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Predictive Modeling for Enhanced Direct Marketing Campaigns

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Motivation/Introduction

In the highly competitive banking sector, optimizing direct marketing subscriptions using demographic and campaign features.campaigns is crucial. This project explores customer behavior using data-driven techniques to enhance marketing efficiency and predict term deposit

SCOPE of the project

This project aims to analyze customer demographics such as age, occupation, and education to gain insights into their interaction with marketing campaigns. By examining these factors, we can identify key elements that influence a customer's likelihood to subscribe to a service or product. Using this understanding, predictive models will be developed to accurately classify subscription outcomes. Furthermore, prescriptive analytics will be applied to recommend effective strategies that can enhance campaign performance and increase customer subscriptions.

Methodology

The analysis began with data profiling and descriptive analytics to understand customer demographics such as age, job, and education, along with financial indicators like average balance. Diagnostic analysis, including hypothesis testing, revealed that factors like older age and shorter call duration reduced the chances of subscription. Predictive models like Decision Tree and Logistic Regression were used to classify subscription outcomes, with call duration and previous contact history emerging as key predictors. Prescriptive analytics, supported by A/B testing, helped recommend effective call strategies and customer targeting methods to improve subscription rates.

BOX PLOT

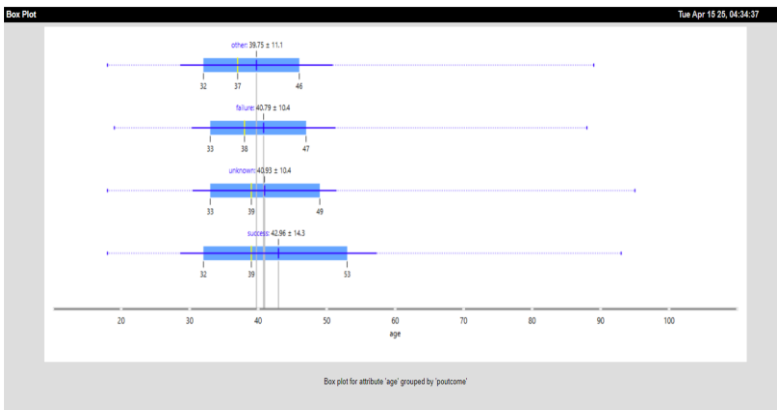

Fig 1

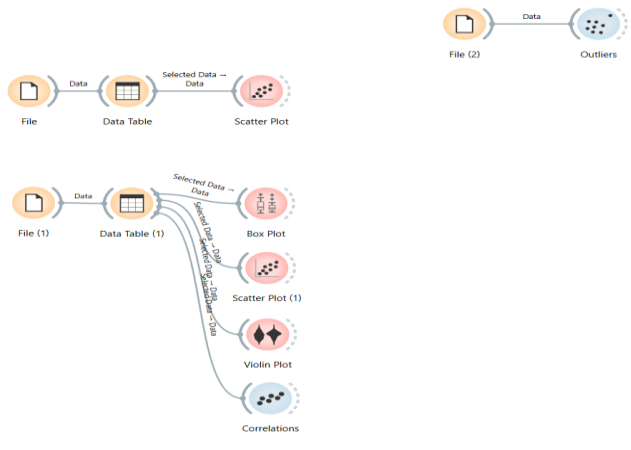

Fig 2

Result

The analysis showed that call duration is the strongest predictor of subscription, while prior contact with customers significantly increases their likelihood to subscribe. Based on these insights, it is recommended to target customers under the age of 50 who have a high account balance and a history of previous contact. Predictive models proved useful in supporting campaign strategies and optimizing resource allocation for better outcomes

Accuracy table:

Model	Accuracy (%)	Precision	Recall	F1 Score	R^2 Score	MAPE (%)	Silhouette Score
Logistic Regression	80	0.80	0.80	0.80	–	–	–
Decision Tree Classifier	90	1.00	0.80	0.889	–	–	–
Random Forest Classifier	100	1.00	1.00	1.00	–	–	–
SVM (RBF Kernel)	90	1.00	0.80	0.889	–	–	–
Holt-Winters (Forecast)	–	–	–	–	-2.647	34.78	–
DBSCAN (Clustering)	–	–	–	–	–	–	0.42
Bayesian Network	95	0.94	0.96	0.95	–	–	–
FNN	91	-	-	-	-	-	-

Fig 3

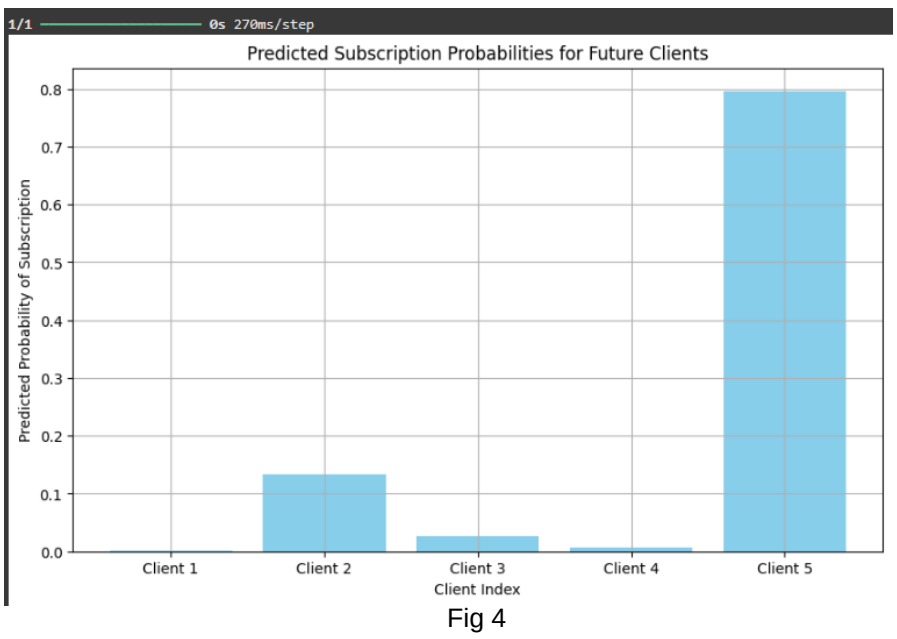

Fig 4

Conclusion / Summary

The LSTM forecast shows that conflicts peaked around the year 2000 and have generally declined since then. However, the model predicts a gradual rise in the number of conflicts from 2024 onward. This suggests a possible reversal of the previous downward trend. Continuous monitoring is essential to validate these projections and guide proactive measures.

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Reference / Acknowledgement

GitHub Link: https://github.com/Srishreyan/eda_project