Survival Analysis on Telco Customer Churn

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Springboard

About customer churn

- What is customer churn?
  the percentage of customers that stop using a company's
  products or services;
- Why is it critical to the business?
  it usually costs more to acquire new customers than it does to
  retain existing ones.

What is the project goal to achieve?

- Identify the importance of each predictor;

- Build the predictive model using survival analysis;

- Predict risk to churn on unseen new customers

- Launch customer retention program to improve ROI

Telco customer churn data

- size of data : 7,043 unique customers

- number of features: 21 features

|	
tenure, churn:	tenure-event as target variables
customer attributes:	gender, SeniorCitizen, partner, Dependents
consumer behavior:	PhoneService, MultipleLines, InternetService
	OnlineSecurity, OnlineBackup, DeviceProtection,
	TechSupport, StreamingTV, StreamingMovies,
	Contract,PaperlessBilling,PaymentMethod
	MonthlyCharges, totalCharges
customerID:	random serial number, no value for prediction

Distribution of Total Charges

- The distribution positively skewed.

- The majority of customers charged under $2000.

- This feature is unknown at the time of prediction. We will discard it to avoid data leakage

Distribution of TotalCharges
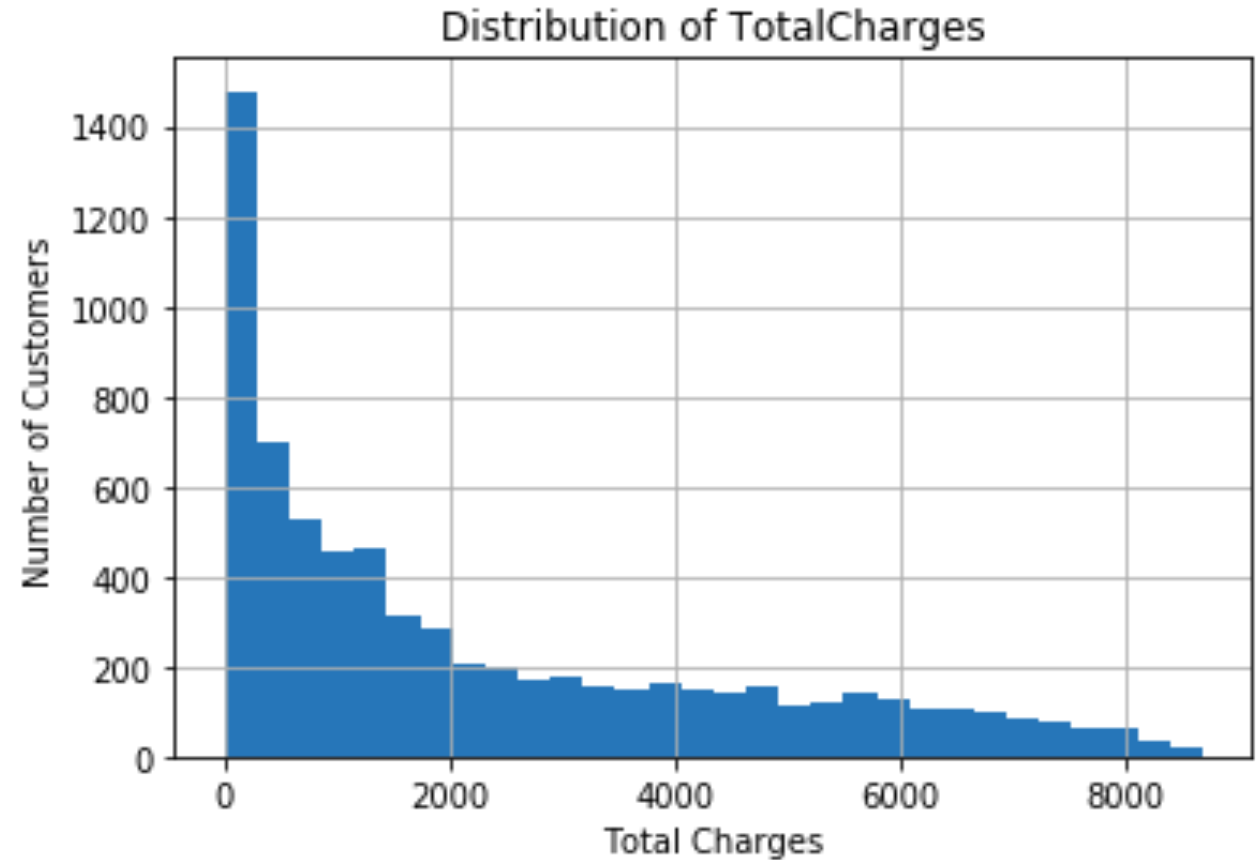
Distribution of Monthly Charges

- Normally distributed above $30 beyond
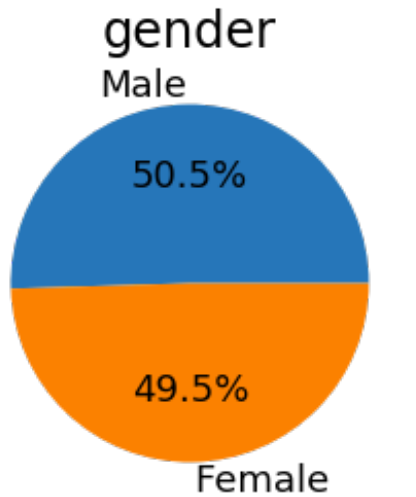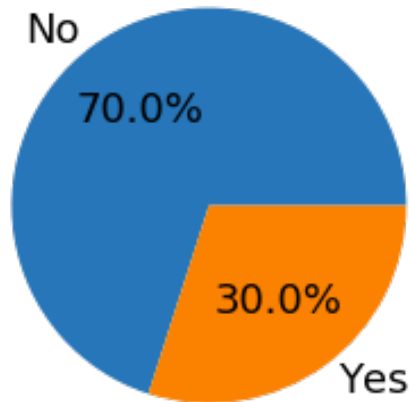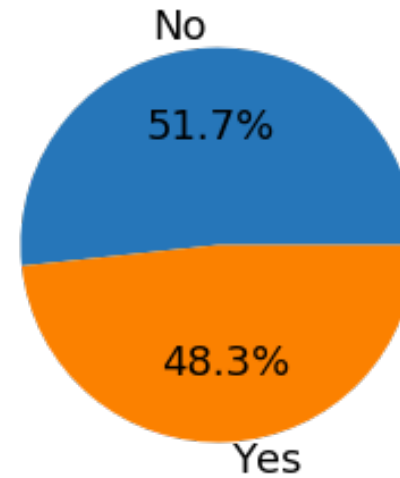- Significant number of low-end customers spent less than $30 monthly

