AI Project

Week 4 – Telco Churn Analysis & Retention Strategy with Cursor AI

(Data-Driven Insights with XGBoost Prediction)

Ken Lin 29/11/2025

Guideline

- Executive Summary
- Business Context
- Tool Used
- Churn Overview & Key Metrics
- XGBoost Churn Model
- Segment-Based Insights
- Retention Strategy
- Summary & Recommendations
- Cursor AI Interface
- Appendix

Executive Summary

- **Churn rate at 26.5%** with **up to $140k monthly revenue at risk**; target reduction to **20–25%**
- Added **5+ segmentation features** to improve customer clustering and analysis
- Built an **XGBoost churn model** to identify strongest churn drivers
- Identified **4 high-risk segments:** Month-to-Month, Tenure < 12, High-ARPU, Fiber
- Designed **4 retention plays** expected to **reduce churn by 5%**

Business Context

- **High churn rates directly reduce revenue. (Usually 25%, currently 26.5%)**
- **Goals:** increase customer LTV and reduce early-stage churn.
- **Project objectives:**

  Identify high-risk customer segments

  Build a predictive churn model

  Design targeted retention strategies

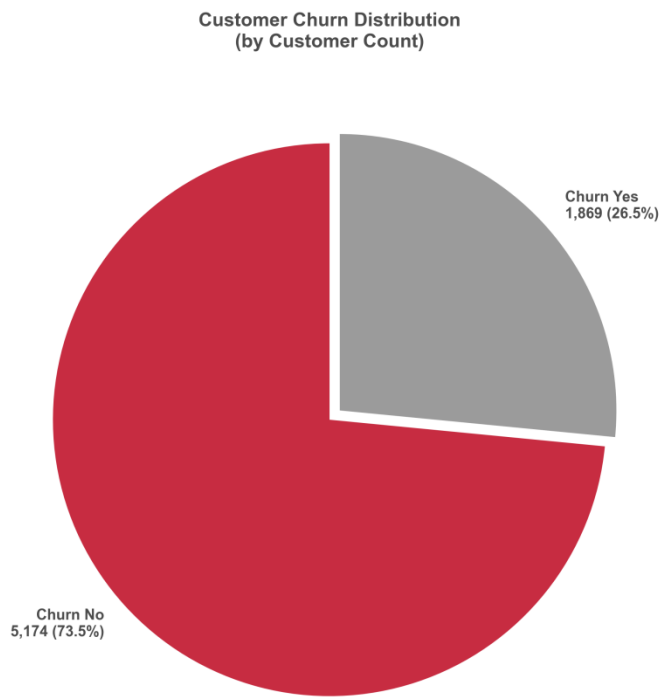
Tool Used

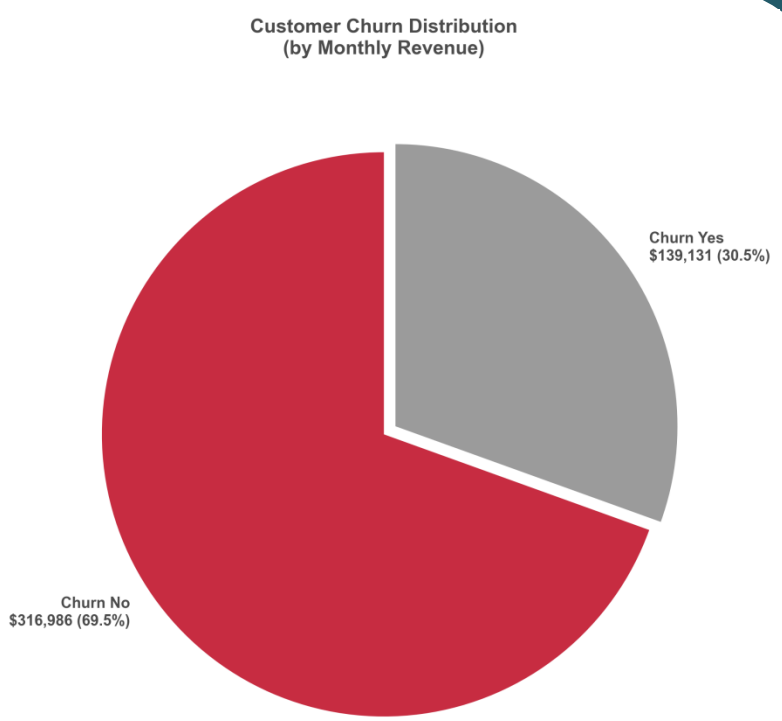
- **Cursor AI & XGBoost**
- **Process Flow:** Prompt > Produce Scripts > Data Clean > Exploratory Data Analysis > Feature Engineering > XGBoost Model > Produce Strategies

