**CHURN PREDICTION PROJECT REPORT**

# **1. Introduction to Churn Prediction**

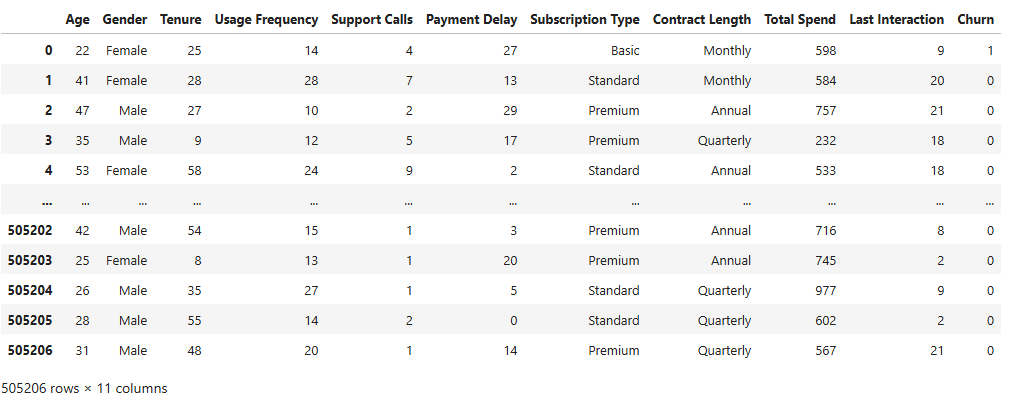
Churn Prediction involves identifying which customers are likely to stop using a company’s products or services in the near future. This is crucial in subscription-based businesses, telecom, e-commerce, and other industries where customer retention drives profitability.

# **2. Purpose of Churn Prediction**

The main goal of churn prediction is to:

* Proactively retain at-risk customers by identifying them early.
* Increase customer satisfaction by understanding pain points.
* Improve overall customer lifetime value by reducing churn rates.

# **3. Dataset Overview**



**Source:**

* customer\_churn\_dataset-training-master.csv
* customer\_churn\_dataset-testing-master.csv  
  (Downloaded from Kaggle)

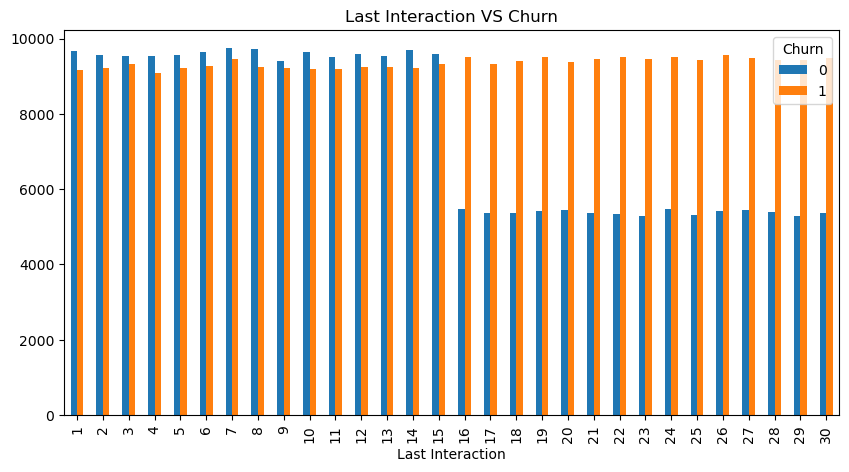
**Features (12 columns):**

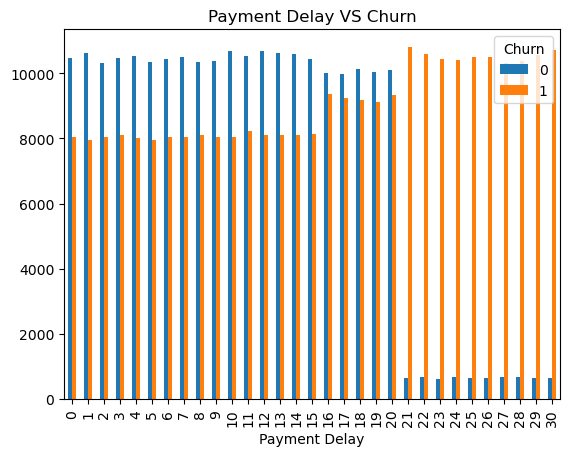
| **Feature** | **Description** |
| --- | --- |
| CustomerID | Unique identifier for each customer |
| Age | Age of the customer |
| Gender | Gender of the customer |
| Tenure | Months the customer has used the service |
| Usage Frequency | Service usage in the last month |
| Support Calls | Calls made to customer support last month |
| Payment Delay | Days the customer delayed payment last month |
| Subscription Type | Type of subscription plan |
| Contract Length | Duration of customer's contract |
| Total Spend | Total amount spent on products/services |
| Last Interaction | Days since the last interaction |
| Churn | Target variable (1 = churned, 0 = not churned) |

