



Customer Churn Analysis

Overview & Goal

+ **Overview:**

Analyze a telecom company's dataset to determine what variables cause customers to churn

+ **Goal:**

Identify key variables impacting customer churn and provide recommendations to lower this in the future

Data Utilized


+ Dataset

- Churn in Telecom's Dataset

+ Target Variable = Churn

+ Key Features

- Customer Service Calls
- Customer usage metrics (calls, charges, etc...)
- International Plan
- Voice Mail Plan
- State

 DAVID_BECKS · UPDATED 7 YEARS AGO

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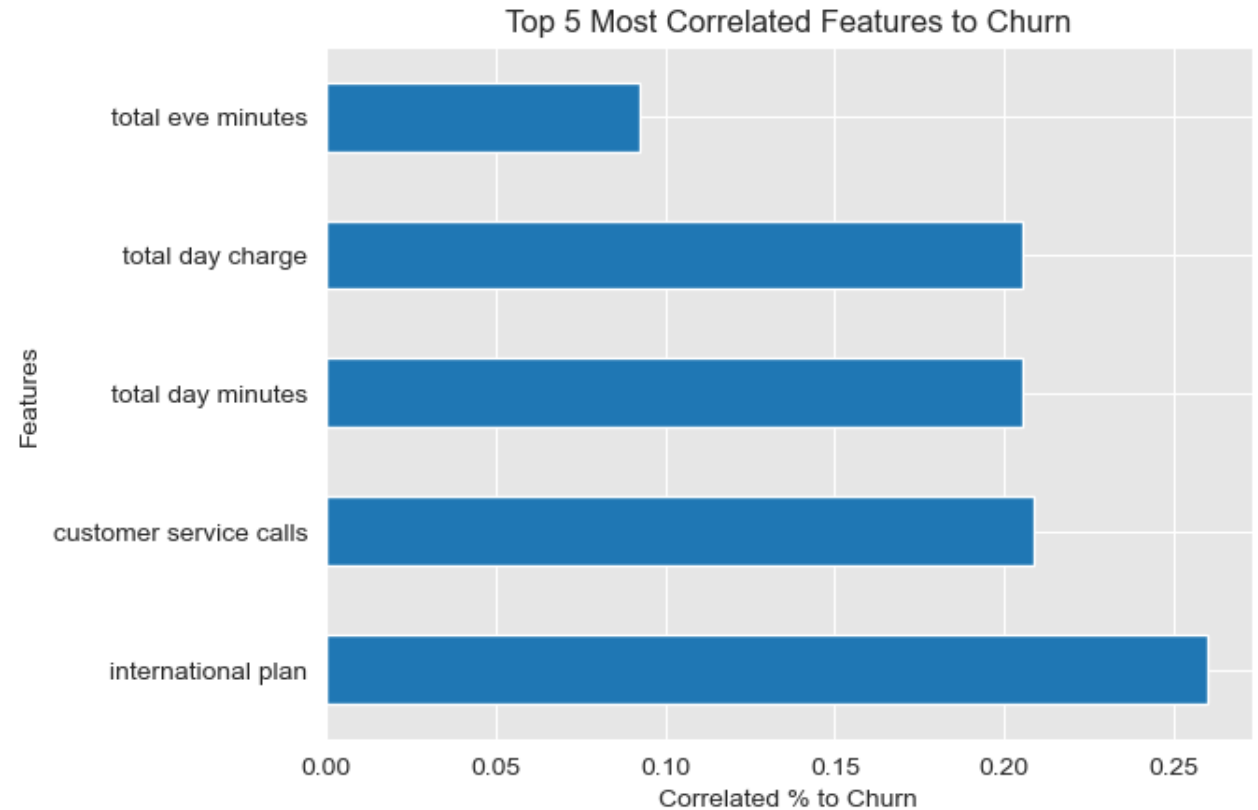
Churn in Telecom's dataset

Data Card Code (76) Discussion (3) Suggestions (0)