Distribution of MonthlyCharges
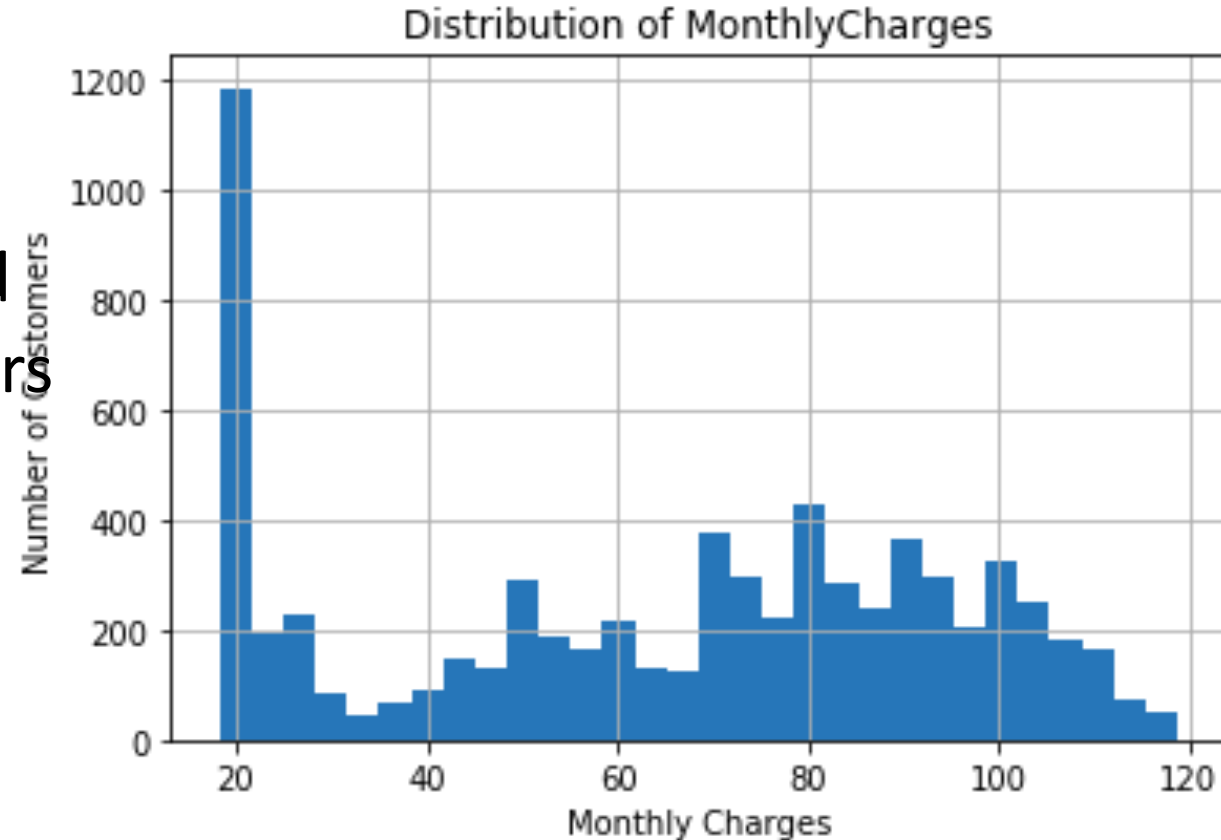
Distribution of tenure

- relatively stable trend between 10 months and 60 months.
- significant number of customers stayed with business for 10 months (new customers) or above 60 months (loyal customers).