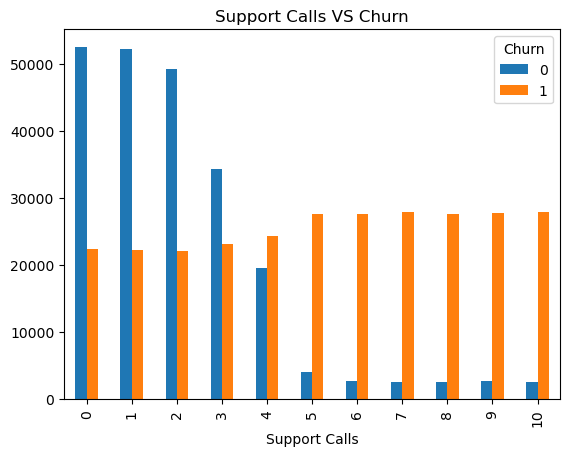
# **4. Key Features for the Churn Prediction Project Dataset**

The following features were found to be most significant for predicting churn:

1. **Age** – Older customers may churn less frequently.
2. **Support Calls** – Frequent support calls could signal dissatisfaction.
3. **Payment Delay** – Delays in payment may indicate churn risk.
4. **Last Interaction** – Long inactivity gaps suggest disengagement.







# **5. Observed Churn Factors**

Based on exploratory analysis:

* **Customer Support Issues**: More than 3 support calls in a month often led to churn.
* **Transaction Delays**: Customers experiencing delays of over 15 days in service confirmation are more likely to churn.
* **Low Engagement**: Customers who haven’t been engaged for over 14 days tend to churn.

# **6. Churn Reduction Recommendations**

To minimize churn:

1. **Improve Customer Service**
   * Faster response times and helpful resolutions.
2. **Address Payment and Delivery Delays**
   * Streamline operations to ensure timely service.
3. **Enhance Customer Engagement**
   * Regular touchpoints, personalized communications, and loyalty incentives.

# **7. Model Performance**

**Model Accuracy: 85.9%**

| **Metric** | **Class 0 (Not Churned)** | **Class 1 (Churned)** |
| --- | --- | --- |
| Precision | 0.84 | 0.88 |
| Recall | 0.85 | 0.87 |
| F1-score | 0.84 | 0.87 |

**Overall KNN Classifier Model Evaluation:**

* **Macro Avg F1-Score**: 0.86
* **Support Size**: 101,042 customers

This indicates a robust model with balanced performance across both churn and non-churn classes.

# **8. Model Benefits**

The churn prediction model empowers the business to:

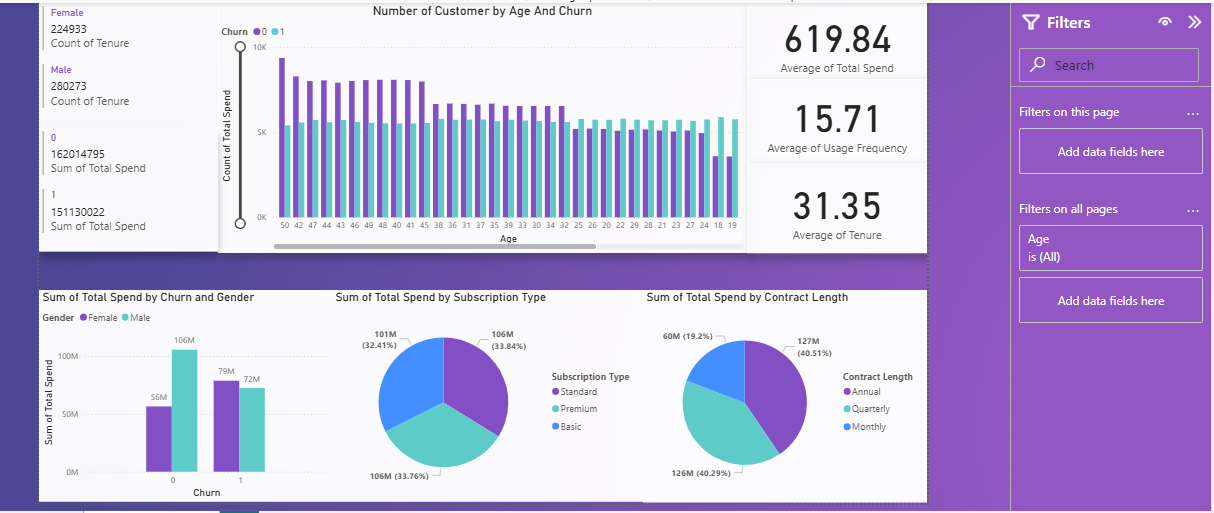
* Identify at-risk customers and intervene early.
* Optimize customer retention strategies.
* Allocate marketing and customer service resources more effectively.

# **9. Model Enhancement Recommendations**

To further improve model performance:

* **Conduct deeper feature engineering** to uncover hidden churn signals.
* **Incorporate behavioral and feedback data** (e.g., survey results, NPS).
* **Apply ensemble methods** for better predictive accuracy.
* **A/B test retention campaigns** informed by model predictions.

# **10. Dashboard Overview**

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**Purpose:**

The dashboard visualizes key features and their relationships with churn to:

* Highlight impactful variables (like support calls, tenure, etc.).
* Track churn rates across different customer segments.

**Objective:**

To communicate the driving features behind churn and validate the model’s findings for stakeholders.

# **11. Conclusion**

This churn prediction project provides actionable insights into customer behavior. By understanding and mitigating churn risks through data, businesses can enhance retention, boost revenue, and improve overall customer experience.

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