CURSOR

python

Churn Overview & Key Metrics





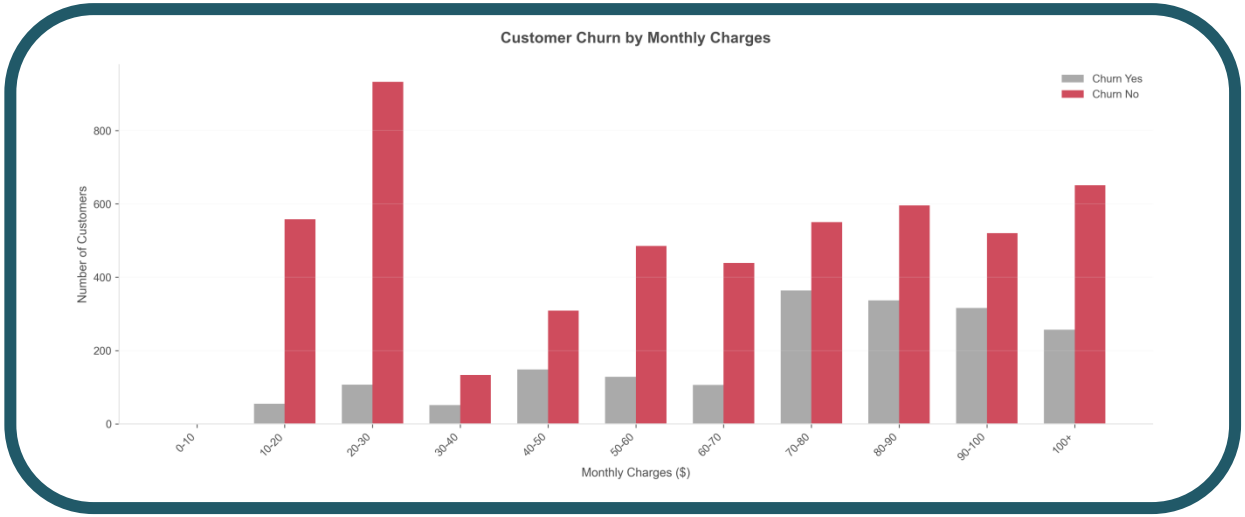
Overall Churn Performance

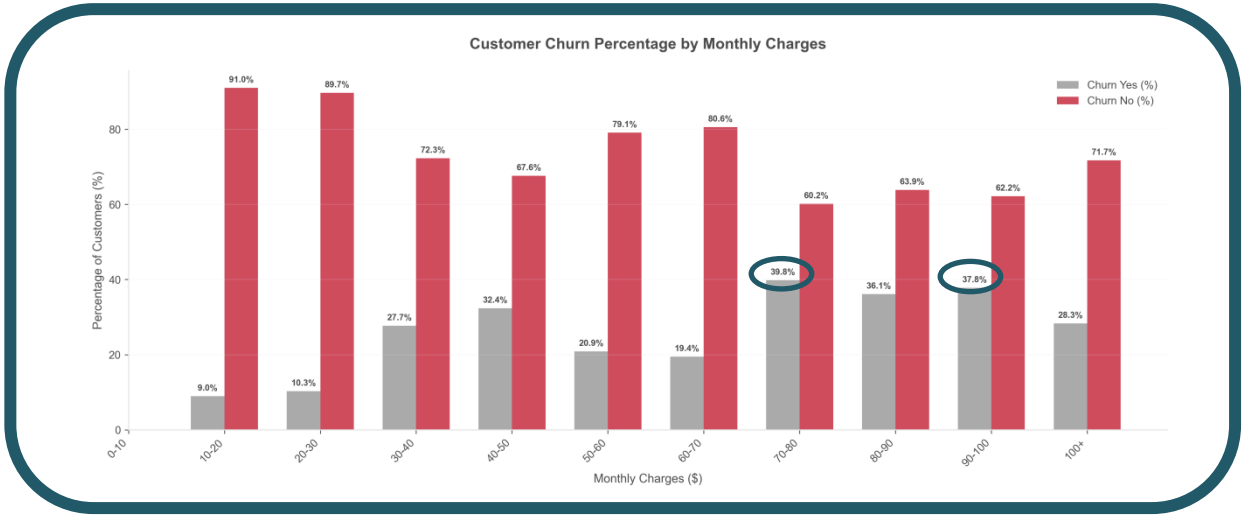
Among 7,043 customers, **1,869 churned → 26.5% churn rate**

With an average ARPU of up to $130, the **estimated revenue impact is up to $139,131 (30.5%)**

Churn Overview & Key Metrics

