# Telco Customer Churn Prediction

Supervised Learning Final Project

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# 01 Project Background & Objectives

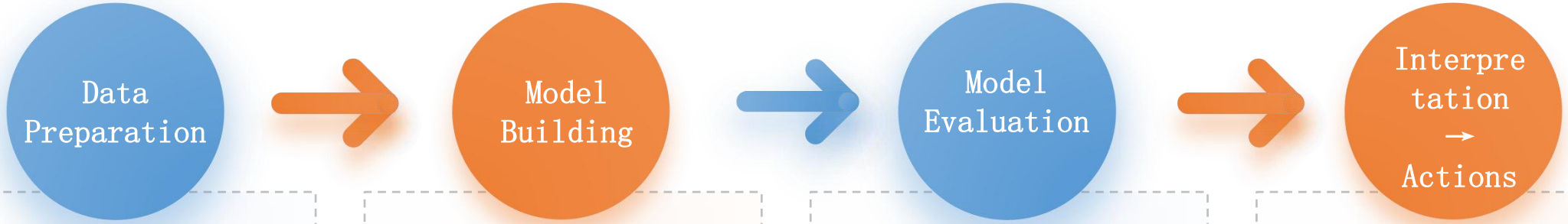
**Background:**

- Customer churn is a critical problem for subscription businesses, leading to significant revenue loss.
- So the key question of this project is: Can we predict which customers are likely to churn?

**Objectives:**

- Explore customer patterns through **exploratory data analysis.**
- Build predictive **machine learning models.**
- Identify the **key drivers of churn**.
- Translate the results into actionable **business strategies.**

# 02 Methodology & Workflow




- Clean/impute, One-Hot Encode, scale (Standard/MinMax), train/test split
- Handle imbalance: class weights + SMOTE

- Logistic Regression (baseline, class-weighted)
- kNN, Decision Tree, Random Forest (bagging)
- Gradient Boosting (sklearn), XGBoost, LightGBM
- SVM (RBF kernel)
- Stacking (e.g., SVM + LGBM + XGB → LR meta-learner)

- Primary: ROC-AUC; also Accuracy, Precision, Recall, F1
- Confusion matrices & threshold analysis

- Feature importance (tree-based & permutation), PDP/ICE（ARPU& Tenure）
- Translate drivers to retention strategies & revenue impact

# 03-07 Instructions

**Sections 03–07 are not shown here in slides. Instead, they are demonstrated directly in the Jupyter Notebook,**

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# 08 Conclusion & Takeaways

## Model performance

- Model performance close: most models **AUC ≈ 0.84–0.85**
- Robust baselines: Logistic Regression & Random Forest stable and interpretable
- Future potential: XGBoost / LightGBM promising with richer features & larger data

## Key churn drivers

- Key churn drivers: ARPU ↑, Short tenure, Month-to-month contracts, Electronic check payment, Internet Service , Monthly/Total Charges

## Business impact:

- Business impact: Reducing churn **25% → 20% ≈ +$293K** annual revenue

## Takeaway

- Value is not just model accuracy, but turning insights into actionable retention strategies

Future work: enrich feature engineering, try deep learning methods, and validate on real business data for deployment.