Distribution of tenure
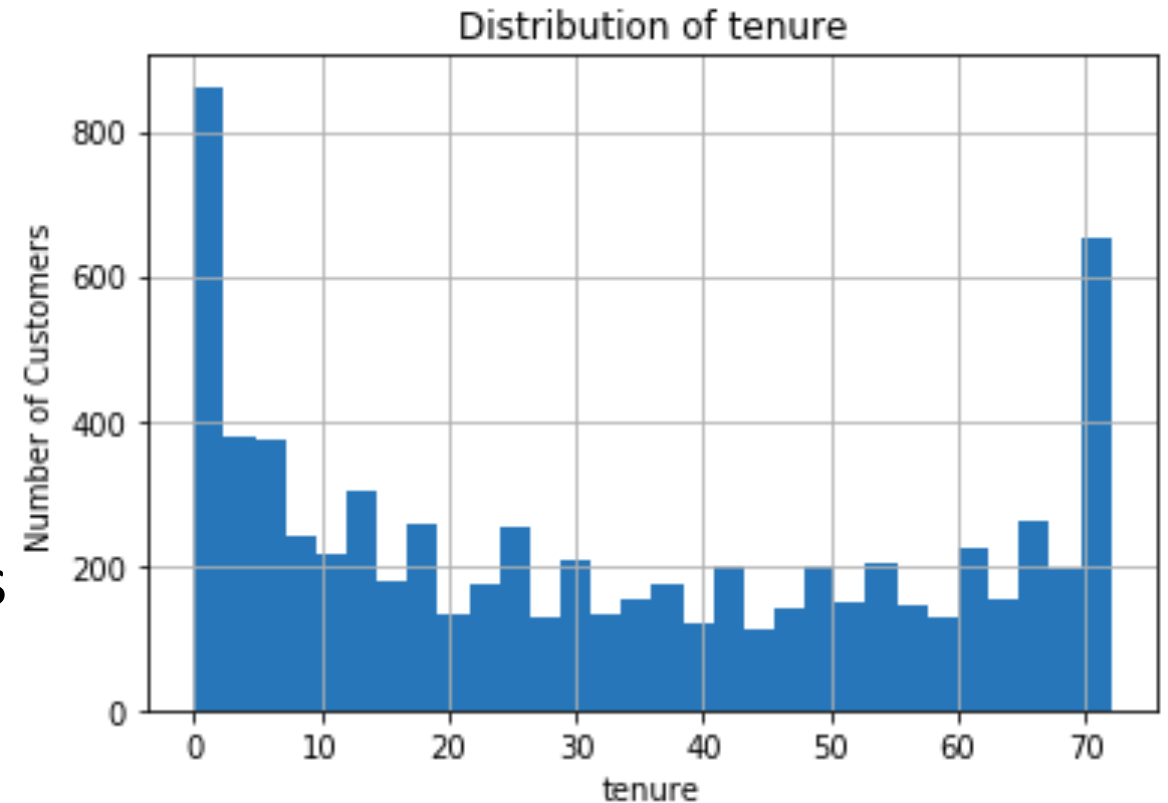
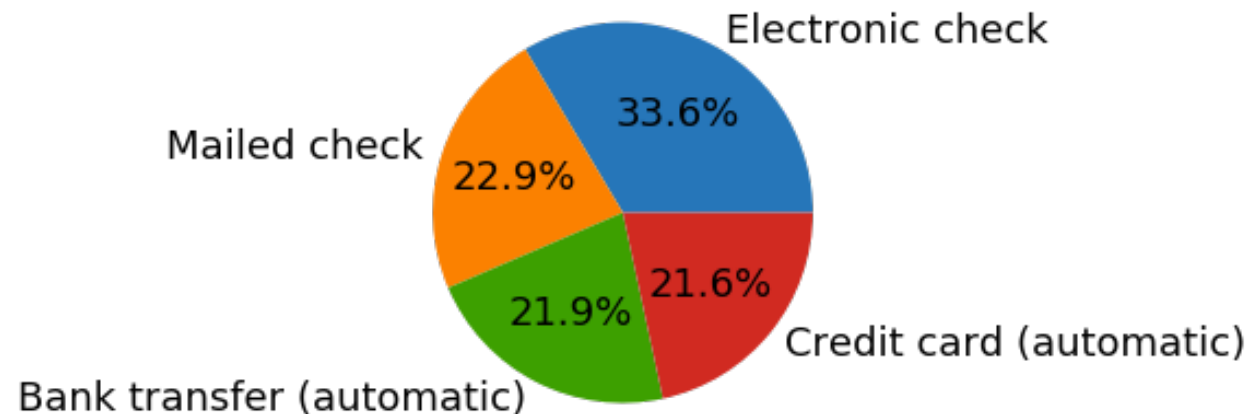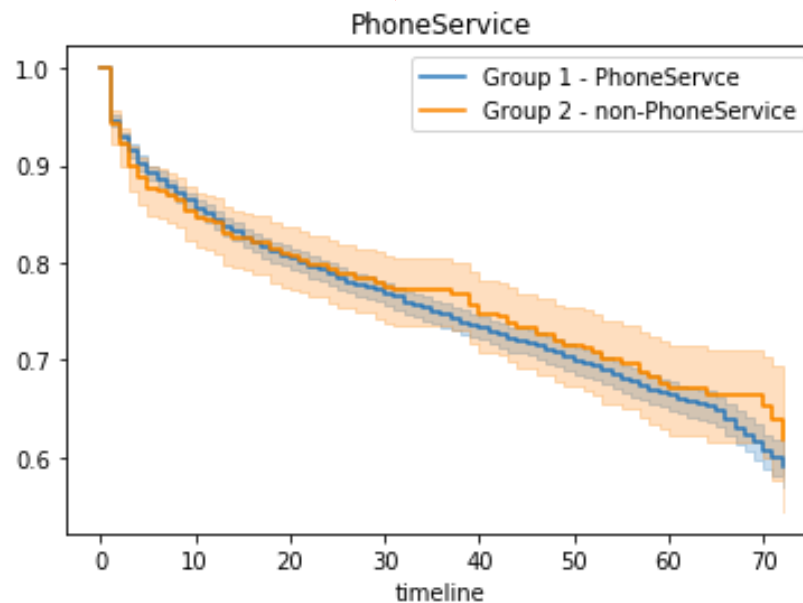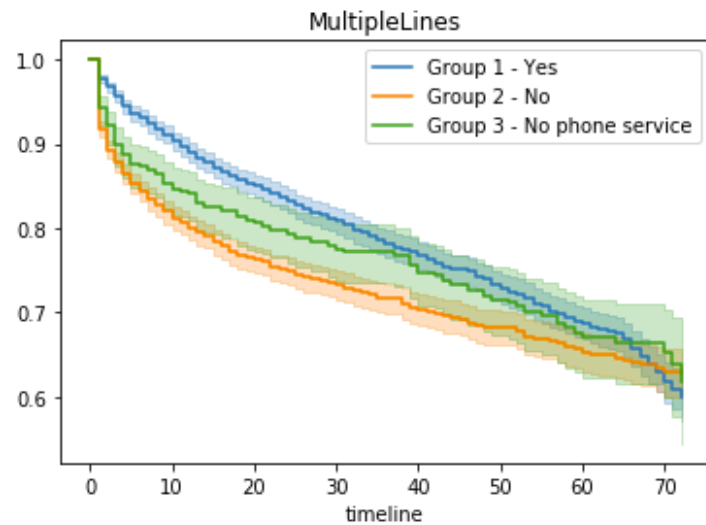