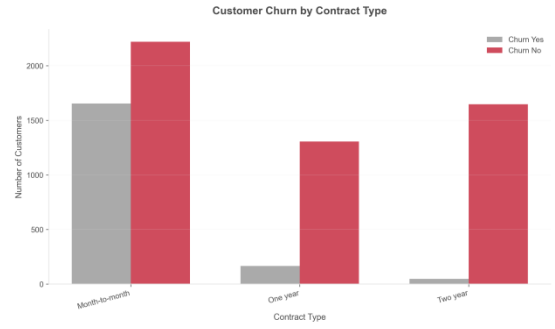
Churn Rates by Key Segments
High ARPU $70–80: 39.8%
High ARPU $90–100: 37.8%

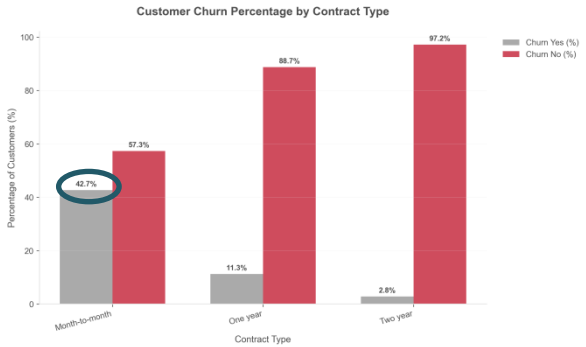




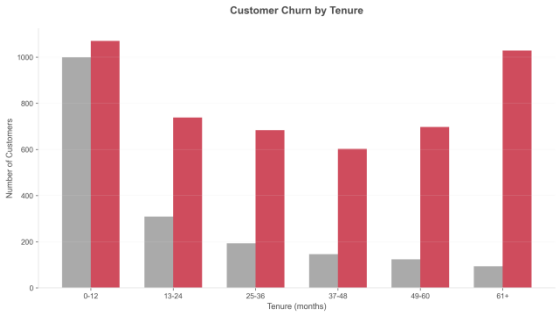
Churn Overview & Key Metrics

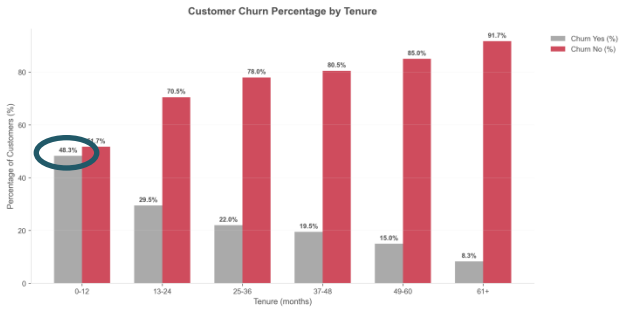
Churn Rates by Key Segments
Month-to-Month: 42.7%





