for an individual analysis of a customer arises, with no perfect solution to the problem. Application of this project relieves the bank of going through analysis of each and every financial service of a customer and predicting a justification for the loss of a customer.

III. Proposed System

A network of neural lines are engaged which studies the previous data set and predict an outcome for a new data set. The neural network advocates the use of machine learning and provides an output by analyzing a large data set of inputs and thus helping the banks to be financially lucrative. The predictions depicted by the computer algorithm will allow banks to provide new benefits and offers to a probable leaving customer thus retaining his bank account. The final outcome of the project predominantly depends upon the number and nature of the neural networks. The project consists of a standard neural networks; comprising of an input layer which has the n number of various terminals, the terminals are various criteria which are to be engaged. There is a second hidden layer which engages multiple input layers according to their weightage into the model. The final output layer consists of a result that depends on the nature of input layers. The output layer demonstrates a predictive analysis of the input fields. Artificial neural networks (ANNs) employed functions in a phase of two data sets, training and testing. ANN uses the previous data set to train itself and then the trained ANN is tested on a new set of data. The ANN is monitored throughout the process to check for any errors. Back propagation method is employed to correct any errors if found through the neural networks.

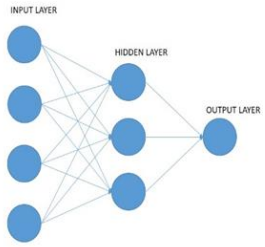

Fig. 1. Multilayer neural network

IV. Advantages of Proposed System

Neural networks play a very significant role in data mining and its applications. They provide a much more accurate and elaborate results. Neural networks are applicable in a wider variety of fields with different purposes. The use of neural network is very extensive in the data mining field as it has

ability to learn and model non- linear and complex relationships. Neural networks have the ability to learn organically, that is they can generalise their inputs. They follow non-linear computing and can find shortcuts and also derive connections between data. Neural networks are capable of regenerating data from data sets from inference and have the ability to self -diagnose and self -debug. Through this proposed system our motive is to apply it in strengthening customer relationship management (CRM).

V. System Architecture

Our proposed model has the ability to work with numerous aspects and fields. The number of fields act as a criteria and hold weightage accordingly in giving out an output. The fields are organized as a component of x-axis and the condition for exiting is organized as a component of y-axis for a certain customer. The labels or non- numerical values, if any, in a certain field are encoded into particular labels. The criteria for a field is only chosen if it has the ability to affect the result or the output.

The randomly selected data is made to run through the artificial neural network, which trains on a certain percentage of data and is then tested on to a certain percentage of data. The artificial neural network can be configured to be run through the data a number of times which is called epoch. During every single epoch the neural network becomes more efficient than the previous. The process after completion can specify the accuracy of the system, in which our model has proved to be satisfactory. The input if contains ‘n’ neurons and the output contains ‘m’ neurons then the hidden layer in our system contains n+m/2 neurons.

VI. Real Time Application

Our project has been tested and implemented on the data of 10000 random users. There were included a total of 13 fields out of which 11 fields hold weightage in the output. The fields included credit score, geography , gender, age, tenure, balance, number of products used, credit card usage, activity, approximate income and condition if exited or not. The data was run through a neural network for a number of 25 epoch and the accuracy was found to be 83.61%. The neural networks in this case were trained on 80% data and tested on 20% data. The experimental data predicted a decent accuracy rate for the model and proved to be effective in real time application.

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Epoch 19/25
8000/8000 [==============================] - 1s 117us/step - loss: 0.4045 - acc: 0.8351
Epoch 20/25
8000/8000 [==============================] - 1s 118us/step - loss: 0.4043 - acc: 0.8364
Epoch 21/25
8000/8000 [==============================] - 1s 114us/step - loss: 0.4042 - acc: 0.8342
Epoch 22/25
8000/8000 [==============================] - 1s 112us/step - loss: 0.4039 - acc: 0.8329
Epoch 23/25
8000/8000 [==============================] - 1s 115us/step - loss: 0.4040 - acc: 0.8357
Epoch 24/25
8000/8000 [==============================] - 1s 121us/step - loss: 0.4035 - acc: 0.8352
Epoch 25/25
8000/8000 [==============================] - 1s 126us/step - loss: 0.4035 - acc: 0.8361
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Fig. 2. Accuracy

VII. Conclusion

Our project has been designed by the motive of solving a complex and futile problem which result in major losses. The use of neural networks has been made efficiently to reach a maximum level of accuracy rate and to allow scope for future prediction on arbitrary data. The efficient and detailed analysis of the complex data will give out relatable and accurate results fulfilling our motive of solving what might possibly be a major problem.

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