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(57) Abstract :

Customer churn remains a pressing concern for telecom providers, as it directly impacts revenue, customer lifetime value, and competitive standing. This project proposes a comprehensive machine learning solution to predict customer churn using structured data. By employing ensemble classifiers such as Gradient Boosting, Random Forest, and Support Vector Machines, and addressing class imbalance through SMOTE, the system achieves strong predictive performance. The Gradient Boosting model achieved an accuracy of 86% and ROC AUC of 0.86. To overcome the black-box limitation of machine learning models, SHAP SHapley Additive exPlanations was used to provide transparent, feature-level insights. The model's predictions were further validated statistically using the Wilcoxon Signed-Rank Test. This approach ensures accurate, interpretable, and actionable churn predictions that support data-driven retention strategies.

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