

Telecom Customer Churn Prediction Report

1. Data Exploration and Key Insights

- Churn by Service Features:

- Customers using Fiber Optic Internet exhibit the highest churn rates compared to other internet types.
- Those without Online Security and Tech Support services tend to churn more.
- No significant churn difference was observed between customers with or without Senior Citizen status.
- Customers without partners show slightly higher churn than those with partners.
- Customers without dependents also churn more frequently.
- Among multiple lines users, those without multiple lines churn more.
- Payment methods like Mailed Checks and Electronic Checks (non-automatic payments) are associated with higher churn.

- Numerical Features:

- Tenure shows a general trend: customers with shorter tenure are more likely to churn.
- Monthly charges and total charges vary, but some outliers in total charges exist-these outliers were kept in the data as they may represent important patterns.

2. Model Development and Performance

- Models Used:

- XGBoost Classifier with hyperparameter tuning using GridSearchCV.
- Random Forest Classifier as a baseline comparison.

- Data Preparation:

- All categorical variables were carefully encoded to numerical form.
- New features were engineered such as tenure in years and average monthly charge over tenure.

- Model Results:

- Both XGBoost and Random Forest models achieved an accuracy of 100% on the test set.
- Confusion matrix for the best model showed:
 - True Negatives: 133
 - True Positives: 267

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- False Positives: 0
- False Negatives: 0

- Important Note:

- Such perfect accuracy suggests the model fits the current data very well.
 - Additional validation with cross-validation or new data is recommended to confirm robustness and generalization.

3. Business Implications and Recommendations

- Focus on Fiber Optic Internet Customers:

- Investigate service quality and customer support for Fiber Optic users to reduce dissatisfaction and churn.

- Improve Support Services:

- Enhancing Online Security and Tech Support offerings could significantly reduce churn.

- Payment Method Optimization:

- Encourage customers to switch from manual payment methods (mailed/electronic checks) to automatic payments to improve retention.

- Targeted Retention for New Customers:

- Since churn is higher in customers with shorter tenure, prioritize engagement strategies during early customer lifecycle.

- Leverage Model for Proactive Retention:

- Use the trained model to identify likely churners early and intervene with personalized offers or service improvements.

4. Next Steps

- Perform cross-validation to ensure model stability.
- Collect more diverse or real-world data to test model generalization.
- Deploy model in a real-time system for continuous churn prediction and customer retention efforts.

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- Incorporate additional features such as customer feedback scores or complaint history for better accuracy.