

# Telco Customer Churn Prediction

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# Problem Statement

- Customer churn is a critical revenue challenge in telecommunications.
- Acquiring new customers is more costly than retaining existing ones.
- The goal is to predict churn early to devise proactive retention strategies.

# Dataset Overview

- The project used Telco Customer Churn dataset with 7,043 customer records.
- Data Features include demographics, services, billing, and contract information.
- Target variable indicates whether a customer churned.

# Exploratory Analysis

- Churners are the minority class, hence, creating class imbalance.
- Month-to-month contracts show significantly higher churn rates.
- Customers with low tenure are more likely to churn.

# Data Preprocessing

- Separated numeric and categorical features.
- Applied imputation, scaling, and encoding using pipelines.
- Used ColumnTransformer to ensure consistent preprocessing.

# Handling Class Imbalance

- Imbalanced classes bias models toward non-churn predictions.
- SMOTE used to oversample churners in training data only.
- Improved detection of churn cases.

# Modeling Approach

- Data analyzed using two models; Logistic regression and Decision Tree.
- Logistic Regression used for baseline and interpretability.
- Decision Tree used to capture non-linear churn patterns.
- Models tuned using GridSearchCV optimizing Recall.

# Model Performance

- Baseline models achieved limited Recall.
- Logistic Regression + SMOTE achieved highest Recall (~79%).
- Decision Tree + SMOTE achieved comparable performance.

# Key Insights

- Fiber optic internet service shows higher churn risk.
- Contract type and tenure strongly influence churn.
- Long-term contracts reduce likelihood of churn.

# Business Recommendations

- Target month-to-month customers with personalized offers.
- Review fiber optic service pricing and quality.
- Improve onboarding and engagement for new customers.

# Conclusion

- Data-driven strategies support long-term revenue growth.
- Churn prediction enables proactive customer retention.
- Recall-focused modeling aligns with business priorities.