Correlation to Churn

+ Key Takeaways

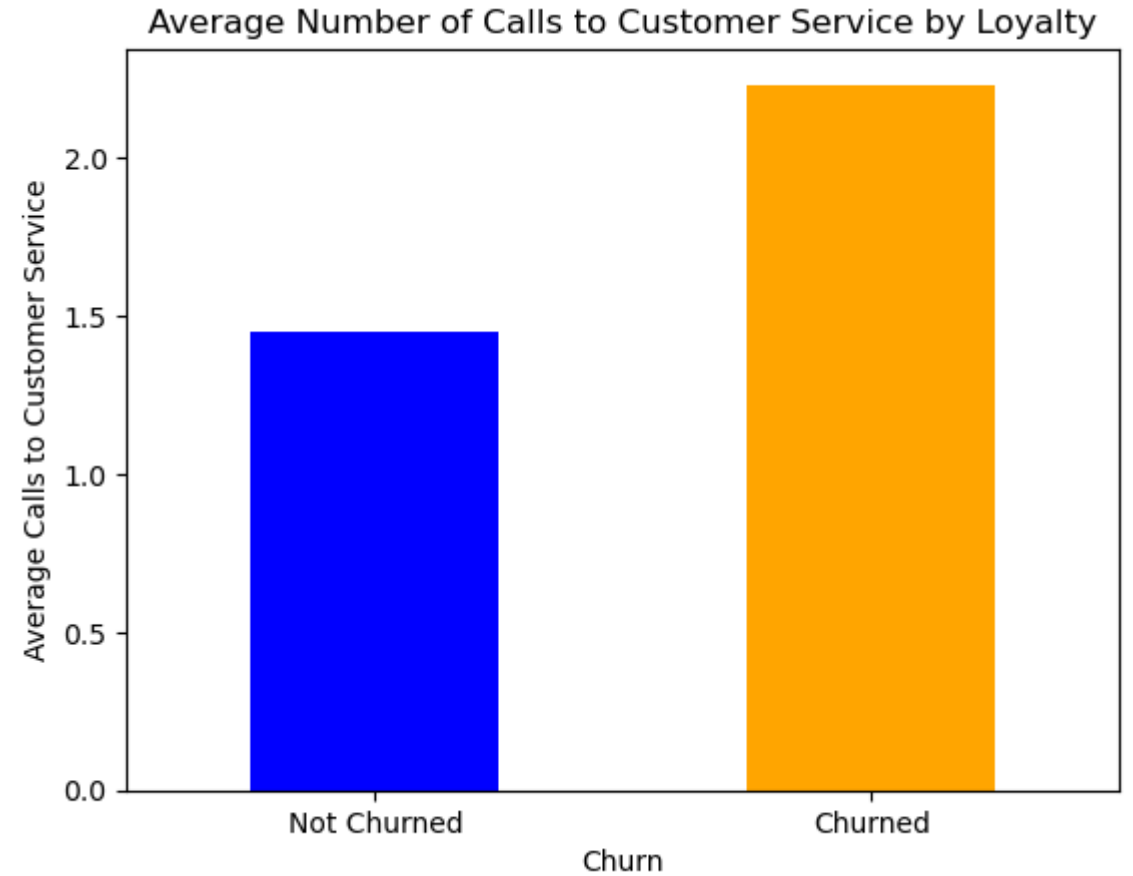
- **Customer service calls is 20% correlated to predicting churn**
- **Total day minutes and charge are slightly lower**



