

**FOOD
& DRINK
COUPONE**



GIFT
40%

EXPIRATION DATE
03/05/2020



In-Vehicle Coupon Recommendation System Project

This project explores how personalized coupon recommendations can enhance acceptance and marketing efficiency.

Group Members: Austin Kanja, Benson Ouma, Rahab Gachie, Ted Ronoh, Winnie Odoyo

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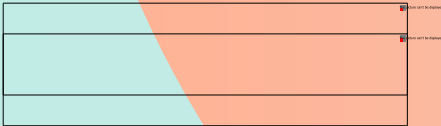
6 Outcomes





01

Introduction





Problem Statement

In the competitive food and beverage industry, businesses frequently use coupons to attract customers. However, sending irrelevant or poorly timed coupons often results in low redemption rates, wasted marketing resources, and customer disengagement. At the same time, customers value offers that are timely, relevant, and tailored to their preferences and current situation. Currently, businesses lack a data-driven system to determine which specific coupon type and expiration period should be offered to maximize the likelihood of acceptance.

Objective: To develop a predictive model that leverages passenger demographics, trip context (time, weather, destination, etc.) and behavioral patterns to recommend the most appropriate coupon type and expiration period for a given passenger during their journey.

Project Goal

01 Build a predictive Model

Recommending the best coupon type and expiration duration using a predictive model.

02 Personalization Factors

Tailoring offers using passenger demographics, trip context, and behavioral tendencies.

03 Maximizing Acceptance Rates

The goal is to maximize coupon acceptance rates through personalized recommendations.

01

Project Focus

Developing a Coupon Recommendation System to boost customer satisfaction and increase coupon acceptance rates.

02

Why? The Importance of Personalization

Delivering personalized, timely, and relevant offers is crucial for customer satisfaction and engagement in today's digital economy.

03

Optimizing Efforts

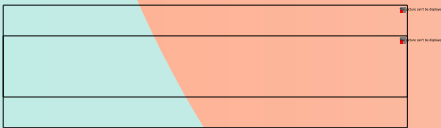
This project also focuses on optimizing promotional efforts through data-driven strategies.





02

Machine Learning



Model Development

Classification Model

Develop a classification model that predicts and recommends the most appropriate coupon-expiration combination.

Goal

The goal is to recommend the best coupon type and expiration duration using a predictive model which maximizes coupon acceptance rates, so the coupon sent must be relevant.

03

Data Understanding

Data Source



UC Irvine Machine Learning Repository

The data is sourced from the UC Irvine Machine Learning Repository.



Dataset Link

<https://archive.ics.uci.edu/datasets/>



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Data Size and Features

01

Dataset Size

The dataset comprises 12,684 records, so careful handling is required for computational efficiency.

02

Input Variables

Input variables include demographics, contextual factors, and behavioral patterns to accurately represent preferences.

03

Target Variables

Target variables consist of coupon type (Restaurant, Coffee House, Bar, etc.) and expiration (2 hours vs 1 day).

Initial Steps

Data Preprocessing & EDA



01

Importing Libraries

Importing necessary libraries such as Pandas, NumPy, and Seaborn is essential; these tools enhance data handling capabilities.



02

Data Loading and Inspection

Loading and inspecting the data ensures its integrity and suitability for analysis.

Data Cleaning



Handling Null Values

Addressing missing data points maintains accuracy throughout the analysis process.



Encoding Categorical Variables

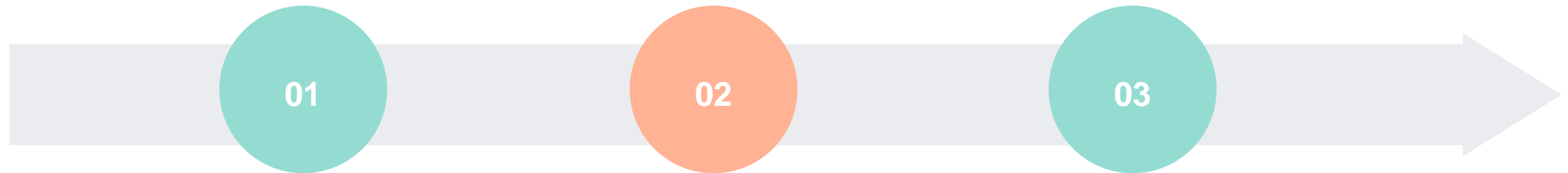
Encoding categorical data enables compatibility with machine learning algorithms since the data must be numeric.