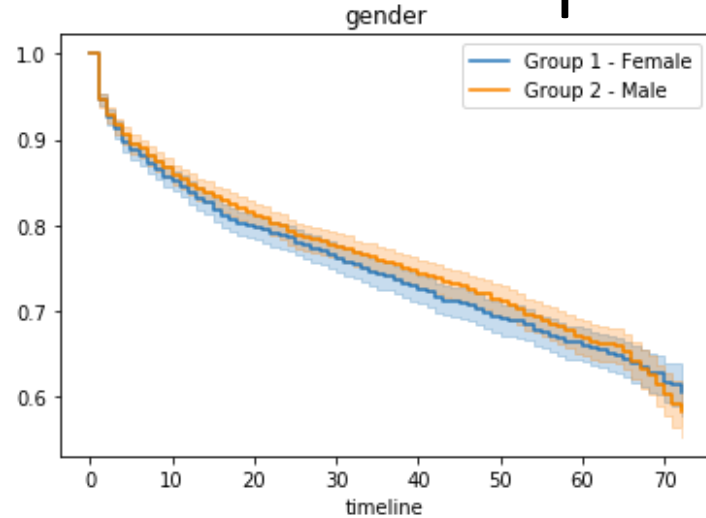# Customer attributes analysis
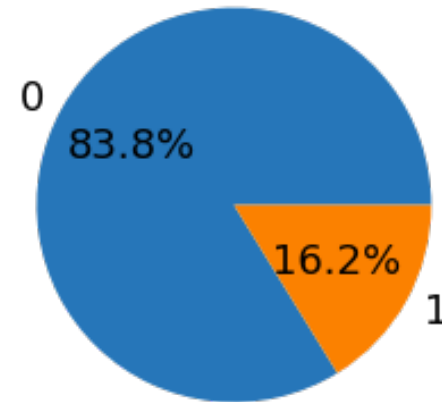
consumer behavior analysis (1)