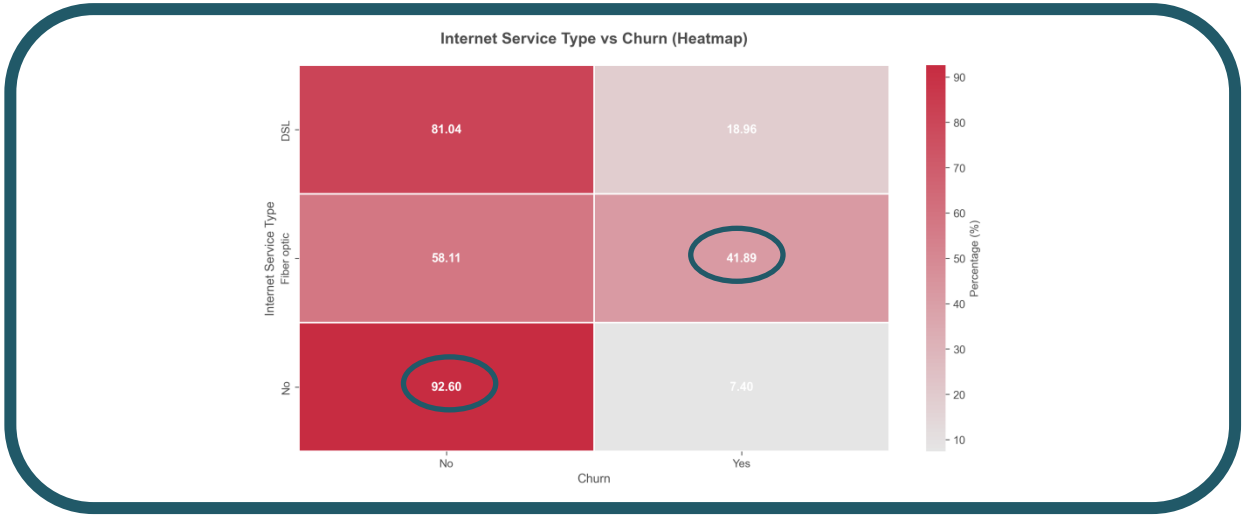
Tenure 0–12 months: 48.3%



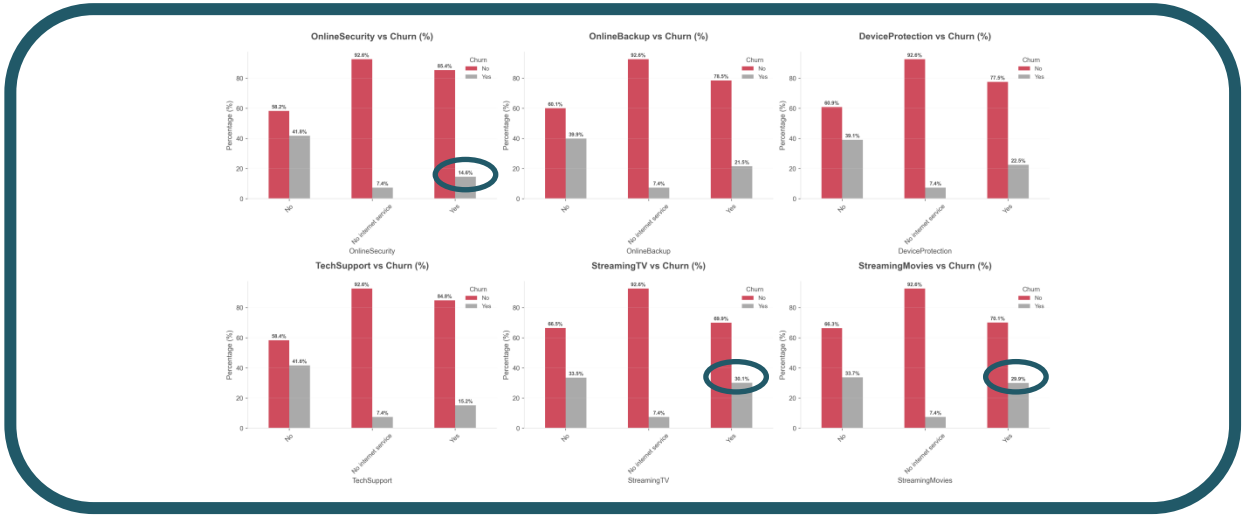


Churn Overview & Key Metrics

Churn Rates by Key Segments
Fiber Optic users: High
No Internet service: Low



Streaming TV / Movie: up to 30%
Online Security users: Lowest



Churn Overview & Key Metrics

Key Takeaways

Early-stage customers (0–12 months) and month-to-month contracts are the biggest pain points

High-ARPU users show weaker loyalty

Service usage patterns show clear churn risk signals (Fiber + Streaming)

XGBoost Churn Model

