A dynamic approach to churn prediction using time series classification

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ABSTRACT

As customer retention is important due to the high costs of acquiring new customers, churn prediction is necessary to identify valuable customers at risk of leaving. Previous works on churn prediction models often use static data, overlooking the dynamic nature of customer behavior, which leads to less accurate predictions and less timely response of retention campaigns. To address this issue, this paper proposes a dynamic approach to churn prediction using weekly multivariate time series data to better capture changes in customer behavior. Two time series classification models, namely MINIROCKET and LSTM-SLP, were compared to three static models: Random Forest, XGBoost, and Ridge Regression. Experimental results demonstrate that the MINIROCKET model outperforms all other state-of-the-art methods, achieving the highest F1 score. Furthermore, both time series classification models, LSTM-SLP and MINIROCKET, consistently yielded better results in comparison to traditional models using static data. This superiority highlights the effectiveness of considering temporal dynamics in classification models, which previous static models fail to address. This finding indicates the potential of time series classification in enhancing churn prediction accuracy and, consequently, improving customer retention strategies.

1. Introduction

In nowaday's business environment, enterprises operating within competitive markets primarily depend on the revenue generated from their customer base. Therefore, it is necessary to focus on promoting customer retention rather than attracting new customers (Sağlam & El Montaser, 2021). Customer churn prediction has also become a major concern in the marketing and management literature in recent times. One of the most direct and effective methods to retain current customers is that companies should predict customers at risk of leaving over time and respond promptly. Recognizing the signs of potential churn, satisfying customer needs, restoring, and re-establishing loyalty