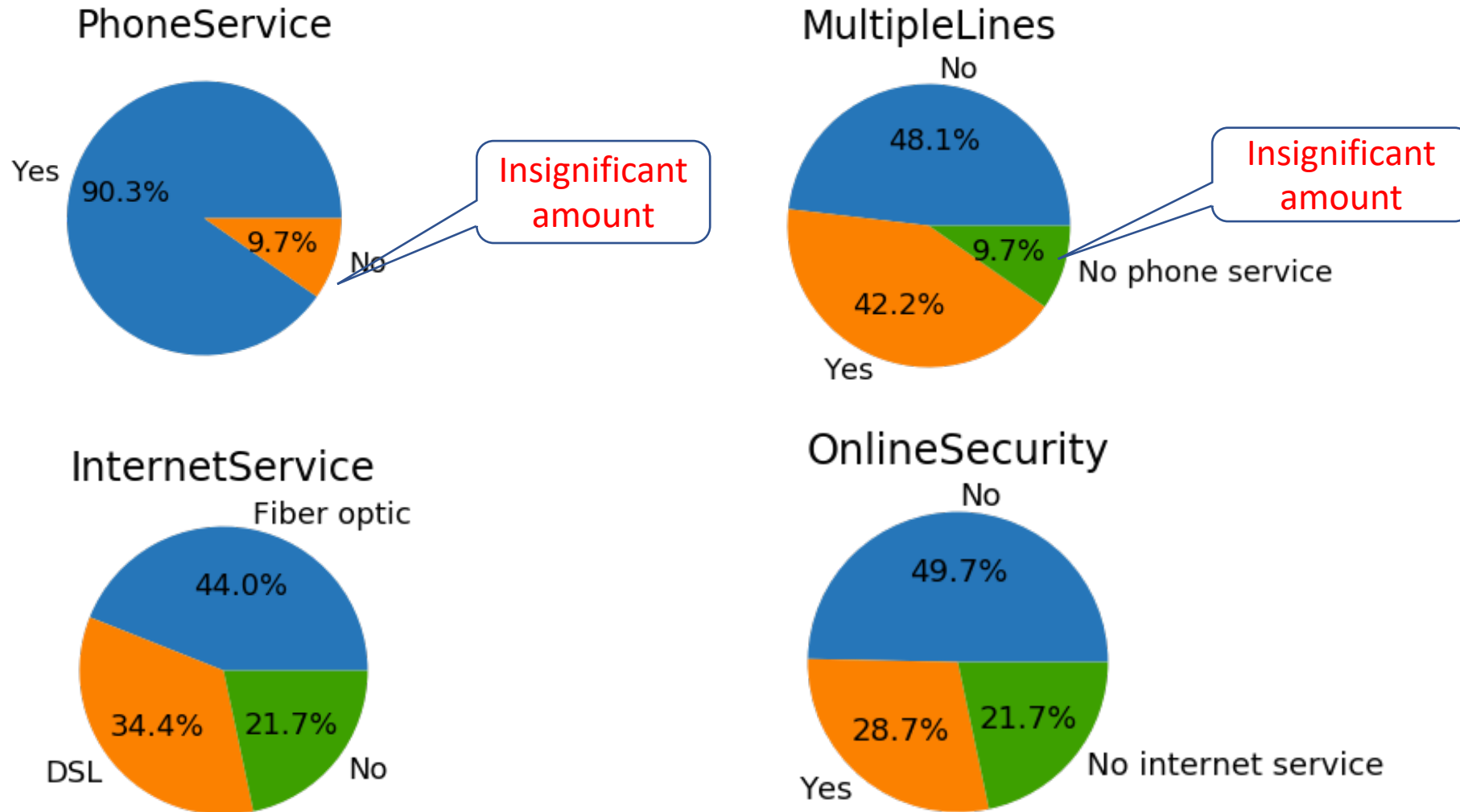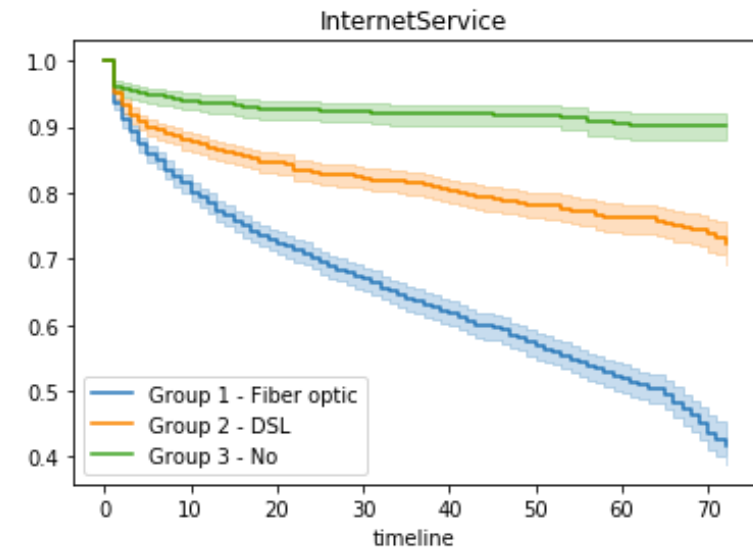
consumer behavior analysis (2)
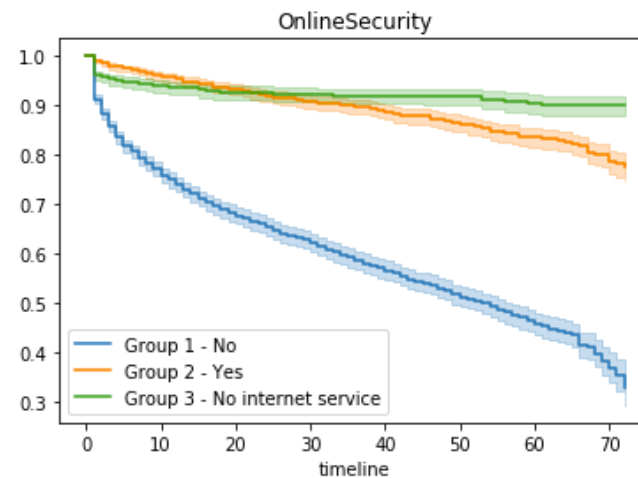
consumer behavior analysis (3)

