# Problem Statement

**Objective**:  
 Predict whether a customer will churn (cancel their subscription) based on their demographic details, service usage patterns, and billing behavior.

**Context**:  
 Customer churn is a critical issue for subscription-based businesses like Netflix. Retaining existing users is often more cost-effective than acquiring new ones. By identifying users at high risk of churn, the company can take proactive retention measures such as offering discounts, improving service quality, or targeted communication.

**Business Goal**:  
 Build a machine learning model using historical customer data to classify users as likely to churn or not. The model should also provide interpretable insights (via SHAP) to help the business understand the key drivers of churn and inform strategic decisions.

## **Why Churn Prediction Is Universal Across Industries**

**At its core**, churn prediction = *predicting whether a user/customer/client will stop using a service or product*. This insight is **vital for revenue forecasting, customer success, and product strategy**.

## **How It Maps Across Industries**

### **Netflix / Subscription Services**

* **What churn looks like**: Cancelling subscription
* **Features**: Tenure, watch time, device types, payment history, plan type, streaming frequency
* **Use**: Proactively offer discounts, personalized content, or upgrades

### **Coinbase / Fintech**

* **What churn looks like**: Inactive wallet, stopped trading, stopped funding account
* **Features**: Trading volume, asset types, login frequency, funding method, app engagement, fee sensitivity
* **Use**: Trigger educational nudges, fee waivers, or re-engagement rewards

### **🏦 JPMorgan / PNC Bank (Retail or Commercial)**

* **What churn looks like**: Client stops using certain banking products (e.g., ACH, wires, deposits), closes account, or switches to competitors
* **Features**: Product usage patterns, payment flows, balances, tenure, digital engagement, cross-product depth
* **Use**: Retain at-risk clients, cross-sell relevant services (e.g., move from deposits-only to credit or TM), optimize RM outreach

### **💼 Treasury Management (Product Usage - B2B)**

* **What churn looks like**: Business clients stop using TM services (ACH, wires), or reduce volume drastically
* **Features**: Monthly revenue per product, usage count, time since onboarding, RM contact history, business size
* **Use**: Segment clients into at-risk buckets, prioritize upsell or education on underutilized features (e.g., fraud protection, instant payments)

## 

## Basic Start: Churn Prediction (Phase 1)

# Goal: Predict if a customer will churn based on basic account and service usage data.

### **Dataset Assumptions**

# Each row = 1 customer

# Target = Churn (Yes/No)

# Mimics Netflix or Telco subscription behavior

### **Basic Features Used**

# Tenure (how long they’ve been subscribed)

# Contract type (monthly vs yearly)

# MonthlyCharges and TotalCharges

# PaymentMethod, PaperlessBilling

# Basic services used (StreamingTV, InternetService, TechSupport)

### **Tool**s

# XGBoost for classification

# SHAP for interpretability

# pandas, seaborn, scikit-learn

## Advanced Phase: Industry-Ready Churn Modeling (Phase 2)

**Goal**: Customize churn modeling for specific industries and business KPIs

### **Advanced Feature Engineering**

* **Behavioral Trends**: Usage over time, activity decline
* **Product Depth**: Number and type of services/products used
* **Engagement Metrics**: Login frequency, session length
* **Financial Signals**: Revenue trajectory, transaction volume
* **Relationship Metrics**: RM engagement, ticket/case activity
* **Client Segments**: Industry, size, onboarding cohort

| **Industry** | **What Churn Means** | **Example Feature** |
| --- | --- | --- |
| Netflix | Cancelled subscription | Watch time decline, device type |
| Coinbase | No activity for 30+ days | Trading frequency, wallet funding |
| JPMorgan | Reduced usage of banking tools | ACH volume, product count |
| PNC - TM | Drop in monthly product revenue | Monthly usage per product |