Dropping Irrelevant Columns

Removing unnecessary columns streamlines analysis by focusing on relevant attributes.

Exploratory Data Analysis



Distribution Plots

Using distribution plots for demographics and behavior offers insights into data patterns.

Correlation Heatmaps

Correlation heatmaps reveal relationships between variables, aiding feature selection.

Target Variable Analysis

Analyzing target variables helps understand coupon-expiration drivers; this enhances decision-making throughout the experimentation.

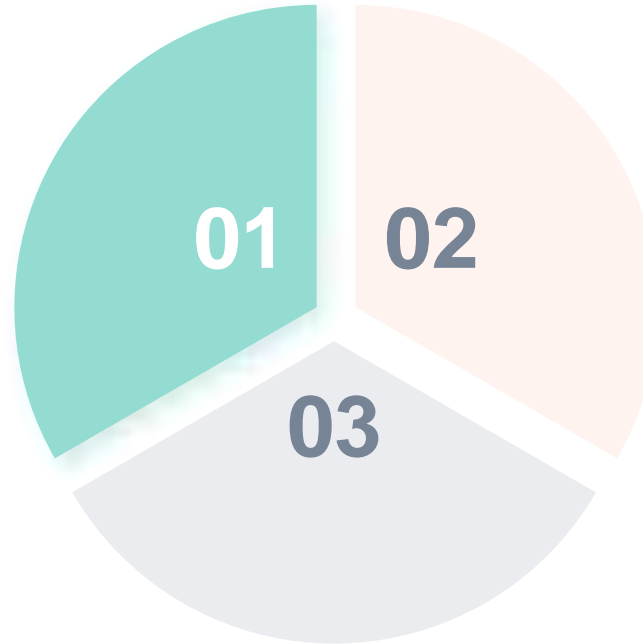
Modeling Approach

Baseline Models

Dummy Classifiers

Decision Tree

XGBOOST/LightGBM

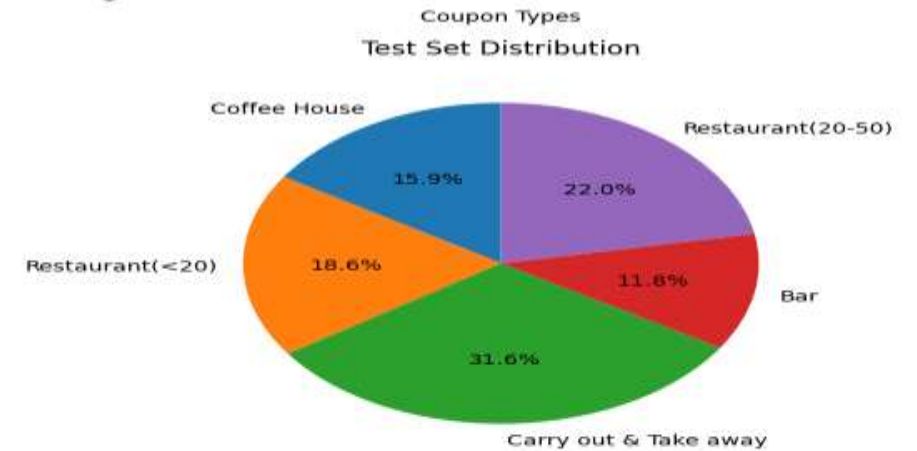
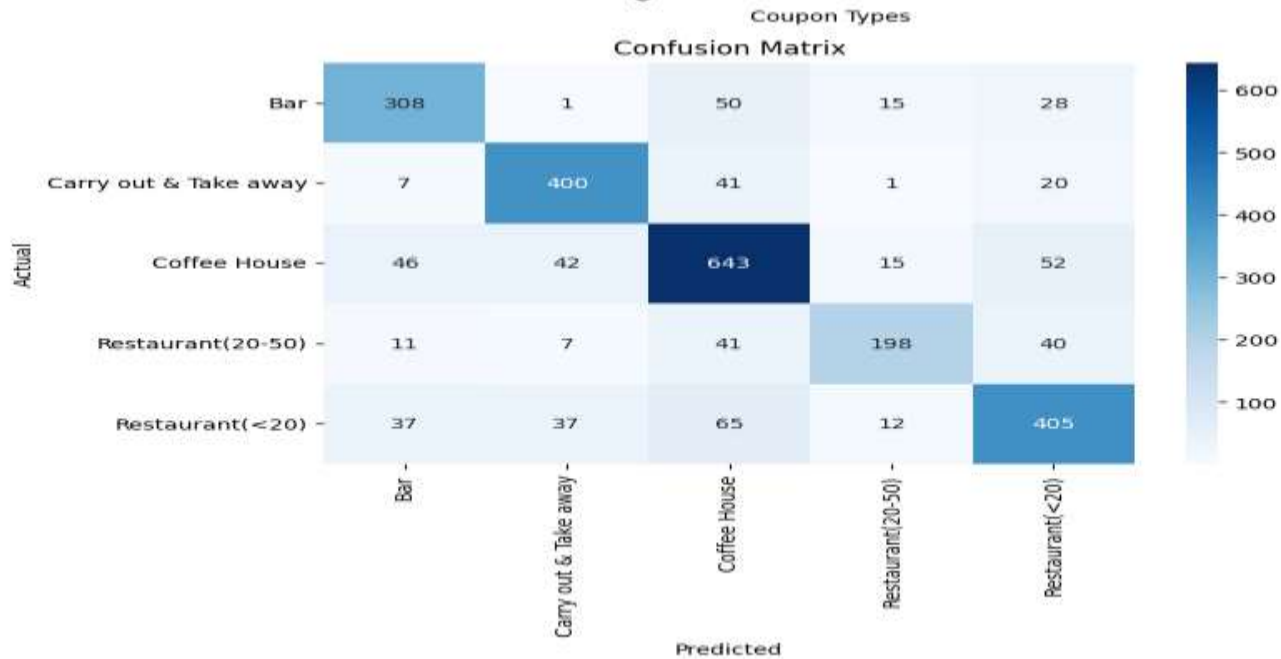
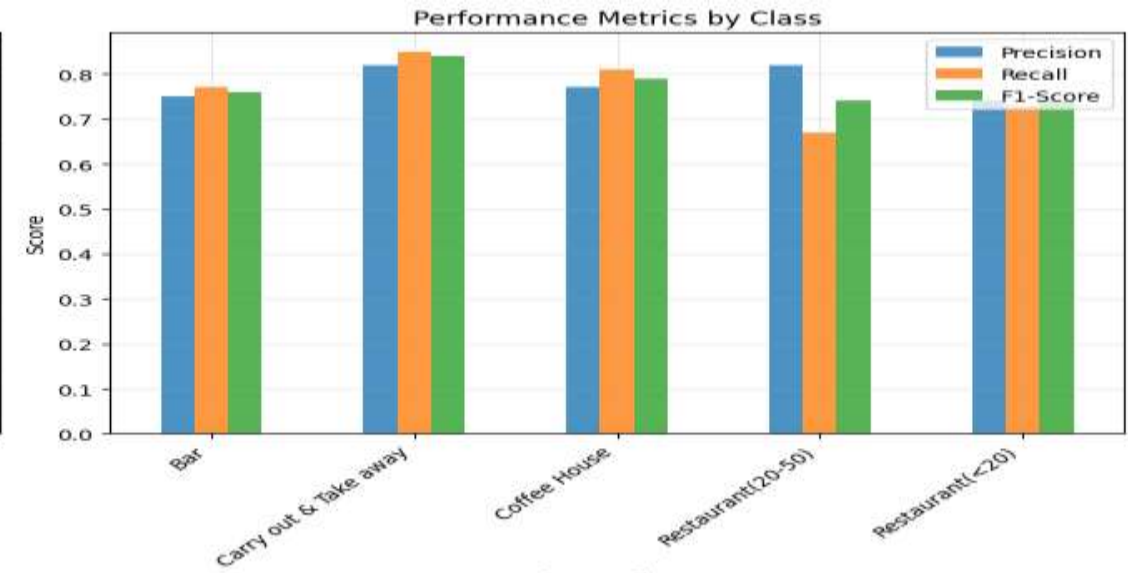
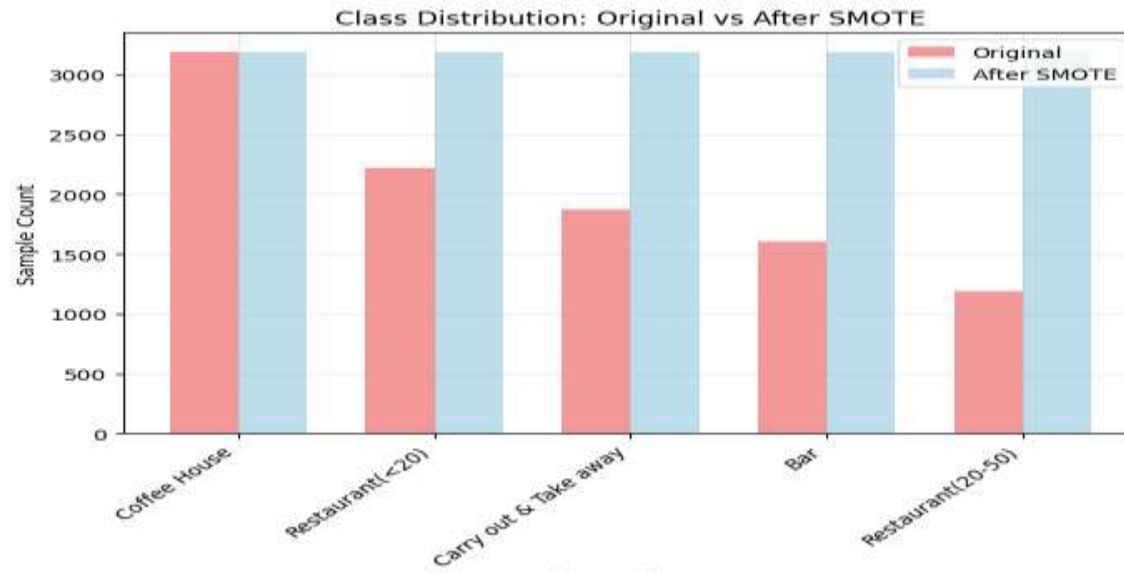