Feature Importance to Predict Churn (1)
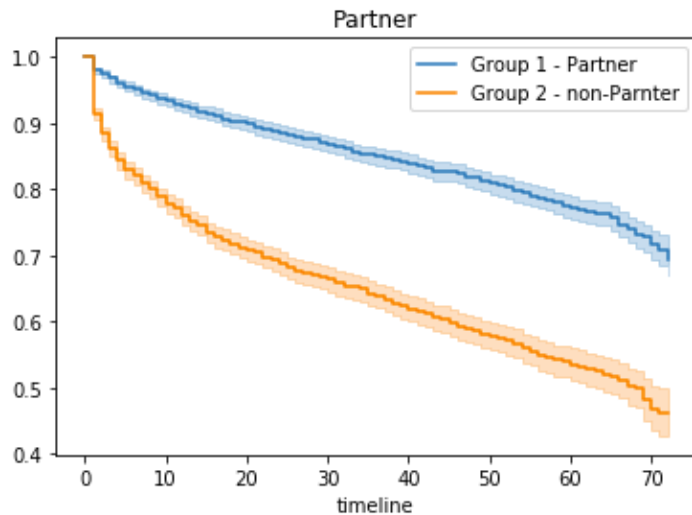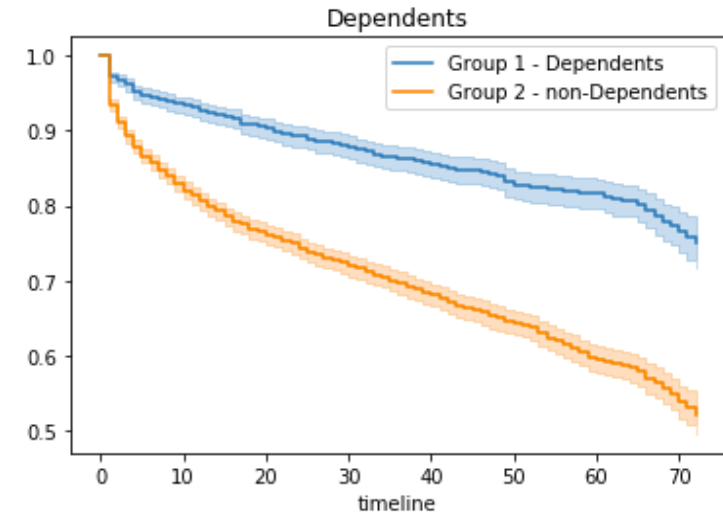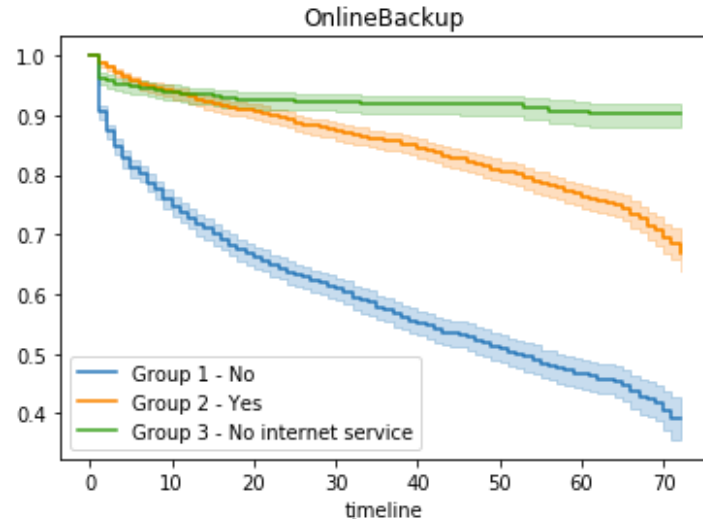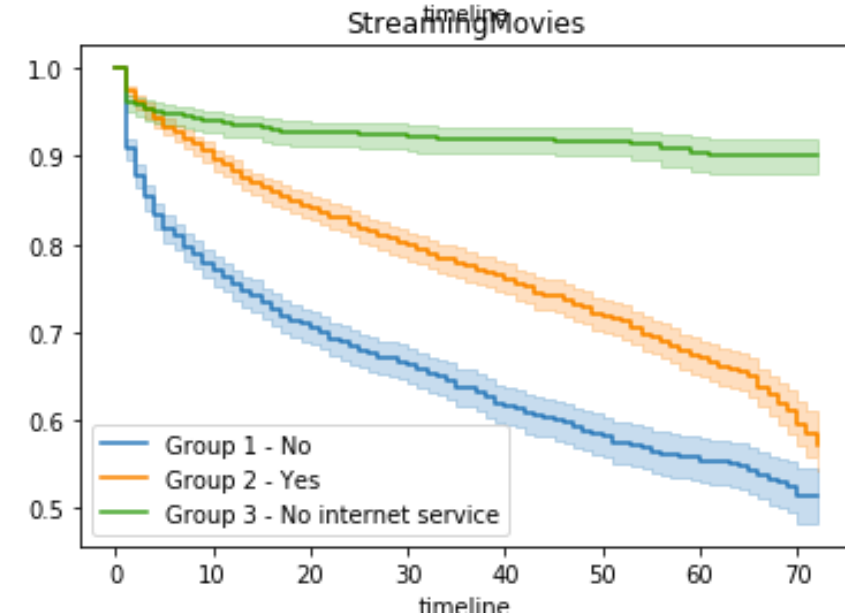
Feature Importance to Predict Churn (2)
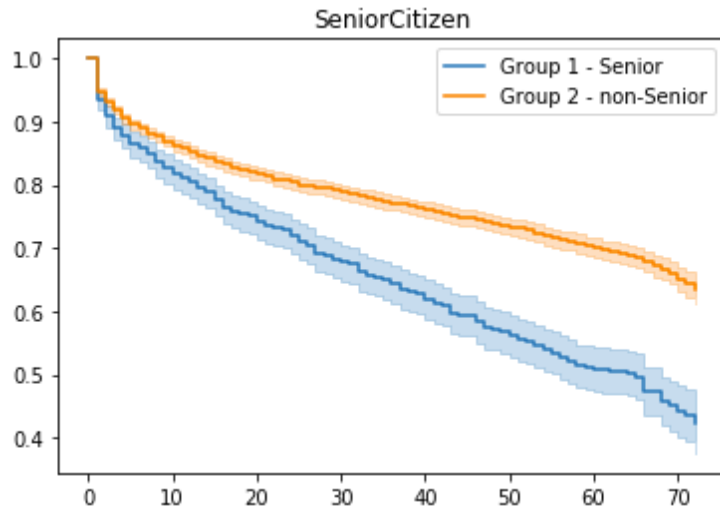
