

Supervised Learning Methodologies to Improve Customer Support - development of a recommendation system to help diagnose telecommunication issues

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The advances in technology are making the access to telecommunications services easier, and the need for efficient operations and quality of service is more and more a requisite. In the telecommunications sector, real losses come from unsatisfied customers and that is why a lot of time and effort is put into improving customer support. The goal of this work is to help the technical assistants of a certain telecommunications provider to do a better and faster diagnostic of the possible causes of customers' reported problems by the development of a predictive model.

Two approaches were implemented: the first one involves training popular Machine Learning algorithms, such as Naïve Bayes, Multinomial Logistic Regression, Random Forests and Neural Networks. The second approach involves building a model in several steps, where in each step the causes with similar relative frequencies are classified together as an attempt to mitigate the consequences of an imbalanced data. Our experiment was carried out with a real dataset comprising 65900 customers reports, each one with a categorical variable containing the likely cause assigned by the technical assistant and a large number of binary predictor variables. The model's performance was evaluated using the weighted F1-score and a custom metric which tells us how precisely a model predicts the correct cause within the three most probable causes returned by the model (Top 3 accuracy). Results show that the neural network classifier with two hidden layers and two dropout layers outperformed other algorithms, yielding a weighted F1-score of 62% and a Top 3 accuracy of 90%.

Keywords: Telecommunications; Classification; Supervised learning; Class imbalance.