Class Balancing Strategies

SMOTE

SMOTE (Synthetic Minority Over-sampling Technique) balances class distribution by creating synthetic samples.

Visualization



Hyperparameter Tuning



GridSearchCV

GridSearchCV automates hyperparameter tuning to find the optimal configuration.

Model Evaluation

Accuracy

Accuracy is the proportion of correct predictions out of all predictions.

Confusion Matrix

Confusion Matrix provides a breakdown of prediction outcomes, including true positives, true negatives, false positives, and false negatives.

Precision, Recall, F1-score

Precision measures the accuracy of positive predictions; Recall measures the ability to capture all positive instances; F1 balances Precision and Recall. F1 is the most relevant for our business case.



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Outcomes

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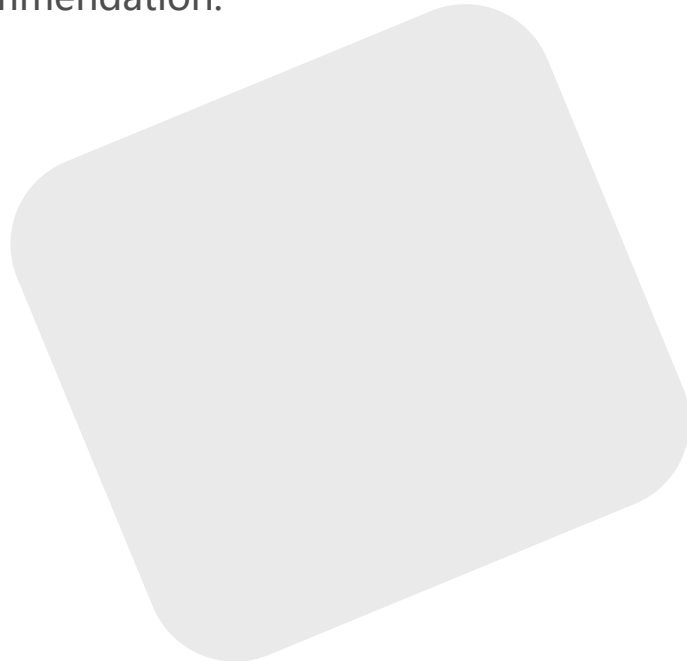


Feature Identification

Important Features



Pinpointing which features are most predictive of coupon recommendation.



