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

	Age	Gender	Tenure	Usage Frequency	Support Calls	Payment Delay	Subscription Type	Contract Length	Total Spend	Last Interaction	Churn
0	22	Female	25	14	4	27	Basic	Monthly	598	9	1
1	41	Female	28	28	7	13	Standard	Monthly	584	20	0
2	47	Male	27	10	2	29	Premium	Annual	757	21	0
3	35	Male	9	12	5	17	Premium	Quarterly	232	18	0
4	53	Female	58	24	9	2	Standard	Annual	533	18	0
...	...	...	...	...	...	...	...	...	...	...	...
505202	42	Male	54	15	1	3	Premium	Annual	716	8	0
505203	25	Female	8	13	1	20	Premium	Annual	745	2	0
505204	26	Male	35	27	1	5	Standard	Quarterly	977	9	0
505205	28	Male	55	14	2	0	Standard	Quarterly	602	2	0
505206	31	Male	48	20	1	14	Premium	Quarterly	567	21	0

505206 rows × 11 columns

Source:

- customer_churn_dataset-training-master.csv
- customer_churn_dataset-testing-master.csv
  (Downloaded from Kaggle)

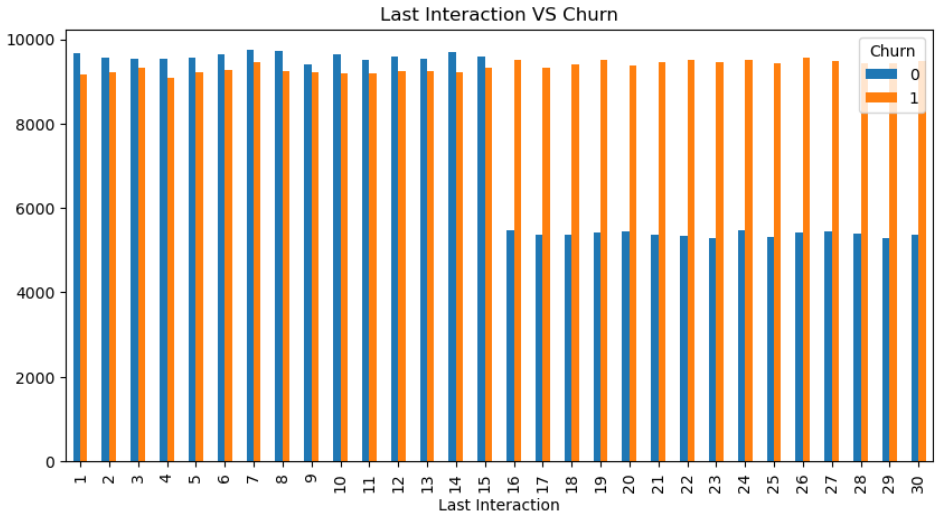
Features (12 columns):

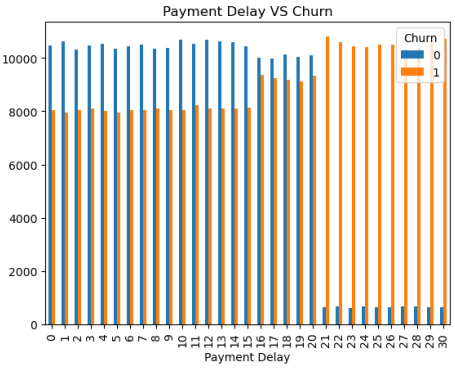
Feature	Description
CustomerID	Unique identifier for each customer
Age	Age of the customer
Gender	Gender of the customer
Tenure	Months the customer has used the service
Usage Frequency	Service usage in the last month
Support Calls	Calls made to customer support last month
Payment Delay	Days the customer 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)

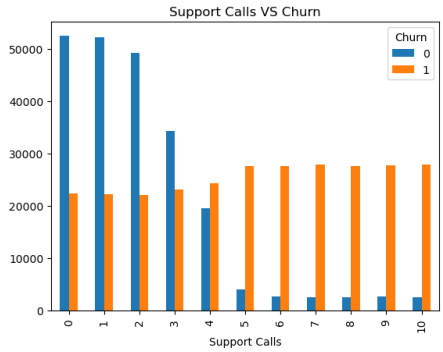
4. Key Features for the Churn Prediction Project Dataset

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:

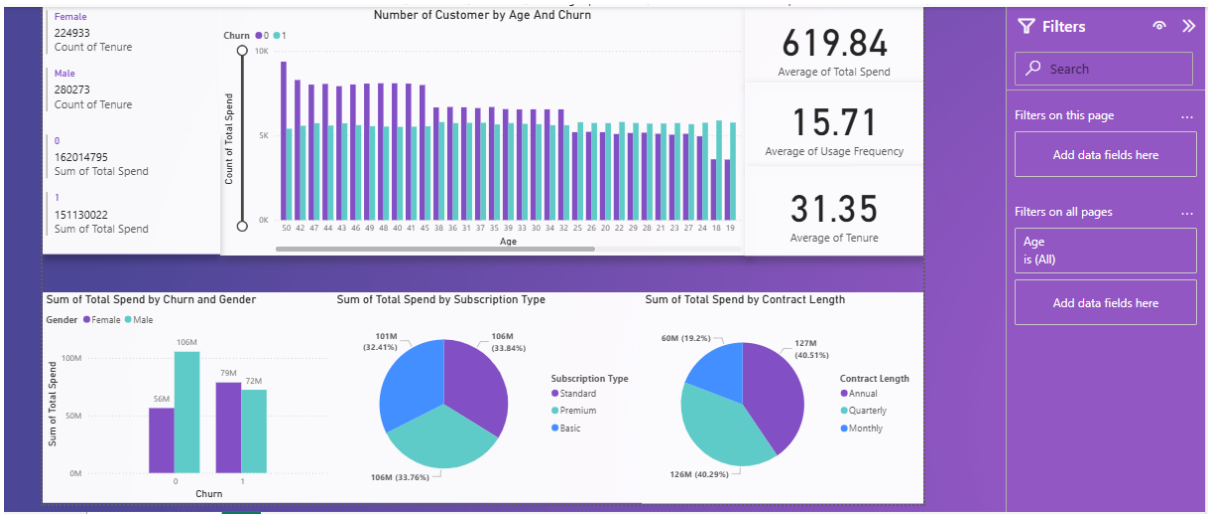
- Identify at-risk customers and intervene early.
- Optimize customer retention strategies.
- Allocate marketing and customer service resources more effectively.

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



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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