Summary on Telecommunication Customer Churn Analysis

1.Objective - The primary goal of this analysis is to understand the factors contributing to customer churn at a telecommunications company and to build predictive models that identify customers likely to churn. The insights derived from the analysis can assist in formulating strategies to improve customer retention.

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2. Dataset Overview -The dataset used for this analysis contains information about customers, including demographics, services subscribed to, account details, and churn status. Key features include:

- **Customer Demographics**: Gender, age, seniority.
- **Services**: Internet service type, phone services, streaming services.
- **Account Information**: Contract type, monthly charges, tenure.
- **Churn Indicator**: Whether the customer has churned (Yes/No).

The dataset underwent an initial examination to:

- Check for missing values.
- Identify data types for all columns.
- Explore class distribution for the target variable (churn).

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3. Data Preprocessing -

Key preprocessing steps performed:

- **Handling Missing Values**: Columns with missing data were either filled (using mean/median for numerical data or mode for categorical data) or dropped based on relevance.
- **Encoding Categorical Variables**: Categorical features such as gender and contract type were converted to numerical values using techniques like one-hot encoding.
- **Feature Scaling**: Numerical features like monthly charges and tenure were scaled to ensure uniformity.
- **Removing Outliers**: Detected and removed extreme values using statistical methods.

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4. Exploratory Data Analysis (EDA) - EDA was conducted to uncover trends and relationships in the data. Key observations include:

- **Churn Trends**:
    - Customers with month-to-month contracts exhibit higher churn rates.
    - Churn is more prevalent among customers with higher monthly charges.
- **Service Usage**:
    - Customers not subscribed to internet services have lower churn rates.
    - Streaming service users showed varying churn tendencies based on contract type.
- **Demographics**:
    - Senior citizens have slightly higher churn rates compared to younger customers.

Visualizations such as histograms, bar charts, and heatmaps were used to support these findings.

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5. Predictive Modeling -

Various machine learning models were implemented to predict churn. The steps include:

- **Model Training and Evaluation**:
    - Models used include Logistic Regression, Decision Trees, and Random Forest.
    - Metrics such as accuracy, precision, recall, F1-score, and ROC-AUC were calculated to evaluate performance.
- **Best Performing Model**:
    - Random Forest achieved the highest accuracy of ~85%, with a balanced precision and recall, making it the most reliable model for churn prediction.
- **Feature Importance**:
    - Key predictors of churn identified by the models include:
        - Contract type.
        - Tenure.
        - Monthly charges.
        - Internet service type.

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6. Key Insights and Recommendations -

Insights:

1. Month-to-month contracts significantly contribute to churn; offering discounts or benefits for longer-term contracts may help reduce churn.
2. Customers with higher monthly charges are more likely to churn, indicating potential dissatisfaction with perceived value.
3. Senior citizens exhibit higher churn rates, suggesting a need for targeted retention strategies for this demographic.

Recommendations:

1. Introduce loyalty programs and incentives to encourage long-term contracts.
2. Provide tailored plans or discounts to high-billing customers.
3. Focus on improving service quality and customer support for senior citizens.
4. Implement proactive churn prevention mechanisms using the predictive model to identify at-risk customers and offer retention deals.

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7. Conclusion -

This analysis highlights the importance of understanding customer behavior and leveraging data-driven strategies to improve retention. The predictive model developed serves as a robust tool to identify churn risks, enabling the company to take preemptive measures and enhance customer satisfaction.