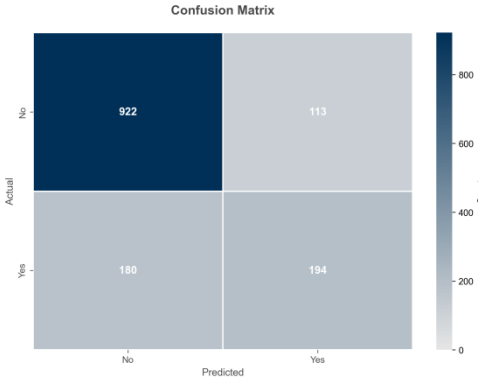
Feature Engineering

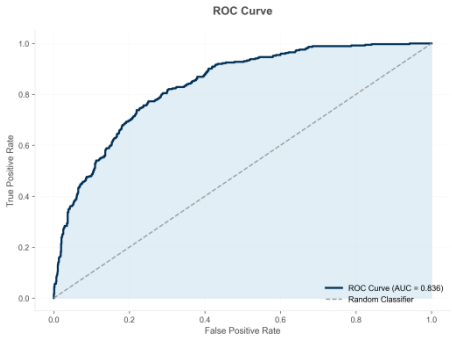
1.Contract type (Label Encoding)
2.Tenure (Add Group)
3.Monthly Charges (Add Group)
4.Total Charges (Add Group)
5.Service Count (Count add-on services like Security, TV, Movies…)
6.High ARPU flag (Monthly Charges > 70)
7.Early Tenure flag (Tenure < 12, Month-to - month)

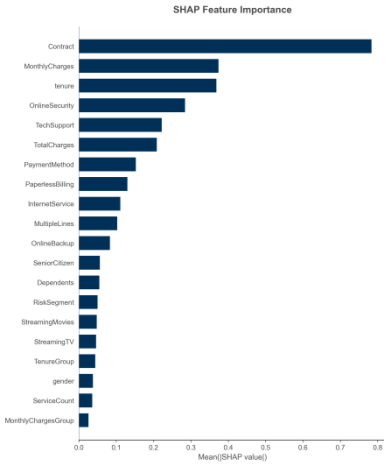
Model Results

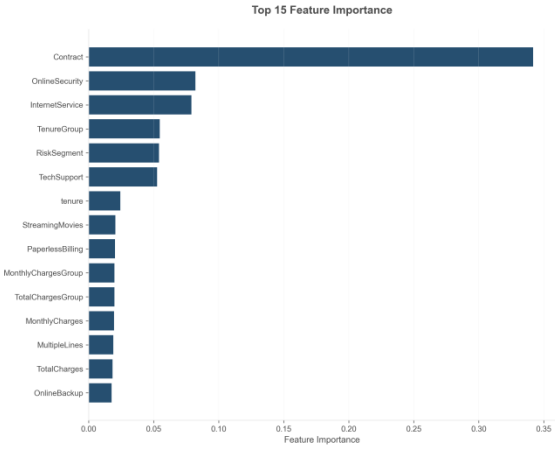
AUC > 0.836*(**Expected**)
Recall **High** → High risk customers
Feature importance（SHAP）Top 5：