Customer Service Calls

+ Key Takeaways

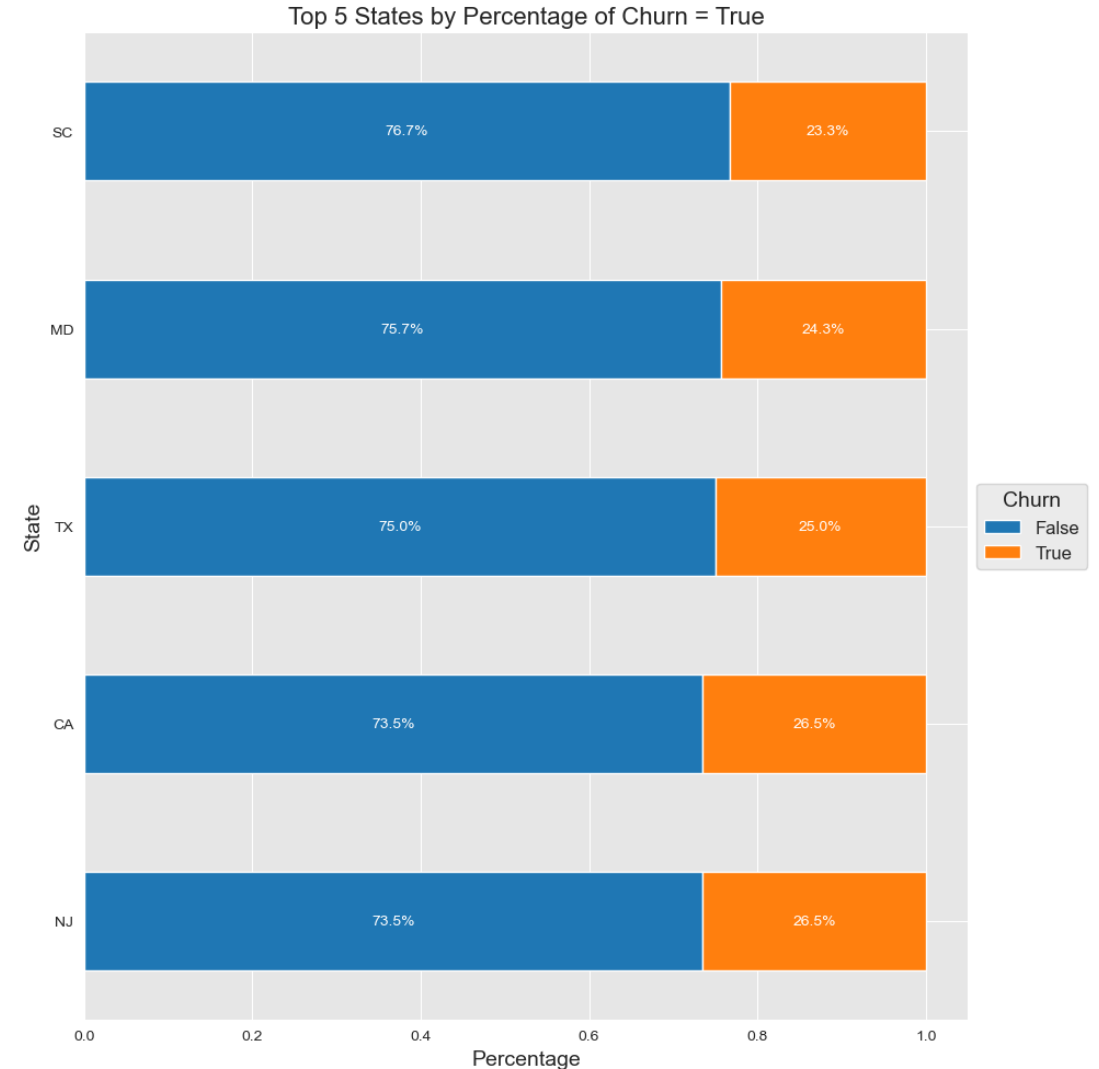
- Customers who churn have an average of over 2 customer service calls
- Users who do not churn average around 1.5 calls



