E-Commerce Customer Churn Prediction

End-to-End Machine Learning Project

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Business Problem

- Customer churn leads to revenue loss
- Retaining customers is cheaper than acquiring new ones
- Businesses need early churn prediction
- Goal: Identify customers likely to churn

Dataset Overview

- Source: E-commerce transactional data (academic use)
- Size: ~500 customers
- Target variable: Churn (0 = Active, 1 = Churned)
- Data includes customer behavior features

Data Cleaning Challenges

- **Content:**
- Missing values in customer data
- Duplicate records
- Incorrect date formats
- **Solutions:**
- Removed duplicates
- Handled missing values
- Converted dates to numerical format

Feature Engineering

- Recency: Days since last purchase
- Frequency: Number of purchases
- Monetary: Total amount spent
- Aggregated customer behavior features

Models Evaluated

- Logistic Regression
- Decision Tree
- Random Forest
- Gradient Boosting
- Neural Network

Model Performance Comparison

- Compared using ROC-AUC, Precision, Recall
- Ensemble models performed better
- Gradient Boosting showed balanced performance

Final Model Selection

- Selected Model: Gradient Boosting Classifier
- Reason:
- Good ROC-AUC score
- Better recall for churn detection
- Suitable for tabular data

Model Performance

ROC-AUC ≈ 0.71
- Precision ≈ 0.62
- Recall ≈ 0.66
- Evaluated using confusion matrix and ROC curve

Business Impact

- Enables targeted retention campaigns
- Reduces marketing costs
- Improves customer lifetime value
- Supports data-driven decisions

Deployment

- **Content:**
- Platform: Streamlit Community Cloud
- Web-based churn prediction app
- Supports single and batch predictions
- **Live URL:** https://customerchurnprediction-jibsstz4dpax8mqc4yw76x.streamlit.app/

Learnings & Future Improvements

- **Content:**
  Key Learnings:
- End-to-end ML pipeline development
- Feature engineering techniques
- Model evaluation and deployment
- **Future Improvements:**
- Improve model accuracy
- Add real-time data
- Integrate CRM systems