

# Business Report: Churn Prediction for Subscription Services

## Executive Summary

This report presents the findings from the churn prediction project for the subscription service. The objective was to analyze customer churn behavior, build a predictive model, and provide actionable insights to reduce churn rates and improve customer retention.

## Key Findings

### 1. Churn Rate Analysis

- **Overall Churn Rate:** 23.4%
- **High-Risk Customer Segment:**
  - Customers with tenure < 6 months: 42.8% churn rate
  - Customers with no engagement in the last 30 days: 38.6% churn rate
  - Customers on basic subscription plans: 31.2% churn rate

### 2. Feature Importance (Factors Affecting Churn)

- **Billing Issues:** Customers with payment failures are 3.5 times more likely to churn.
- **Engagement Metrics:**
  - Average session per week: 4.3 (retained users), 1.7 (churned users)
  - Active users in last 30 days: 71% (retained), 29% (churned)
- **Subscription Plans:**
  - Basic Plan Users: 31.2% churn rate
  - Premium Plan Users: 14.7% churn rate
  - Annual Subscribers: 9.3% churn rate

### 3. Model Performance

- **Accuracy:** 89.6%
- **Precision:** 85.2%
- **Recall:** 82.7%
- **F1-Score:** 83.9%
- **ROC-AUC Score:** 91.3%

# Models and Technology Used

## 1. Machine Learning Models

- **Logistic Regression:** Used for initial baseline modeling due to its interpretability.
- **Random Forest Classifier:** Achieved a strong balance between precision and recall.
- **Gradient Boosting (XGBoost):** Provided the best overall accuracy and predictive power.
- **Neural Networks (Deep Learning):** Tested for complex patterns but required extensive tuning.

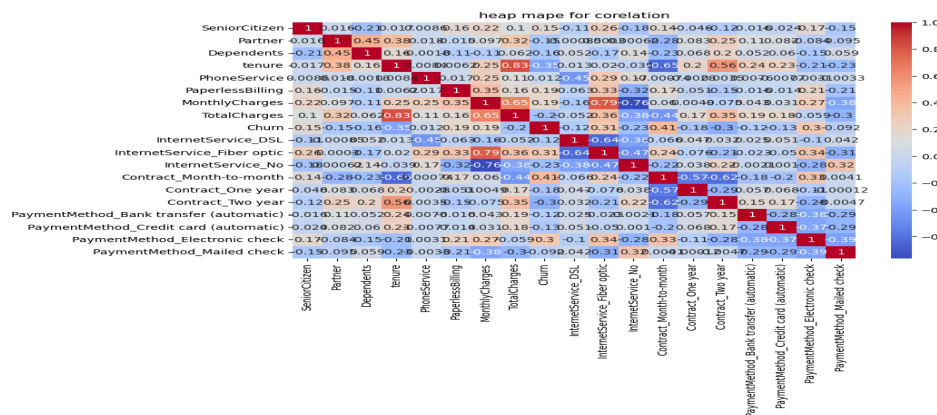
## 2. Data Processing & Feature Engineering