- Contract type
- Tenure
- Monthly charges
- Online Security
- Tech Support









XGBoost Churn Model

customerID	Churn_Probability	Churn_Risk	Contract	tenure	MonthlyCharges	InternetService	Revenue	OnlineSecurity	OnlineBackup	DeviceProtection	TechSupport	StreamingTV	amingMo	ServiceCount
2012-NWRPA	0.956846893	High	Month-to-month	11	99.55	Fiber optic	99.55	No	No	Yes	No	Yes	Yes	3
9497-QCMMS	0.956449151	High	Month-to-month	1	93.55	Fiber optic	93.55	No	No	No	No	Yes	Yes	2
9300-AGZNL	0.955652833	High	Month-to-month	1	94	Fiber optic	94	No	No	No	No	Yes	Yes	2
9248-OJYKK	0.955340385	High	Month-to-month	1	76.45	Fiber optic	76.45	No	No	No	No	No	No	0
6894-LFHLY	0.95513612	High	Month-to-month	1	75.75	Fiber optic	75.75	No	No	No	No	No	No	0

High-risk Person from Model

Person A : New customer , tenure <12 , Fiber, Month to Month

Person B : High charge ($80+), no add-on (Low service engagement)

Person C : Streaming-heavy, sensitive to price

Segment-Based Insights

Segmentation Design

- Tenure : Early (0–12) / Mid (12–36) / Loyal (>36)
- Contract : Month-to-month / 1 Year / 2 Year
- Monthly Charge : Lowest ($0-$30) / Low ($30-$50) / Mid ($50-$70) / High ($70-$90) / Highest ($90+)
- Internet Service : DSL / Fiber / No
- Risk Segment : Low (Other) / Mid (Month-to-month & Tenure >= 12) / High (Month-to-month & Tenure < 12)

Segment Churn Summary

High Risk :

- Month-to-month
- Tenure (<12)
- High Charge ($70-90)
- Fiber
- No add-on service

Retention Strategy

Strategy A — New (Tenure < 12), Month-to-month customers

Customer Count – 806, Average Churn Probability – 77.62%, Monthly Revenue At Risk - $60,792.25

- Offer 10 to 15 % Discount on 1-year contract

Action Items

- Offer onboarding support package
- Give 90-day welcome program
- Assign dedicated retention specialist
- Offer first-month tech check
- Offer price-lock promised price

Strategy B — High charge ($70+) customers

Customer Count – 910, Average Churn Probability – 75.59%, Monthly Revenue At Risk - $80,027.70

- Convert to annual contract with premium benefits

Action Items

- Offer 2-year contract with 20% discount
- Provide premium service add-ons (Security / Tech Support / Streaming / TV)
- Priority customer service access
- Exclusive loyalty rewards program
- Family bundle (lower churn 20–30%)
- Customized personal content package

Retention Strategy

Strategy C — Fiber Optic customers

Customer Count – 963, Average Churn Probability – 76.06%, Monthly Revenue At Risk - $83,949.20

- Improve service quality and add value

Action Items

- Service quality audit and improvement
- Offer speed upgrade or price match
- Add complementary services (security, backup)
- Proactive technical support

Strategy D — Low service engagement customers

Customer Count – 572, Average Churn Probability – 75.32%, Monthly Revenue At Risk - $39,503.95

- Increase service stickiness

Action Items

- Offer bundled services at discounted rate
- Free trial of premium services (Security, Backup)
- Educational content on service benefits
- Referral program incentives

Summary & Recommendations

- **Total High-Risk Customers: 1,124**
- **Total Monthly Revenue At Risk: $90,544.00**
- **Annual Revenue At Risk: $1,086,528.00**

