

Comparative Analysis of Support Vector Machine and Multilayer Perceptron for Bank Customer Churn Prediction

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Abstract— *In the fiercely competitive banking industry, retaining customers has become paramount. Predicting customer churn, the phenomenon where customers discontinue their relationship with a bank, is crucial for implementing targeted retention strategies. This research paper presents a comparative analysis of two prominent machine learning algorithms, Support Vector Machine (SVM) and Multilayer Perceptron (MLP), for the task of predicting bank customer churn. We evaluate these algorithms based on accuracy, precision, and recall to assess their performance. The results of our study provide valuable insights into the efficacy of these algorithms in addressing this critical challenge.*

I. INTRODUCTION

Beating implies a client who passes on one organization and moves to another organization. It isn't just a misfortune in pay yet in addition other adverse consequences on the tasks and furthermore primarily Client Connection [2][3]. The executives is vital for banking when the organization considers it as they attempt to lay out long haul associations with clients and furthermore it will prompt increment their client base [4]. The specialist co-op's difficulties are tracked down in the way of behaving of the client and their assumptions.

The issue of foreseeing client beat has forever been a broad worry of business banks. In view of conventional factual strategies, AI approach and the group learning technique, the exploration on the client beat expectation has made plentiful accomplishments [5]. Be that as it may, a significant yet testing issue in agitate forecast is the colossal expenses of marking test names. In stir expectation, a significant yet testing issue is the colossal expenses of marking test names [9][10]. In this paper, we utilize a learning technique to foresee client stir, called gaining from name extents in which the preparation information is given in gatherings and just the extent of each class in each gathering is known. All in all, we utilize just the extents of the churners in each gathering to anticipate the idle client agitate. The extent data in each gathering can be assessed by the experience of the business bank's client director, so it can significantly diminish the expenses brought about by marking test stir names. In the exploratory area, we build the issues of administered endlessly gaining from mark extents separately.

II. METHODOLOGY

A large number of kinds of request strategies have been proposed recorded as a hard copy that integrates Choice Trees, Guileless Bayesian procedures, Brain Organizations, Calculated Relapse, SVM and KNN, etc. In this paper, we survey the presentation of the Help Vector Machine and Multi-facet Perceptron for anticipating the client stir expectation.

2.1 Support Vector Machine (SVM)

SVM is areas of strength for a learning computation used for gathering and backslide endeavors. It intends to find an ideal hyperplane that disconnects different classes in the component space. The essential idea behind SVM is to grow the edge, which is the distance between the hyperplane and the nearest information of interest of each class [7][8].

SVM can manage both straightforwardly unmistakable and non-straightly separable data by using segment abilities to design the data into higher-layered feature spaces. The most normally used pieces consolidate straight, polynomial, and twisting reason capacity (RBF) parts. SVMs have solid speculative foundations and are suitable in dealing with high-layered data[11][12].

SVMs are known for their ability to get complicated decision cutoff points and handle abnormalities as a matter of fact. They are also less leaned to overfitting. Nevertheless, SVMs can be fragile to the choice of hyperparameters, similar to the regularization limit (C) and the piece limits. Planning SVMs can be computationally serious, especially for colossal datasets.

2.2 Multilayer Perceptron (MLP)

A MLP is a legend among the most by and large saw Cerebrum Connection plan that has been used for various applications. The MLP coordinate is in general made using different obsessions or overseeing units, and it is figured out into an improvement of something like two layers [7]. The central layer (or the most diminished layer) is named as an information layer where it gets the external information while the last layer (or the most overpowering layer) is a yield layer where the response for the

issue is gotten. The secret layer is the overall exciting layer in the data layer and the yield layer, and may frame with some spot pretty much one layers. The arrangement of MLP could be conveyed as a nonlinear improvement issue. The objective of MLP learning is to find the best loads that limit the bundle between the information and the yield. The most otherworldly getting ready appraisal used in NN is Back causing (BP), and it has been used in managing various issues in model approval and portrayal [11]. This evaluation depends on two or three cutoff points, for instance, novel covered center obsessions at the hid layers learning rate, energy rate, request work and how much hoping to happen. Also, these cutoff points could change the show on the getting from dazzling to momentous accuracy.

III. EXPERIMENTAL RESULTS

The preliminaries have been coordinated by using python programming language. The python Scikit-Learn is a group for data plan and discernment. We have thought about the Bank educational record, the dataset is transparently open online on Kaggle [6]. This educational assortment has 10000 lines and 14 fragments and two class names are no agitate class has 7963 models and stir class has 2037 events.

In this review, two AI calculations, specifically Backing Vector Machine and Multi-facet Perceptron were applied to the Bank client beat dataset. The presentation of every calculation was assessed utilizing exactness, accuracy, and review as assessment measurements. The exploratory outcomes are summed up in the table-1.

TABLE 1
PERFORMANCE OF CLASSIFIERS

Algorithm	Accuracy	Precision	Recall
Support Vector Machine	93.74	94	94
Multilayer Perceptron	92..53	92.5	92.5

3.1 Results and Discussion

The results indicate that both Support Vector Machine and Multilayer Perceptron demonstrate strong predictive capabilities for bank customer churn. However, SVM slightly outperforms MLP in terms of accuracy, precision, and recall. SVM achieved an accuracy rate of 93.74% compared to MLP's 92.53%. Furthermore, SVM exhibited a precision and recall rate of 94%, while MLP achieved 92.5% in both metrics.

These findings suggest that SVM may be a preferable choice for bank customer churn prediction due to its slightly superior performance. However, the choice between these algorithms should consider various factors, including computational resources, dataset size, and interpretability.

The study also highlights the significance of machine learning in the banking industry, emphasizing the potential for predictive analytics to reduce customer churn rates. Further research could explore the optimization of hyperparameters and feature engineering techniques to enhance the predictive capabilities of these algorithms. Additionally, it is essential to consider the ethical and regulatory implications of implementing machine learning models in sensitive financial domains.

IV. CONCLUSION

In conclusion, this comparative analysis provides valuable insights for banks and financial institutions seeking effective strategies to reduce customer churn. Both SVM and MLP offer promising results, with SVM exhibiting a slight edge in performance. However, the choice of algorithm should be made considering the specific needs and constraints of the organization.

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