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# USE OF MACHINE LEARNING TO SOLVE THE PROBLEM OF CUSTOMER CHURN

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## ВИКОРИСТАННЯ МАШИННОГО НАВЧАННЯ ДЛЯ ВИРІШЕННЯ ЗАВДАННЯ ВІДТОКУ КЛІЄНТІВ

У статті наводиться приклад застосування машинного навчання для вирішення завдання відтоку клієнтів від операторів мобільного зв'язку. Пропонується використання алгоритму на основі дерева прийняття рішень.

Today, due to competition, mobile communication operators face the problem of churn of customers. Since the cost of retaining a customer is usually less than the cost of attracting a new customer, it becomes advantageous to identify clients prone to care in advance and try to retain them using various methods, for example, by making special offers.

To date, many companies have accumulated a lot of data about their customers, which makes it urgent to apply machine learning methods to solve this problem.

The problem of the churn of customers is solved for the incoming customers, it is necessary to predict the rejection of services and to influence the customer until after he ceases to use the services of the mobile operator.

The solution to the problem of customer churn is to classify clients according to 2 groups: the client is inclined to churn or the client is not inclined to churn. If the client falls into the first group, then it must be influenced by the methods of marketing retention.

This article examines the identification of customers who are potentially inclined to churn.

Forecasting outflow can be viewed as a controlled classification problem in which the user behavior is used to train the binary classifier.

Depending on the recharge, each client can be in one of the following states: (i) new, (ii) active, (iii) inactive or (iv) churn (Figure 1) [1]. The churn of customers is always preceded by an inactive state, and since the aim of the research is to predict the churn, it is suggested to use the inactive state as a reference for forecasting the churn. In particular, we define t = 30 days, without replenishing the balance as the threshold state used to change the state from active to inactive. In

addition, we define q = 30 days without making or receiving calls, if the subscriber does not show activity during the time q, it goes into churn.

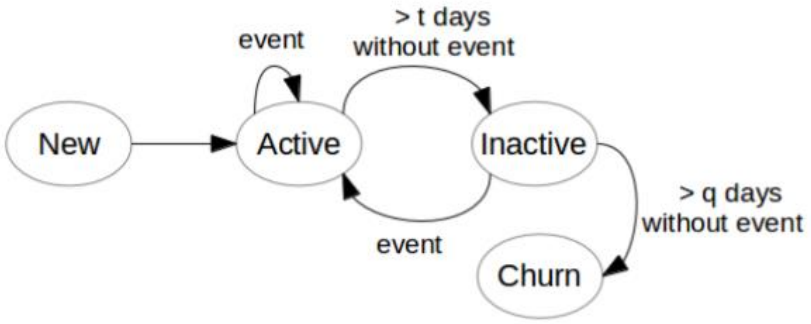


Fig. 1. diagram of possible client states based on recharge events and specific thresholds of t and q

In Figure 2 shows the scheme of the learning and prediction model. To properly train the model, you need expert sampling, which is divided into data for learning the model and data to verify the performance of the model. After that, the model is trained on the first sample and checks its performance on the second, the model is applied to real data, the results of which are used in the subsequent training and improvement of the model.

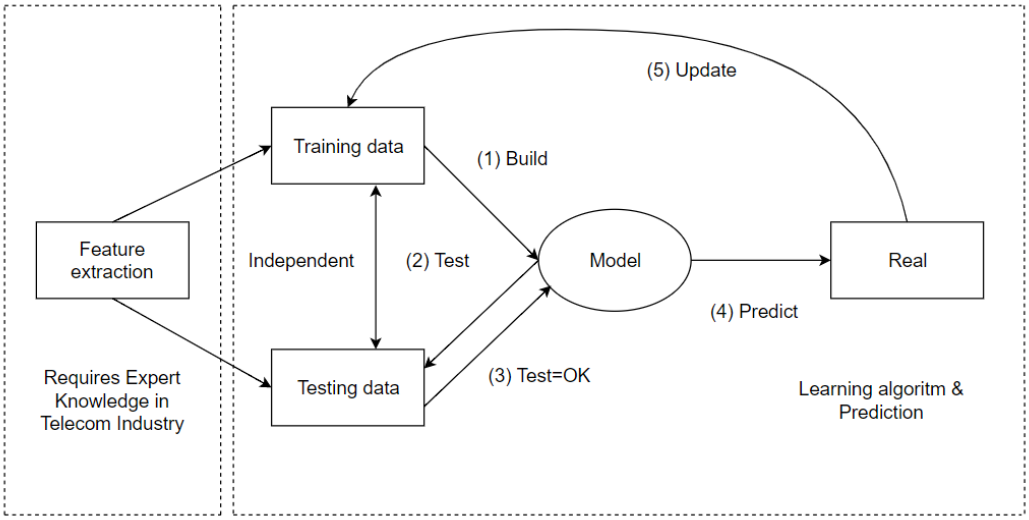


Fig. 2 The scheme of learning and predicting the model of machine learning

To implement the work of the model, an algorithm based on the decision tree can be used. The graphical representation is shown in Figure 3.

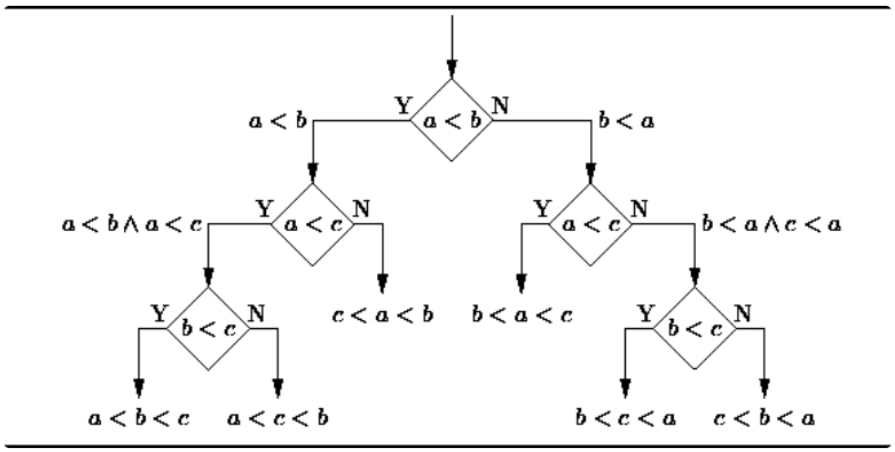


Fig. 3 Graphical representation of the tree structure

Decision trees are a way to represent rules in a hierarchical, consistent structure, where each object has a single node that provides the solution. The decision trees solve the classification problems well, requiring the assignment of objects to one of the previously known classes. The main advantage of the decision tree is that you can observe how the decision was made, unlike other algorithms, which are a "black box".

In this paper, it is proposed to use machine learning to solve the problem of churn of customers using the decision tree algorithm. To make a decision on a possible churn of customers, data are used to replenish the customer's account and make calls, in the future, to improve accuracy, it is possible to use other customer data.

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