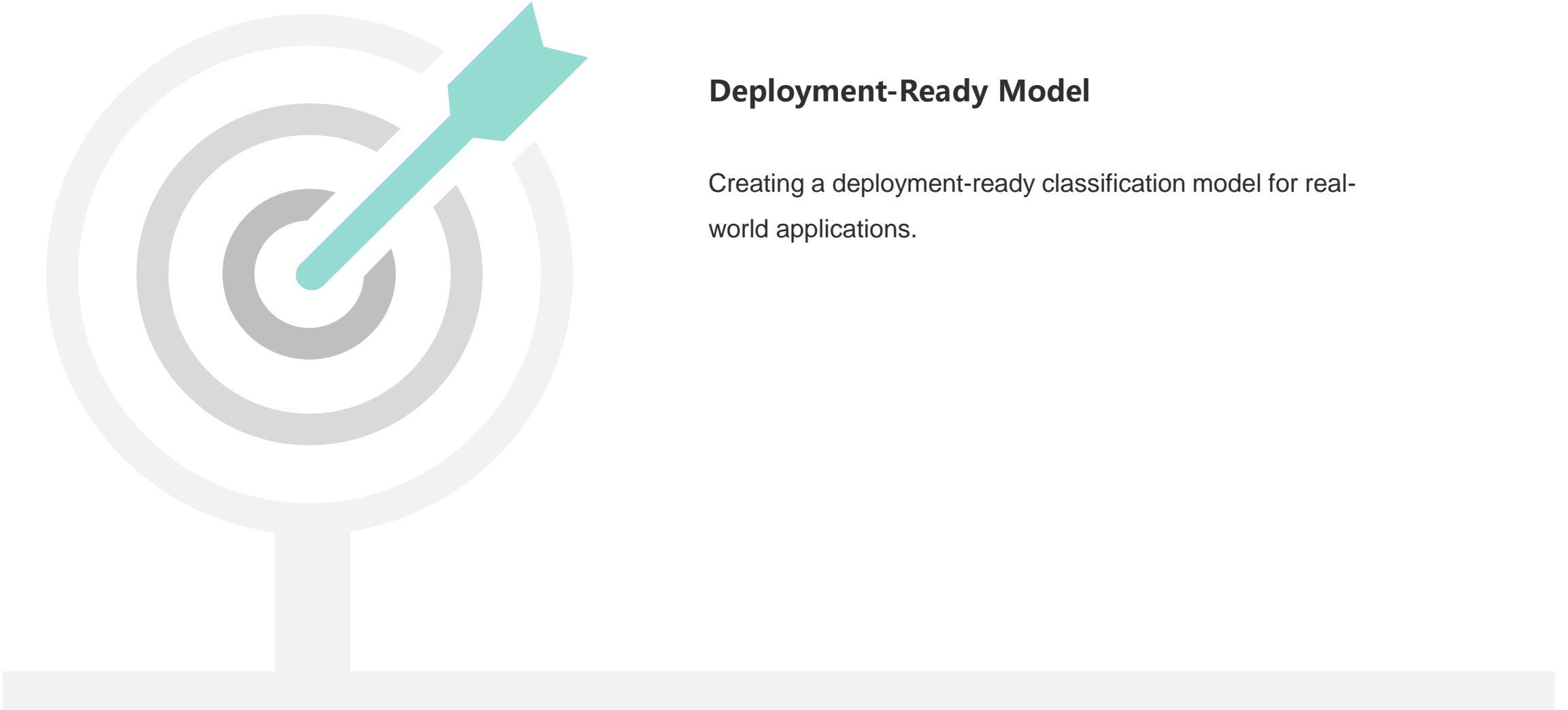
Coupon Effectiveness

Scenarios for Coupon Use

Knowing which coupons are most effective in which scenarios is also critical for success; for example, do certain coupons perform better on certain days?



Model Deployment



Deployment-Ready Model

Creating a deployment-ready classification model for real-world applications.



07

Key Insights

Recommendations



1. Promote Takeaway and Low-Cost Restaurant Coupons

Coupons for carry-out, takeaway, and restaurants priced under \$20 perform best.

2. Use 1-Day Expiry for Better Results

Coupons valid for one day are more effective than those with shorter (2-hour) durations.

3. Target Young, Single, Middle-Income Users

Younger users (under 30), singles and those with middle incomes are most responsive to coupon offers.

4. Leverage Favorable Weather and Peak Times

Coupon acceptance increases in sunny weather and during peak times like 10 AM and 6 PM.

5. Focus on Convenient or Leisure-Driven Destinations

Users heading to shopping centers or without urgent destinations are more likely to use coupons.

Conclusion & Next Steps

- **Context matters** – Coupons perform best in sunny weather, at 10 AM or 6 PM and when users are not in a hurry.
- **Simple, affordable offers work** – 1-day takeaway and low-cost restaurant coupons have the highest acceptance.
- **Target the right users** – Young, single, middle-income individuals are most likely to redeem coupons.

Next Steps

- Integration with Uber & Bolt APIs
- Approach restaurant chains like Java House to run a pilot program aimed at boosting targeted marketing performance through personalized coupon delivery.

Thank you.

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