Highest Churn by State

+ Key Takeaways

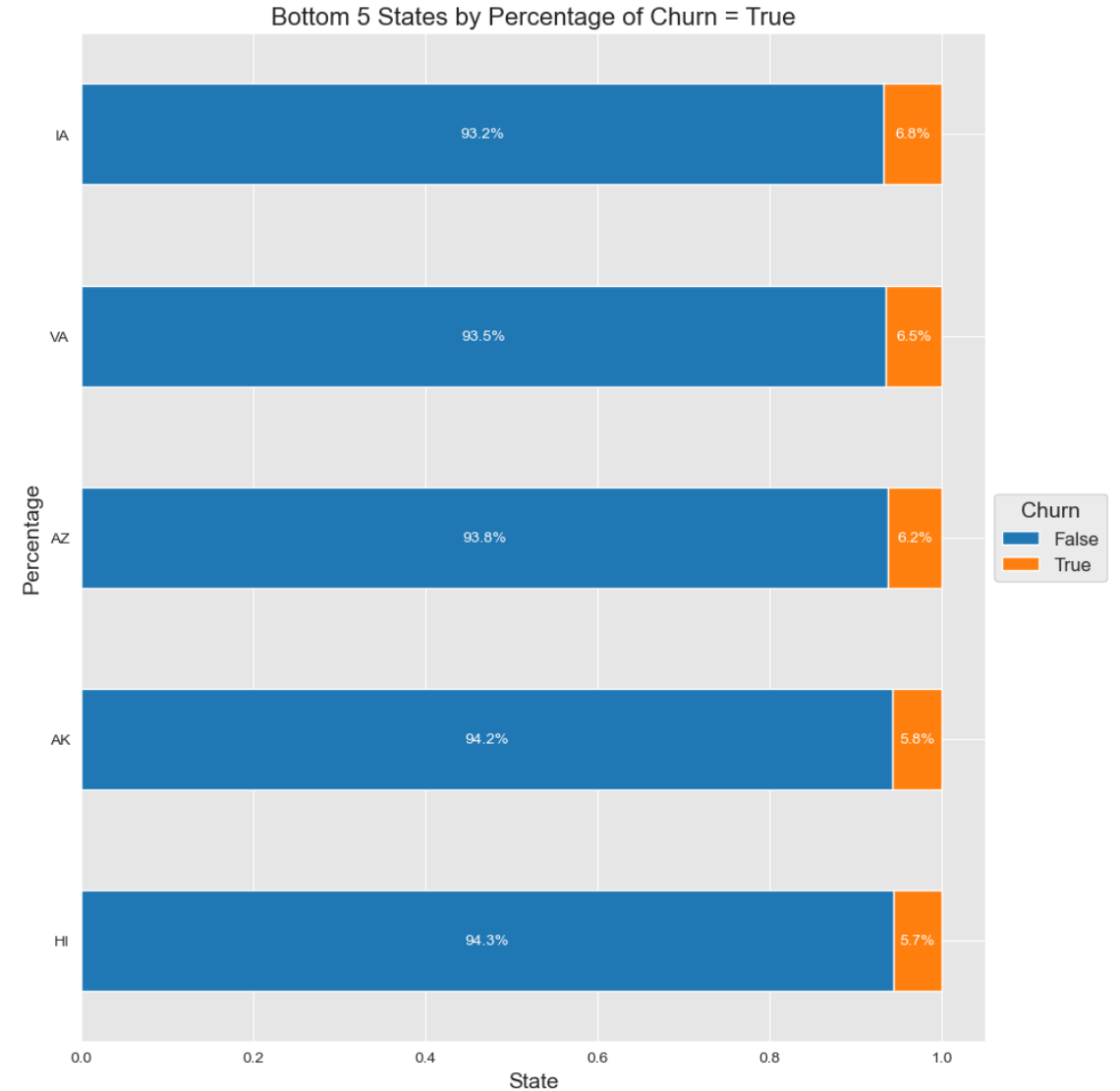
- **NJ, CA, and TX all have churn rates 25% or higher**
- Three of the most populous states have the highest churn rate



Lowest Churn by State

+ Key Takeaways

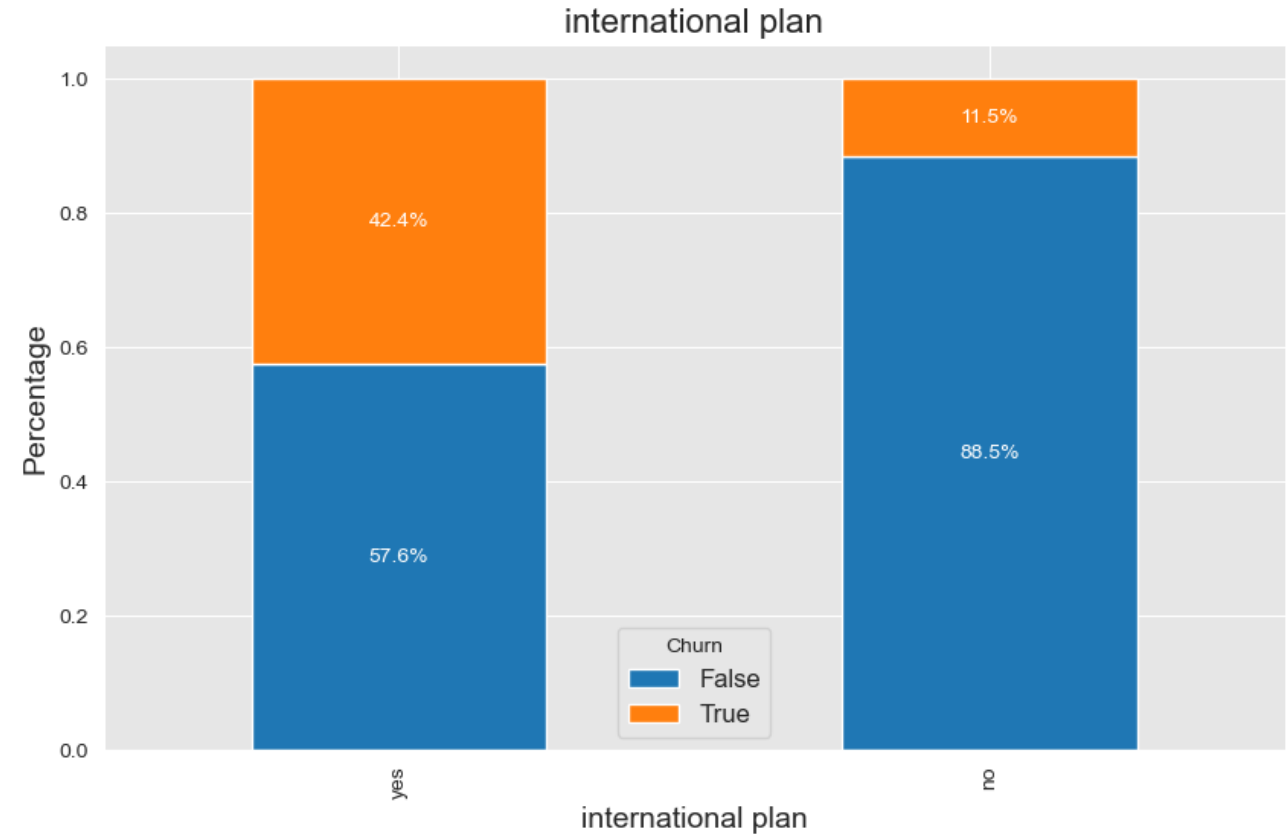
- HI, AK, and AZ have the lowest churn % rates at 6.2% or lower



