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Dynamic Churn Prediction Using Machine Learning Algorithms on Telecommunication

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Abstract
Any organization's ability to increase revenue and profit depends heavily on its customers. So, it is crucial for organizational managers to keep a single effective customer relationship management system by choosing the target consumers and maintaining effective relationships with them. This would help them to increase customer satisfaction. Customers are becoming more drawn to the quality of service (QoS) offered by businesses in the present. Yet, the present day shows greater rivalry in offering clients technologically cutting-edge QoS. Yet, effective customer relationship management systems can help the organization attract new clients, preserve client connections, and enhance client retention by generating more revenue for the company's operations. Also, the client retention methods can benefit greatly from the use of machine learning models like support vector machines and Random Forest algorithms. One essential machine learning approach that effectively analyses the data for churn prediction is support vector machine learning. The telecom industries have extensively embraced machine learning as an efficient application of artificial intelligence in assessing and mitigating customer turnover.
Keywords: customer relationship management, customer retention, machine learning, support vector algorithm

Introduction
Customers always play a crucial part in boosting the income and profit of any company; as a result, it is crucial for organisational managers to maintain an effective customer relationship management system by identifying their target clients and building strong relationships with them. The firm will also benefit from the CRM system's assistance in identifying the most significant group of customers and their behaviour, which will help it better understand its retention efforts. Moreover, lower customer churn rates are associated with stronger customer loyalty, therefore applying machine learning algorithms like the support vector algorithm can help prevent customer churn. The use of support vector machines to increase customer retention is the main topic of this report.

Related Work
1. Material and Methods:
1.1 Dataset:
Dataset has been taken dynamically from the user. Data analysis is one of the most practical methods for identifying instances of customer churn in business. For instance, E-commerce makes practical use of consumer databases when formulating future business strategies to ensure a smooth flow of trade in the product market. Preprocessing of data is a hub that highlights a producer's familiarity with consumer behavior in relation to their business. For instance, it is much preferable to use a machine algorithm to carry out a regression analysis that will show consumer behavior in relation to various businesses and goods. It is advised to exhibit the findings visually to persuade the management team of the best course of action for stopping customer fraud.

Tools for analyzing analytical data should be used, especially when providing the marketing team with a fast snapshot of ongoing normal market behavior. In order to determine a company's strengths and weaknesses in terms of its trading behavior, categorization is crucial. Also, the variable distribution tables will provide convincing evidence of the mean and mode elements of the purchasing teams in a larger context.

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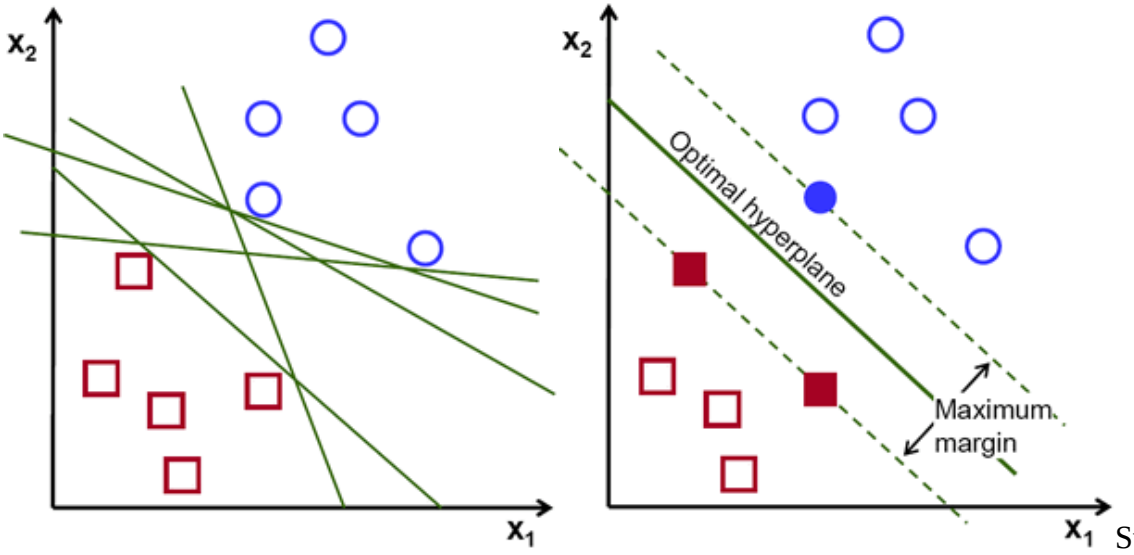
2. Algorithm