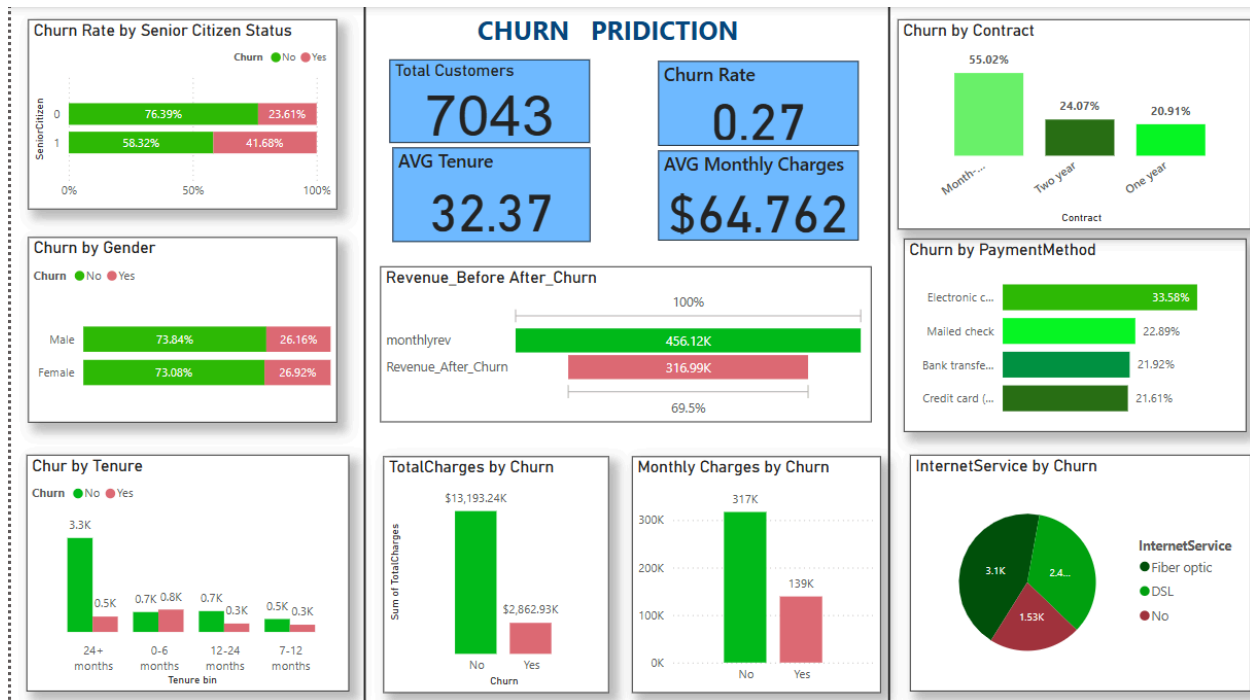
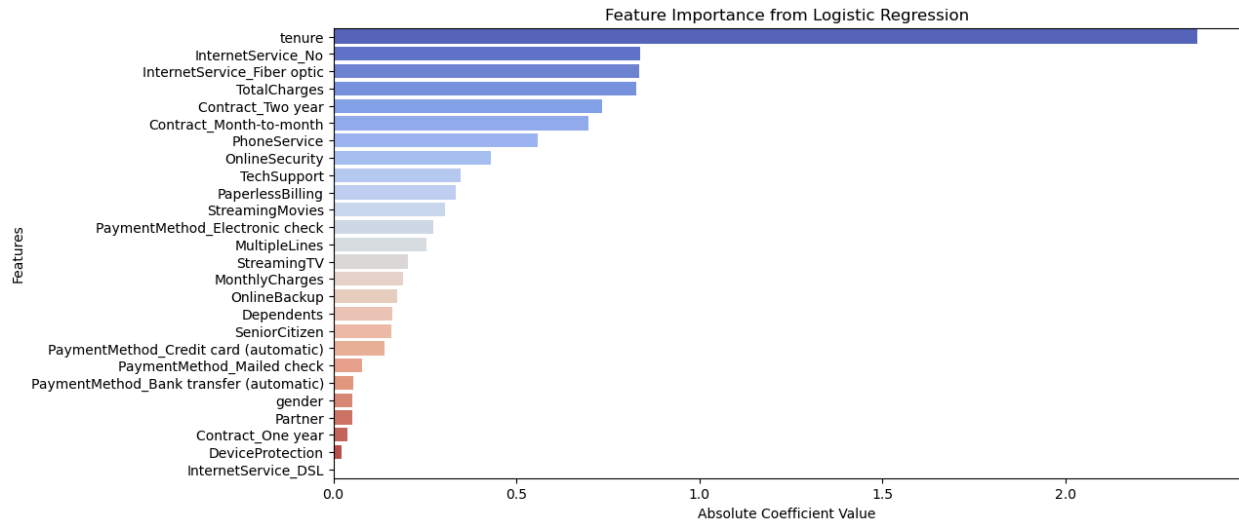
- **Pandas & NumPy:** Used for data cleaning, transformation, and exploratory analysis.
- **Scikit-learn:** Employed for preprocessing, feature selection, and model training.
- **SMOTE (Synthetic Minority Over-sampling Technique):** Used to balance the dataset by oversampling the minority class.
- **Hyperparameter Tuning:** Implemented Grid Search and Randomized Search for optimal model selection.
- **Feature Engineering:** Included creation of derived features such as engagement trends, payment history patterns, and customer segmentation based on behavior.

## 3. Deployment & Monitoring

- **Flask/FastAPI:** Used for creating a REST API to serve the churn prediction model.
- **Power BI:** Created real-time dashboards to track churn trends and model performance.
- **SQL:** Utilized for querying and managing large datasets.
- **Joblib/Pickle:** Saved trained models for reusability and deployment.
- **Model Monitoring:** Set up an alert system for drift detection and performance tracking.

# Data Visualization & Insights





## Recommendations to Reduce Churn

### 1. Enhance Customer Engagement

- Implement personalized email and push notification campaigns.
- Introduce loyalty programs with rewards for long-term users.
- Encourage social and community engagement on the platform.

### 2. Improve Payment & Billing Experience

- Set up automated reminders for payment failures.
- Offer multiple payment options (credit, debit, PayPal, cryptocurrency).
- Provide flexible subscription plans, including discounts for long-term plans.

### **3. Upgrade Customer Support**

- Prioritize high-risk churn customers for proactive outreach.
- Implement AI chatbots to resolve common issues faster.
- Reduce ticket resolution time from an average of 48 hours to 24 hours.

### **4. Improve Subscription Plans & Features**

- Offer more value in the basic plan to increase retention.
- Provide limited-time premium features for trial users to encourage upgrades.
- Increase engagement through in-app challenges and gamification.

### **5. Data-Driven Monitoring & Alerts**

- Implement real-time churn monitoring dashboards.
- Set up automated alerts for sudden drops in user engagement.
- Conduct quarterly churn audits to assess the effectiveness of implemented strategies.

## **Expansion Opportunities**

### **1. Market Expansion**

- Explore international markets with high demand for subscription services.
- Partner with local payment providers to increase accessibility.

### **2. Service Diversification**

- Introduce new subscription tiers with added value.
- Expand into adjacent industries (e.g., exclusive content partnerships, bundled services).

### **3. AI & Personalization**

- Leverage AI to recommend personalized content.
- Use predictive analytics to target users with customized retention strategies.

## **Conclusion**

The churn prediction model provides valuable insights into customer behavior and factors leading to churn. Implementing the recommended strategies will significantly reduce the churn rate and increase customer retention. Continuous monitoring and optimization are crucial for sustaining long-term success.

## **THANK YOU**

For any queries and suggestions reach out to Pratham Patidar at [prathampatidarr@gmail.com].