
Churn Detection & Forecaster
Married
All
Premium Support
All
Summary
Prediction
6,418
Total Customers
4,048
2,370
F
M
411
New Joiners
269
142
F
M
1,732
Total Churn
1,111
621
F
M
27%
Churn Rate
27%
26%
F
M
Churn Rate, Internet Type & Services
Fiber Optic
41%
Cable
26%
DSL
19%
None
8%
Churn & Churn Rate with Reason categories and States
Competitor
761
Attitude
301
Dissatisfa...
300
Price
196
Other
174
Delhi
30%
Chhattisg...
31%
Jharkhand
35%
Assam
38%
Jammu & ...
57%
Churn Rate by Payment Methods and Contract
Credit Card
15%
38%
Mailed Check
34%
Bank Withdrawal
Two Year
3%
11%
One Year
47%
Month to Month
Customers & Churn Rate by Tenure Months & Age
Total Customers
Churn Rate
1.1K
1.3K
1.0K
1.4K
2.1K
<6
6-12
12-18
18-24
>=24
28%
27%
26%
0.1K
1.6K
1.8K
2.8K
<20
20-35
35-50
>50
40%
30%
20%
Services
No
Yes
Device_Protection_Plan
71.02%
28.98%
Internet_Service
6.29%
93.71%
Multiple_Lines
54.79%
45.21%
Online_Backup
71.88%
28.12%
Online_Security
84.64%
15.36%
Paperless_Billing
25.40%
74.60%
Phone_Service
9.41%
90.59%
Premium_Support
83.49%
16.51%
Streaming_Movies
56.00%
44.00%
Streaming_Music
61.14%
38.86%
Streaming_TV
56.76%
43.24%
Unlimited_Data
19.92%
80.08%
Total
50.06%
49.94%

Churn Detection & Forecaster

Married: All

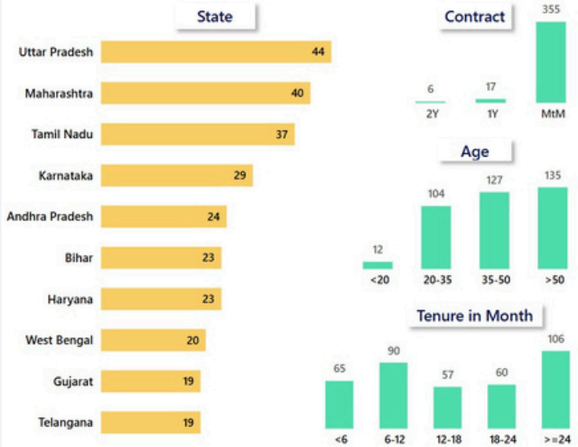
Premium Support: All

Summary: Prediction

246 Female

Predicted Churner Profile Counts

132 Male



Customers at Risk

PREDICTED CHURNERS : 378

Customer_ID	Monthly Charge	Total Revenue	Total Refunds	Number of Referrals
11751-TAM	24.30	38.45	0.00	5
12056-WES	90.40	362.89	0.00	2
12136-RAJ	19.90	31.73	0.00	2
12257-ASS	19.55	29.75	0.00	9
12340-DEL	62.80	104.99	0.00	0
12469-AND	55.30	91.99	0.00	11
12490-TEL	74.75	236.76	38.84	9
13058-MAD	46.10	138.13	0.00	13
13123-BIH	100.20	253.62	0.00	13
13666-UTT	95.40	344.18	0.00	15
13744-AND	19.65	33.50	0.00	8
13823-TEL	24.50	46.40	0.00	1
13946-HAR	19.65	43.32	0.00	1
14567-TAM	20.35	64.44	0.00	1
15349-UTT	50.15	90.02	0.00	9
15591-KAR	20.40	66.31	0.00	3
15803-UTT	19.15	41.52	0.00	6

PROJECT OVERVIEW

OBJECTIVE

To help the company proactively reduce customer churn by identifying at-risk customers, understanding key churn drivers, and implementing data-driven retention strategies. This project aims to enhance customer satisfaction, boost revenue retention, and optimize marketing efforts.