International Plan Churn

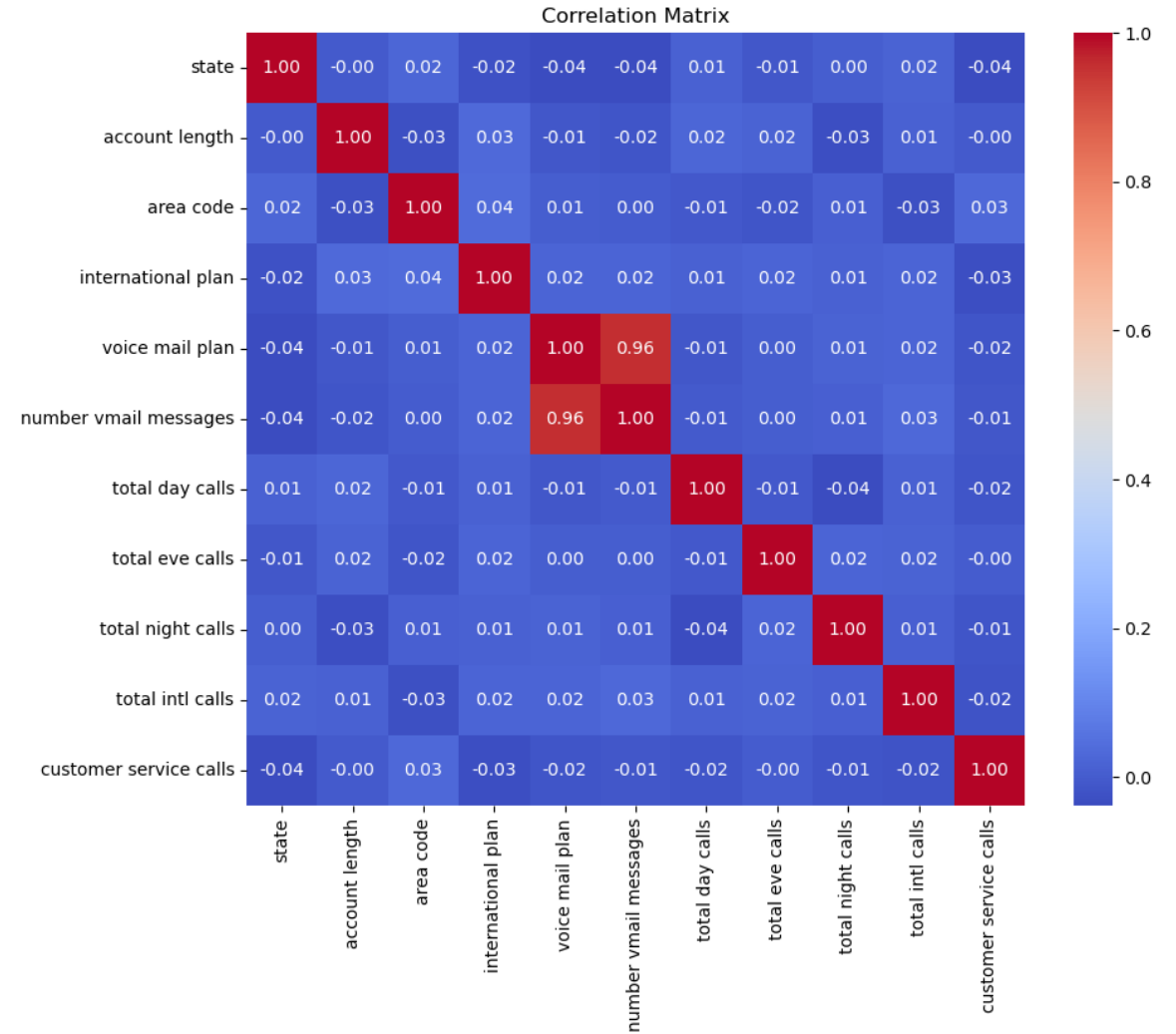
+ Key Takeaways

- People with an international plan churn 42.4% of the time
- People without an international plan only churn 11.5% of the time
- Significant 30.9% difference between having a plan vs not



Correlation Matrix

+ Confirmed there is no collinearity between features



Model Evaluation Using Statsmodels (1/2)

Model	Features	Updates from Previous Model	Key Metrics
Baseline Model	<ul style="list-style-type: none">11 FeaturesState, account length, area code, international plan, voice mail plan, # vmail messages, total day / eve / night / intl calls, customer service calls	<ul style="list-style-type: none">N/A	<ul style="list-style-type: none">R-squared: 6.25%
Optimized Model	<ul style="list-style-type: none">4 featuresCustomer service calls, international plan, voice mail plan, total intl calls	<ul style="list-style-type: none">Limit features to those that have high correlation to churn	<ul style="list-style-type: none">R-squared: 13.5%
Optimized Model #2	<ul style="list-style-type: none">6 FeaturesCustomer service calls, international plan, voice mail plan, total intl calls	<ul style="list-style-type: none">Added categorical features such as intl plan and voice mail plan	<ul style="list-style-type: none">R-squared 19.1%

Statsmodels Overview

- **Focus:** Statistical analysis.
- Provides detailed statistical summaries and hypothesis testing (e.g., p-values, confidence intervals).
- Ideal for understanding the relationships between variables in-depth.

Model Evaluation Using SciKitLearn

Model	Features	Updates from Previous Model	Key Metrics
LogReg Baseline Model	<ul style="list-style-type: none">7 Featurescustomer service calls', 'international plan', 'voice mail plan', 'total intl calls', 'total day charge', 'total day minutes'	<ul style="list-style-type: none">N/A	<ul style="list-style-type: none">AUC 64.5%
LogReg Baseline Model #2	<ul style="list-style-type: none">7 Featurescustomer service calls', 'international plan', 'voice mail plan', 'total intl calls', 'total day charge', 'total day minutes'	<ul style="list-style-type: none">Added an intercept to the model	<ul style="list-style-type: none">AUC 65.2%