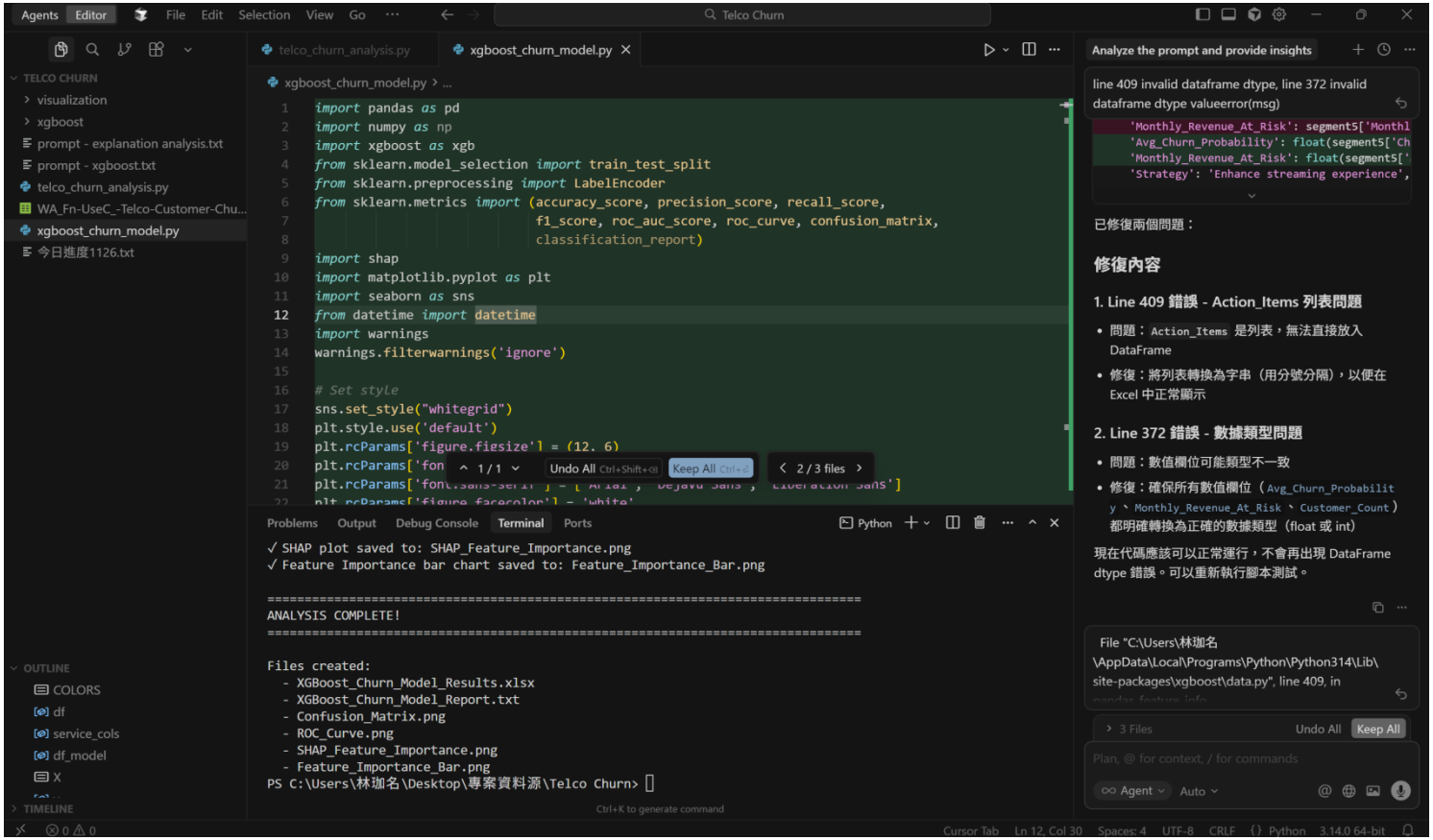
- **Key churn drivers fall into three major categories:**