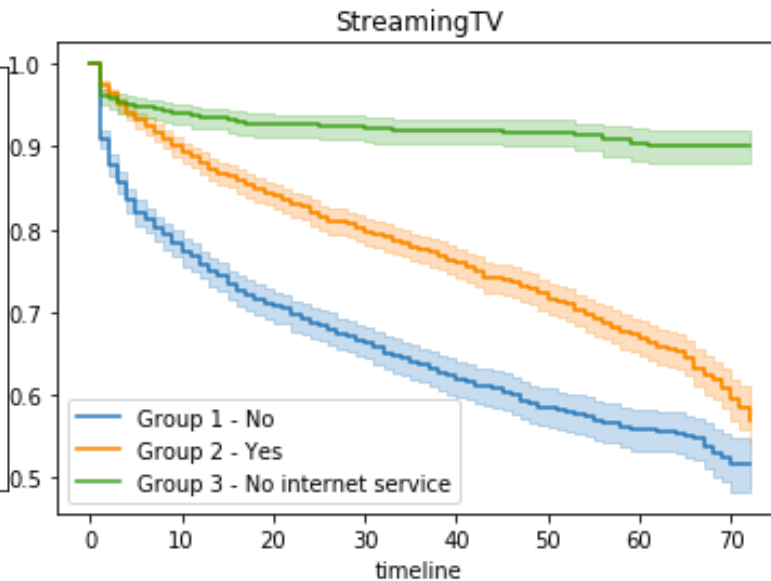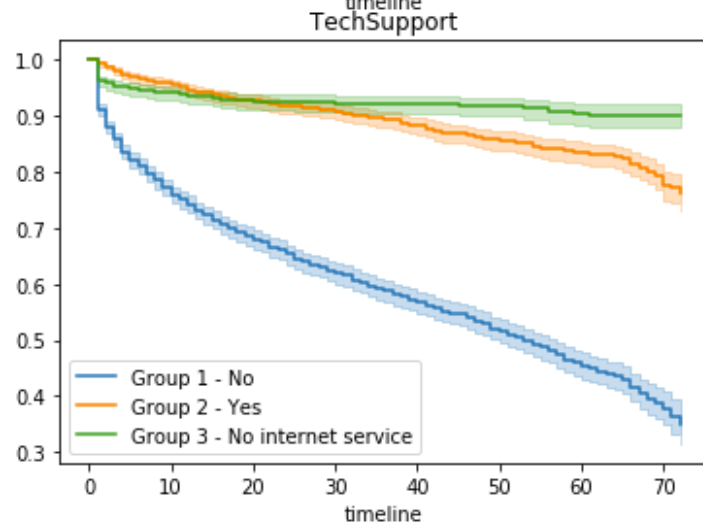# Feature Importance to Predict Churn (3)
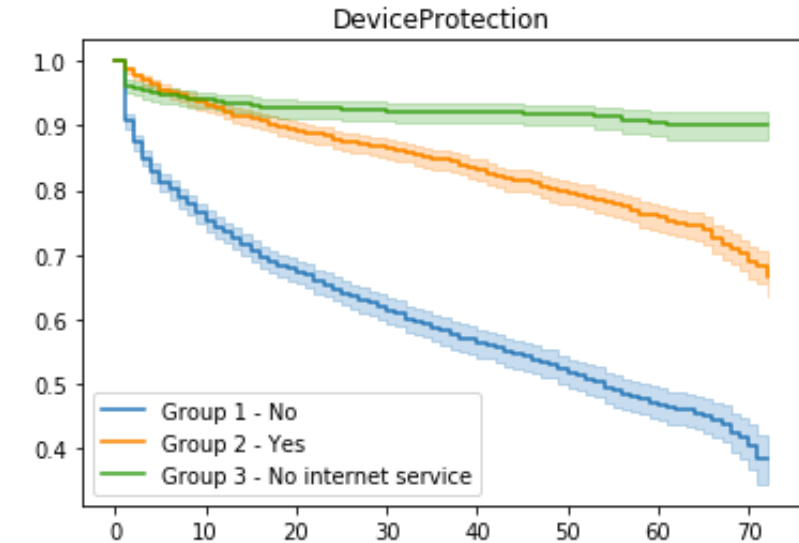
Feature Importance to Predict Churn (4)
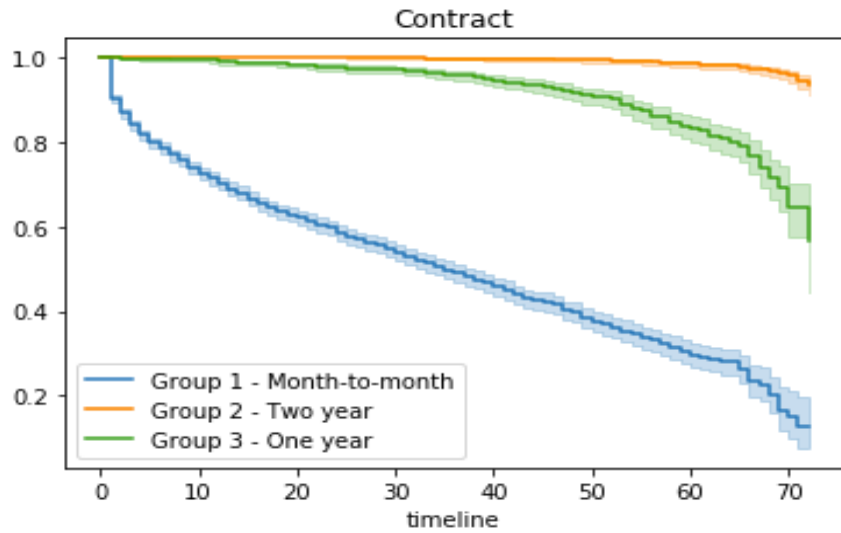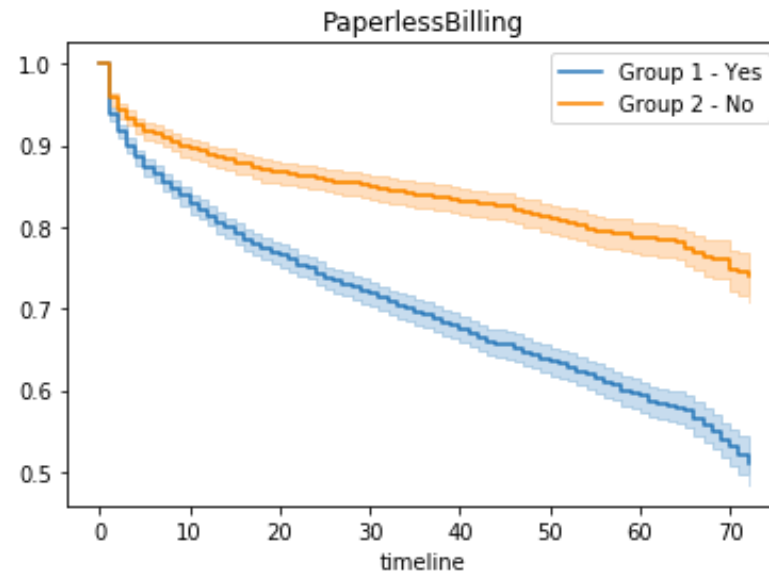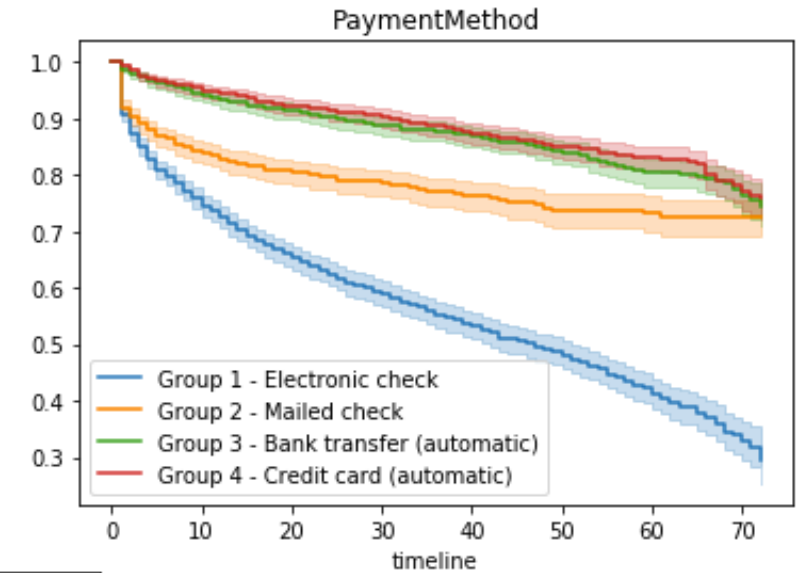
Tenure-Churn Kaplan Meier Curve

