AUTOMATED TELLER MACHINE FAILURE PREDICTION ON TIME SERIES DATA

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Abstract

Automated Teller Machines (ATM) have revolutionalized the way banking services are delivered to its customers. ATM installation, operation and maintenance costs have lead banks to focus more on reducing the ATM failures and ATM downtime as a means of reducing costs and improving overall customer satisfaction. Through this research it was attempted to devise a model that can predict the number of potential ATM failures by failure type. There can be many failures within an ATM device such as the failure of the Card Reader component, failure of the Cash Dispenser etc. Thus this research has devised prediction models based on each of the ATM failure types by the application of forecasting techniques namely; Linear Regression, Holts model, Simple Exponential Smoothing and Naïve model.

The models were built based on ATM failure log data collected from an ATM network of a leading bank in Sri Lanka. After data collection, data analysis and data pre-processing was performed to gain insights into the nature of the dataset, followed by model application and final model evaluation and conclusion. The devised models were tested with real-world data and it provided reasonable predictions of future failures. It was identified that different forecasting techniques have proved optimal for different failure types. For instance, the Holts model was proven optimal for forecasting Dispenser Hardware errors whereas the Simple Exponential Smoothing model and Linear Regression model was proven optimal for forecasting Card Reader Hardware errors. The concluded models can be used by the bank to accurately forecast the ATM failures for future periods thus allowing the bank to gain a range of benefits such as assisting in the strategy of ATM inventory management and also ATM preventive and corrective maintenance.