2.1 Support Vector Machine

The objective of the support vector machine algorithm is to find a hyperplane in an N-dimensional space (N — the number of features) that distinctly classifies the data points.



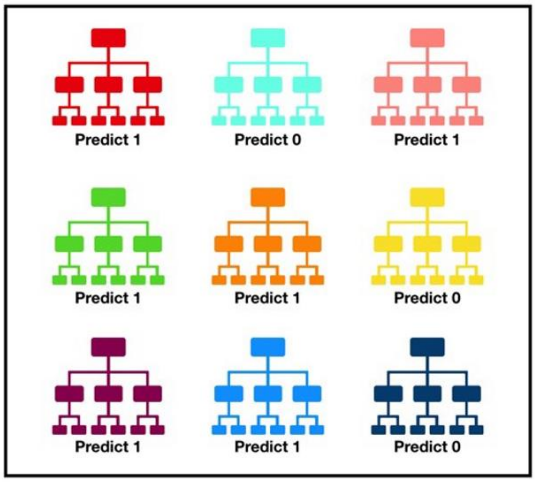
Support vectors are data points that are closer to the hyperplane and influence the position and orientation of the hyperplane. Using these support vectors, we maximize the margin of the classifier. Deleting the support vectors will change the position of the hyperplane. These are the points that help us build our SVM.

2.Random Forest:

Random forest, like its name implies, consists of a large number of individual decision trees that operate as an ensemble. Each individual tree in the random forest spits out a class prediction and the class with the most votes becomes our model's prediction .

Visualization of a Random Forest Model Making a Prediction

The fundamental concept behind random forest is a simple but powerful one — the wisdom of crowds. In data science speak, the reason that the random forest model works so well is:



A large number of relatively uncorrelated models (trees) operating as a committee will outperform any of the individual constituent models.

The low correlation between models is the key. Just like how investments with low correlations (like stocks and bonds) come together to form a portfolio that is greater than the sum of its parts, uncorrelated models can produce ensemble predictions that are more accurate than any of the

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individual predictions. The reason for this wonderful effect is that the trees protect each other from their individual errors (as long as they don't constantly all err in the same direction). While some trees may be wrong, many other trees will be right, so as a group the trees are able to move in the correct direction. So the prerequisites for random forest to perform well are:
1.There needs to be some actual signal in our features so that models built using those features do better than random guessing.
2.The predictions (and therefore the errors) made by the individual trees need to have low correlations with each other.

3. Result:
Based on the dataset given by the user, we can check the accuracy for the algorithms i.e., Support Vector Machines and Random Forest Algorithm. Predict the churn of a customer based on the algorithm which has high accuracy among them.so we predict whether the customer is churned or not in this application.

4. Conclusion:
As a result of the discussion above, it can be said that any organization, regardless of its form, needs to be concerned about customer turnover. Customer retention is the process of preserving a customer's loyalty through comprehending their needs and meeting them appropriately. The organizational management will be helped by a strong churn prediction model to anticipate consumer churn. Support vector machines can be useful for estimating the turnover rate, depending on the complicated data of the telecom business. The concept of client retention as well as the churn forecast were the main topics of the aforementioned paper. Together with the technique, the usage of support vector machines to improve the churn prediction process has also been covered here.

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