Machine Learning Based Optimization of ATM Cash Flow in Bankng: Advancing Financial Efficiency and Predictive Analytics

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Abstract

Optimizing cash flow is the most critical task for any bank as it saves a significant amount of money and significantly reduces the expenses associated with financing ATMs. The paper aims to contribute to the calculation of the daily load by estimating the money drawn from ATMs, using machine learning techniques to keep the amount of cash required in ATMs at a level suitable for intraday operations and increase funding income. In order to increase customer satisfaction by reducing downtime due to cash outflow at ATMs, a 7-day forward-looking cash forecasting model has been designed using machine learning techniques to determine ATM-specific deposit and withdrawal amounts. The data set includes 4200 ATMs of a bank and transactions. Machine learning models such as random forest and xgboost were trained with various combinations of 500 different attributes. The xgboost algorithm was selected because it performs better compared to other methods. The study involves developing a machine learning prediction model for cash withdrawal and deposit transactions using real data from one of the five largest banks in Türkiye. With the results of this study, the cash needs of ATMs for the next 7 days were determined and were successfully integrated into the bank's systems.

Keywords

Banking Systems, ATM Optimization, Cash Forecasting, Machine learning algoritms, Big data, XGBoost, Artificial Intelligence.