UNIVERSITI TEKNOLOGI MARA

FORECASTING PWL STOCK PROCUREMENT USING RANDOM FOREST REGRESSION FOR INVENTORY PLANNING

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ABSTRACT

Effective stock procurement planning is essential to ensure sufficient product availability while avoiding overstocking and stock shortages. However, PWL experiences difficulties in estimating future stock procurement quantities because procurement decisions mainly rely on historical purchase records and manual judgement, resulting in inconsistent stock planning. Therefore, this project aimed to develop a stock forecasting dashboard using predictive analytics to forecast future stock procurement quantities and support procurement planning decisions. The project adopted the CRISP-DM methodology, which consists of business understanding, data understanding, data preparation, modelling, evaluation, and deployment. Historical purchase order data were prepared using Microsoft Excel, while RapidMiner was used to develop and evaluate the forecasting models. Three supervised regression algorithms, namely Linear Regression, Support Vector Machine (SVM), and Random Forest, were compared using Root Mean Squared Error (RMSE) and Mean Absolute Error (MAE). Based on the evaluation results, Random Forest achieved the best forecasting performance with the lowest RMSE of 769.280 and MAE of 389.940 and was therefore selected as the final forecasting model. The prediction results were then deployed through an interactive Microsoft Power BI dashboard consisting of procurement overview, procurement cost analysis, forecast accuracy, and stock forecast pages to support procurement planning. Expert evaluation also indicated that the dashboard was useful, easy to use, and supported procurement decision-making, although several improvements were suggested, including the integration of inventory-related information and additional filtering capabilities. Overall, the proposed dashboard provides a practical solution for improving stock procurement planning at PWL through data-driven forecasting. Future enhancement may include incorporating real-time inventory data and additional inventory management factors to further improve forecasting accuracy and procurement recommendations.