Decision Tree Model	<ul style="list-style-type: none">7 Featurescustomer service calls', 'international plan', 'voice mail plan', 'total intl calls', 'total day charge', 'total day minutes'	<ul style="list-style-type: none">Adjust several hyperparameters based on analysisMax features, max depth, min splits, min leafs	<ul style="list-style-type: none">AUC 59.2%

AUC Overview

- AUC is a score between 0.5 and 1.0 that shows how well the model separates different groups.
- The higher the AUC, the better the model at making accurate predictions.
- AUC helps us decide if the model is good enough to act on, ensuring we focus on the right people or items.

Model Results – Recommendations

+ **Customer Service Calls is the Strongest Predictor**

- The more frequently a customer contacts customer service, the higher the likelihood of churn. This suggests that resolving customer complaints efficiently could reduce churn.

+ **Customers with an International Plan are at Higher Risk**

- These customers may be dissatisfied with the cost or quality of the international calling plan. Improving this service could improve retention.

+ **Voice Mail Plan is Predictive**

- While less obvious, whether a customer has a voicemail plan or not may relate to overall service usage or satisfaction. This could be worth exploring further.

+ **Total International Calls Adds Context**

- Customers making frequent international calls may represent a specific customer segment. Understanding their unique needs (e.g., better international rates or service quality) could reduce churn.

Model Results – Recommendations

+ Takeaways from the Decision Classifier Model

- The decision classifier model helps us predict churn by learning patterns in these selected features. Here's what we learned:

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- The more frequently a customer contacts customer service, the higher the likelihood of churn. **This suggests that resolving customer complaints efficiently could reduce churn.**

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- These customers may be **dissatisfied with the cost or quality of the international calling plan**. Improving this service could improve retention.

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