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Integrating Machine Learning and Rule-Based Decision Models for Enhanced B2B Sales Forecasting and Customer Prioritization

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Abstract : This study explores an advanced approach to enhancing B2B sales forecasting by integrating machine learning models with a rule-based decision framework. The methodology begins with the development of a machine learning classification model to predict conversion likelihood, aiming to improve accuracy over traditional methods like logistic regression. The classification model's effectiveness is measured using metrics such as accuracy, precision, recall, and F1 score, alongside a feature importance analysis to identify key predictors. Following this, a machine learning regression model is used to forecast sales value, with the objective of reducing mean absolute error (MAE) compared to linear regression techniques. The regression model's performance is assessed using MAE, root mean square error (RMSE), and R-squared metrics, emphasizing feature contribution to the prediction. To bridge the gap between predictive analytics and decision-making, a rule-based decision model is introduced that prioritizes customers based on predefined thresholds for conversion probability and predicted sales value. This approach significantly enhances customer prioritization and improves overall sales performance by increasing conversion rates and optimizing revenue generation. The findings suggest that this combined framework offers a practical, data-driven solution for sales teams, facilitating more strategic decision-making in B2B environments.

Keywords : sales forecasting, machine learning, rule-based decision model, customer prioritization, predictive analytics
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