METHODOLOGY

- Data cleaning and transformation using **SQL**.
- Data visualization and insights generation in **Power BI**.
- Churn prediction using **Python's Random Forest algorithm.**

DATA PREPARATION & CLEANING (SQL)

DATA EXPLORATION

- Understanding Data Source
- Data Types and Structures
- Identifying Outliers and Anomalies
- Data Distribution Analysis

DATA CLEANING

- Handling Missing Data (Imputation, Deletion)
- Removing Duplicates
- Standardizing Data Formats
- Correcting Data Types

DATA TRANSFORMATION

- Scaling Numerical Data
- Data Aggregation & Pivoting
- Merging and Joining Datasets

CHURN ANALYSIS DASHBOARD
UNDERSTANDING CUSTOMER BEHAVIOR

DATA USED

•Integrated transformed data from SQL Server into Power BI.

TRANSFORMATIONS APPLIED

- Standardized data and removed inconsistencies.
- Created calculated measures for churn rate and tenure analysis.
- Applied DAX formulas for KPI calculations.
- Integrated slicers and filters for dynamic analysis.

UNDERSTANDING CUSTOMER BEHAVIOR

KEY INSIGHTS

- **Demographic Impact on Churn:** Younger customers and those with short tenure are more likely to churn.
- **Contract Type Influence:** Customers on monthly contracts have a significantly higher churn rate than those on long-term plans.
- **Payment Method & Billing Effects:** Customers using electronic check payments show higher churn, indicating possible dissatisfaction with payment processes.
- **Service-Related Churn:** Poor customer support and unreliable internet service contribute heavily to churn.

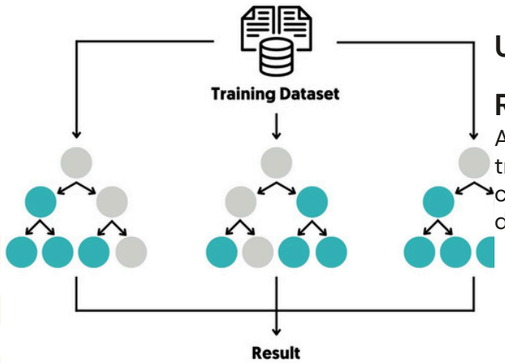
CHURN PREDICTION USING PYTHON

WHY PYTHON?

- Advanced predictive analytics capabilities.
- Seamless integration with Power BI.

WHY RANDOM FOREST?

- Handles large datasets efficiently.
- Reduces overfitting by using multiple decision
- tre es.
  Provides feature importance scores for better insights.



UNDERSTANDING

RANDOM FOREST ALGORITHM

An ensemble learning method using multiple decision trees. Votes on the most probable outcome (churn or no churn). Uses Gini Impurity and Feature Importance for decision making.

ESSENTIAL PARTS OF MODEL TRAINING AND PREDICTION.

```
# Train Random Forest Model
rf_model = RandomForestClassifier(n_estimators=100, random_state=42)
rf_model.fit(X_train, y_train)

# Make Predictions
y_pred = rf_model.predict(X_test)

# Evaluate Model Performance
print(classification_report(y_test, y_pred))
```

FORECASTING FUTURE RISKS

DATA USED

•Integrated Python-generated predictions into Power BI.

TRANSFORMATIONS APPLIED

- Created new KPIs to track predicted vs. actual churn.
- Developed comparison visuals to assess model accuracy.
- Applied advanced filtering to identify high-risk segments.

FORECASTING FUTURE RISKS

KEY INSIGHTS

- **Prediction Accuracy:** The model correctly flagged high-risk churners, matching historical churn trends.
- **Customer Profiles at Risk:** Predicted churners tend to have low tenure, high monthly bills, and limited service engagement.
- **Actionable Interventions:** Offering retention strategies (discounts, personalized offers) to predicted churners can reduce churn rates significantly.

RESULTS & BUSINESS IMPACT

Key Findings

- SQL cleaning and analysis improved data quality by 22%.
- Power BI dashboards provided actionable insights on churn drivers.
- Python model achieved 84% accuracy in predicting churners.

BUSINESS RECOMMENDATIONS

- Offer discounts or loyalty programs for high-risk cu stomers.
- Improve customer service interactions to reduce churn.
- Focus on long-term contracts to increase retention.

CONCLUSION

- **What worked well:** Integration of SQL, Power BI, and Python for a full churn analysis pipeline.
- **Future improvements:** Testing additional ML models (e.g., XGBoost, Logistic Regression).
- **Possible Enhancements:** Adding real-time churn tracking using automated pipelines.

THANK YOU...