Kaplan Meier Curve
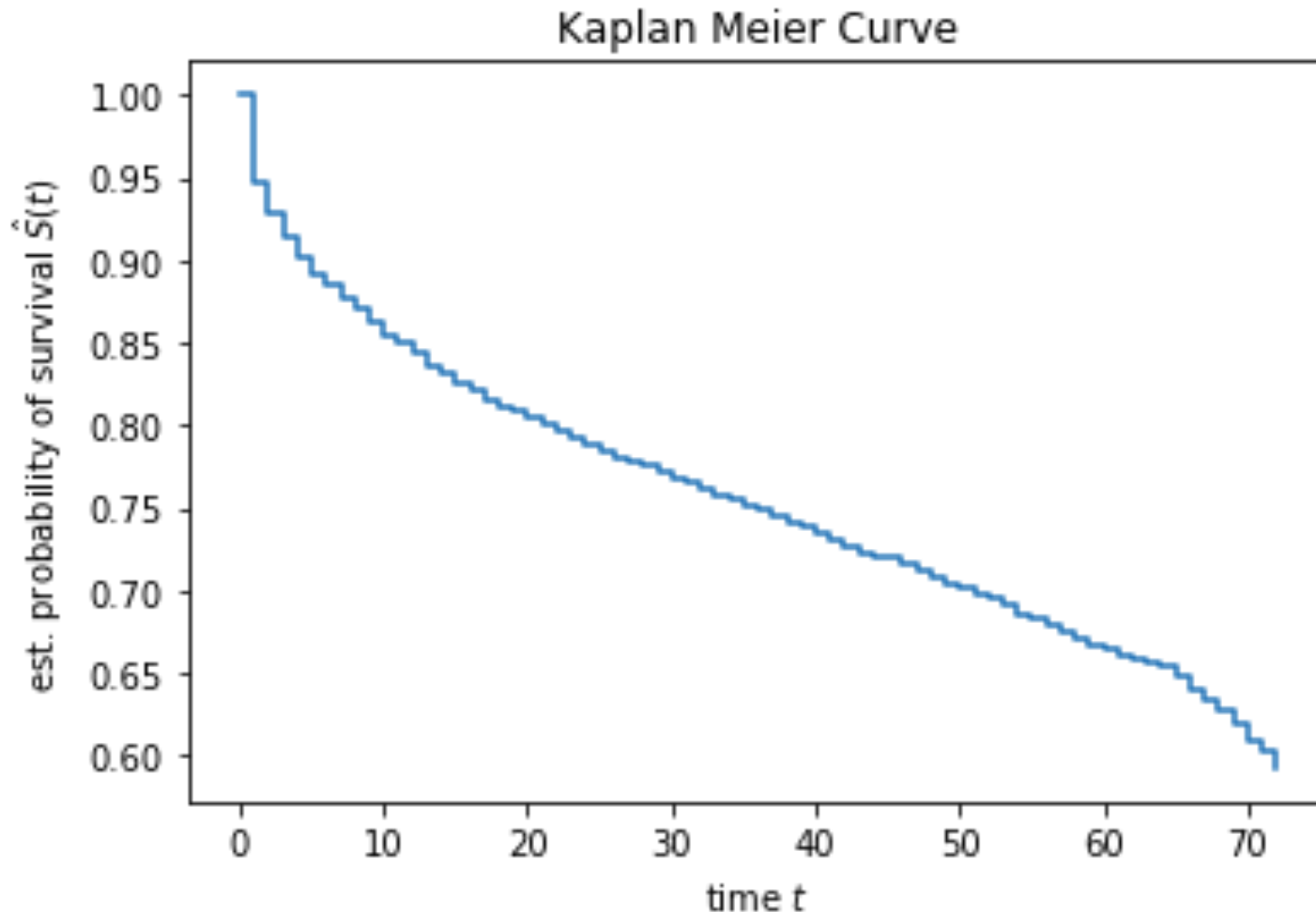
Highlight:

- The trend of survival function shows that during the first three months of tenure, the event of churn occurred rapidly;
- Then the number of survivals declined gradually;
- In the late stage of the month 65 and month 72, a significant number of customers got churned.

Cox Proportional Hazard model performance

- concordance_index_censored
  85.77%

- concordance_index_ipcw
  85.92%

- time-dependent AUC
  0.91

Time-dependent AUC for telco data