Telecom Customer Churn Analysis Report

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1. Executive Summary

In this report, we conducted an analysis of telecom customer churn using a dataset containing customer information and churn labels. Our goal was to identify the most indicative features of churn, build machine learning models to predict churn, and provide recommendations to reduce customer churn for the telecom company.

2. Data Exploration and Preprocessing

We began by exploring and preprocessing the dataset. Key findings from this stage include:

- The dataset contains 7043 rows and 21 columns.
- There were no missing values in the dataset.
- We converted the "Churn" column to binary numeric values (1 for "Yes" and 0 for "No").
- Categorical variables were transformed into dummy variables.

3. Feature Importance

To determine which features are most indicative of churn, we employed a Random Forest Classifier and analyzed feature importances. The top 10 most important features for predicting churn are as follows:

1. Tenure
2. MonthlyCharges
3. Contract (Month-to-month)
4. TechSupport (No)
5. OnlineSecurity (No)
6. PaymentMethod (Electronic check)
7. Contract (Two year)
8. InternetService (Fiber optic)
9. OnlineBackup (No)
10. OnlineSecurity (Yes)

These features provide valuable insights into customer behavior and preferences that can influence churn.

4. Model Building and Evaluation

We constructed machine learning models to predict customer churn, including Decision Trees, K Nearest Neighbors (KNN), Random Forest, and a Neural Network. Model performances were assessed using various metrics such as accuracy, precision, recall, and F1-score. The performance results are as follows:

- Decision Tree Classifier:
  - Accuracy: 0.77
  - Precision: 0.58
  - Recall: 0.48
  - F1-score: 0.52

- K Nearest Neighbors (KNN) Classifier:
  - Accuracy: 0.78
  - Precision: 0.63
  - Recall: 0.50
  - F1-score: 0.56

- Random Forest Classifier (Best Performing Model):
  - Accuracy: 0.80
  - Precision: 0.67
  - Recall: 0.46
  - F1-score: 0.55

- Neural Network Classifier:
  - Accuracy: 0.78

The Random Forest Classifier emerged as the best-performing model with an F1-score of 0.55.

5. Recommendations

Based on our analysis, we recommend the following strategies to reduce customer churn:

1. Improve Customer Retention for New Customers: Customers with shorter tenure have a higher likelihood of churning. Consider offering special incentives, discounts, or personalized services to new customers during their initial months.

2. Enhance Internet Services: Customers using Fiber optic internet service have a higher churn rate. Focus on improving the quality and reliability of this service to retain customers.

3. Promote Long-Term Contracts: Customers with month-to-month contracts are more likely to churn. Encourage customers to sign longer contracts by providing benefits such as discounts or additional services.

4. Streamline Billing and Payment: Simplify the billing process and offer various payment methods to cater to different customer preferences.

5. Boost Customer Support: Invest in tech support and online security services, as customers without these services are more likely to churn. Educate customers about the advantages of these services.

6. Monitor Monthly Charges: Be mindful of monthly charges and consider adjusting pricing strategies, offering bundled services, or discounts to retain price-sensitive customers.

6. Conclusion

In conclusion, our analysis provided insights into the factors influencing customer churn in the telecom industry. By implementing the recommended strategies and leveraging machine learning models, the telecom company can work towards reducing customer churn and improving overall customer satisfaction.