1.Price sensitivity (high monthly fees, month-to-month contracts)
2.Poor early-stage experience (tenure < 12 months)
3.Service bundle mismatch (Fiber Optic + no security/tech support add-ons)

- **Key Recommendations:**

1. Prioritize Month-to-Month customers with low tenure for immediate intervention
2. Focus on high-value customers (>$70/month) for contract conversion
3. Address service quality issues for Fiber Optic customers
4. Increase service engagement for customers with low service count
5. Implement proactive retention campaigns based on churn probability thresholds
6. Monitor model performance monthly and retrain quarterly

Cursor AI Interface



Appendix

XGBoost Report & Segment Analysis (Direct output from Cursor AI)

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================================================================================
XGBOOST CHURN PREDICTION MODEL & RETENTION STRATEGY REPORT
================================================================================
Analysis Date: 2025-11-26 11:27:41


================================================================================
1. MODEL EVALUATION METRICS
================================================================================
   Metric    Value
 Accuracy 0.792051
Precision 0.631922
   Recall 0.518717
 F1 Score 0.569750
      AUC 0.835618


================================================================================
2. TOP 15 FEATURE IMPORTANCE
================================================================================
           Feature  Importance
          Contract    0.341817
    OnlineSecurity    0.082099
   InternetService    0.079043
       TenureGroup    0.054614
       RiskSegment    0.054103
       TechSupport    0.052635
            tenure    0.024279
   StreamingMovies    0.020610
  PaperlessBilling    0.020327
MonthlyChargesGroup    0.019896
  TotalChargesGroup    0.019855
     MonthlyCharges    0.019545
      MultipleLines    0.018933
       TotalCharges    0.018390
     OnlineBackup    0.017706
```

```
================================================================================
3. SEGMENT-BASED CHURN ANALYSIS
================================================================================

Tenure:
--------------------------------------------------------------------------------
             Actual_Churn_Rate  Avg_Churn_Probability  Avg_Monthly_Charges  Customer_Count
TenureGroup
0-12                    0.4768                 0.4742              56.1720            2175
13-24                   0.2871                 0.2886              61.3573            1024
25-36                   0.2163                 0.2127              65.5755             832
37-48                   0.1903                 0.1872              66.3182             762
49-60                   0.1442                 0.1471              70.5508             832
61+                     0.0661                 0.0689              75.9527            1407


Contract:
--------------------------------------------------------------------------------
                Actual_Churn_Rate  Avg_Churn_Probability  Avg_Monthly_Charges  Customer_Count
Contract
Month-to-month             0.4271                 0.4273              66.3985            3875
One year                   0.1127                 0.1079              65.0486            1473
Two year                   0.0283                 0.0303              60.7704            1695


MonthlyCharges:
--------------------------------------------------------------------------------
                      Actual_Churn_Rate  Avg_Churn_Probability  Avg_Monthly_Charges  Customer_Count
MonthlyChargesGroup
0-30                             0.0980                 0.0966              21.5035            1653
30-50                            0.3080                 0.3017              42.7937             646
50-70                            0.2076                 0.2061              59.9692            1161
70-90                            0.3780                 0.3743              80.0601            1844
90+                              0.3278                 0.3346             101.0187            1739


InternetService:
--------------------------------------------------------------------------------
                 Actual_Churn_Rate  Avg_Churn_Probability  Avg_Monthly_Charges  Customer_Count
InternetService
DSL                         0.1896                 0.1887              58.1022            2421
Fiber optic                 0.4189                 0.4200              91.5001            3096
No                          0.0740                 0.0714              21.0792            1526


RiskSegment:
--------------------------------------------------------------------------------
             Actual_Churn_Rate  Avg_Churn_Probability  Avg_Monthly_Charges  Customer_Count
RiskSegment
High                    0.5194                 0.5166              58.0223            1908
Low                     0.0676                 0.0664              62.7596            3168
Medium                  0.3376                 0.3407              74.5235            1967
```