Cart Abandonment Prediction

& CUSTOMER SEGMENTATION

A Machine Learning Predictive Analytics Approach to Understanding E-commerce Customer Behavior

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Problem Statement

A significant portion of potential customers add products to their online shopping carts but fail to complete the purchase, leading to revenue loss. Understanding the patterns, behaviors, and characteristics of these customers is essential to reduce abandonment rates and improve conversion.

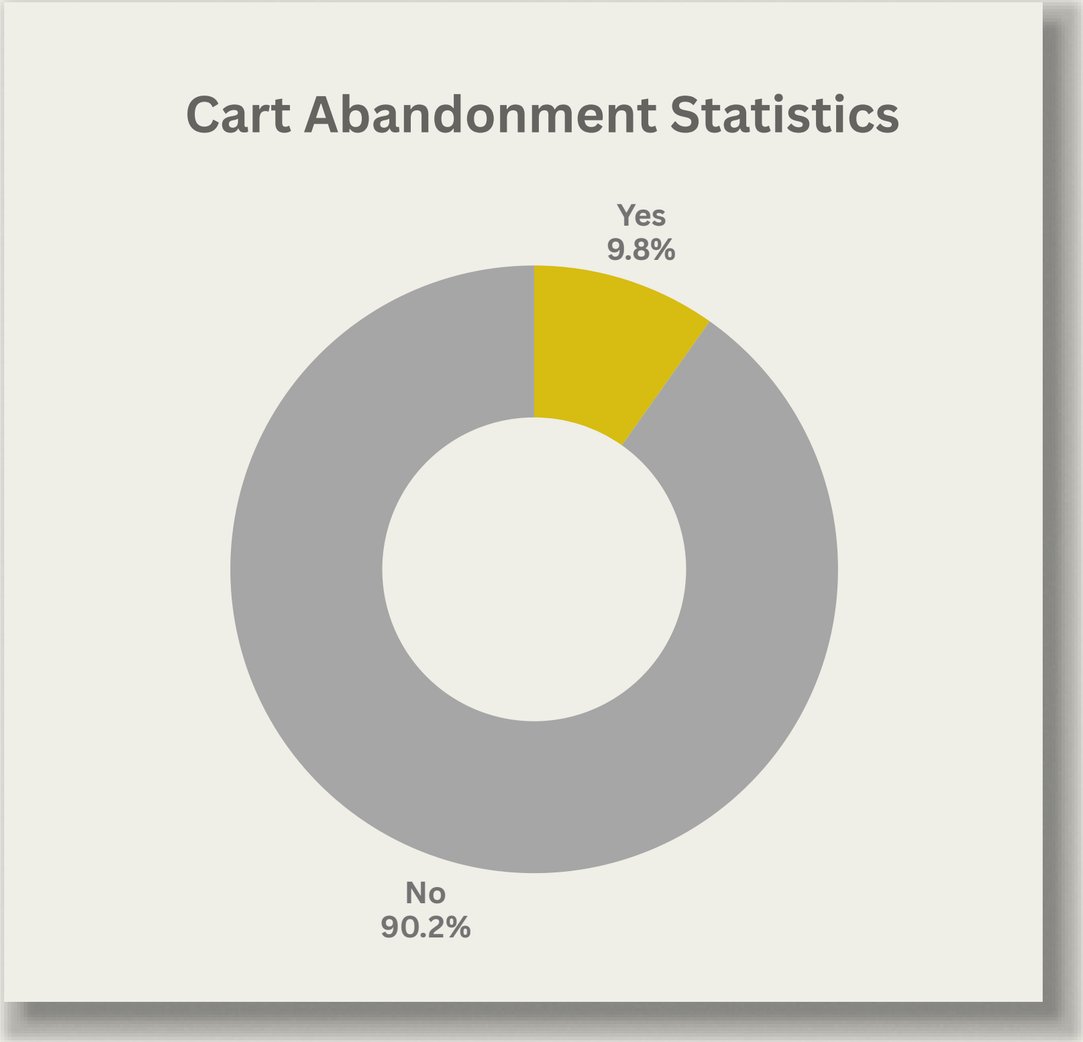
The Challenge

Cart abandonment rates in e-commerce average 9.8 %, representing millions in lost revenue annually.

Identify Key Factors
What drives customers to abandon their carts?

Customer Segmentation
Group customers by behavior pattern

Predictive Modeling
Predict abandonment likelihood



Methodology

Data Collection

E-commerce transaction logs, user behavior data, session analytics

Feature Engineering

Encoding, Log Transformation , Scaling Numerical Features , Feature Selection, Column Transformer, Pipeline Creation with Decision Tree Classifier

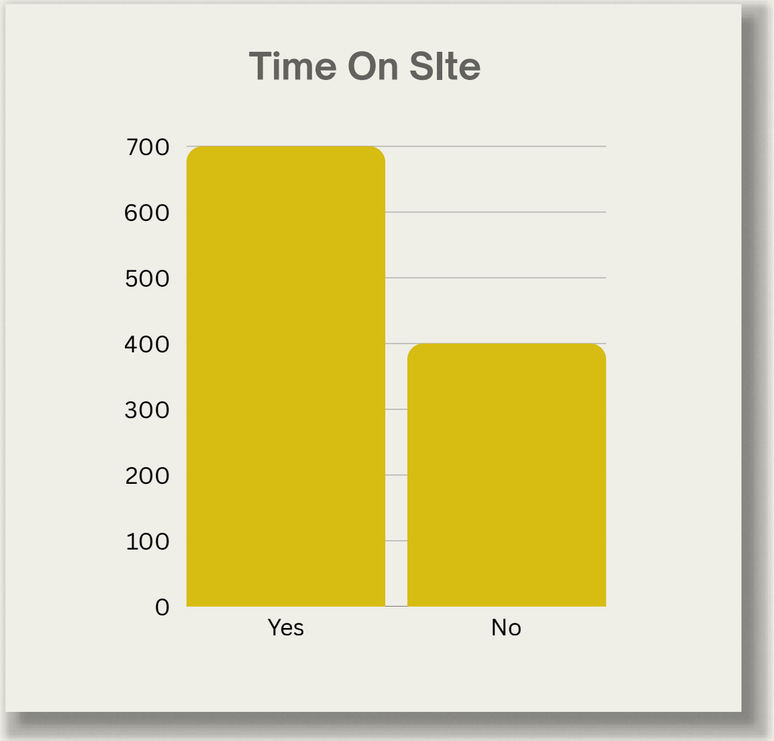
ML Algorithms

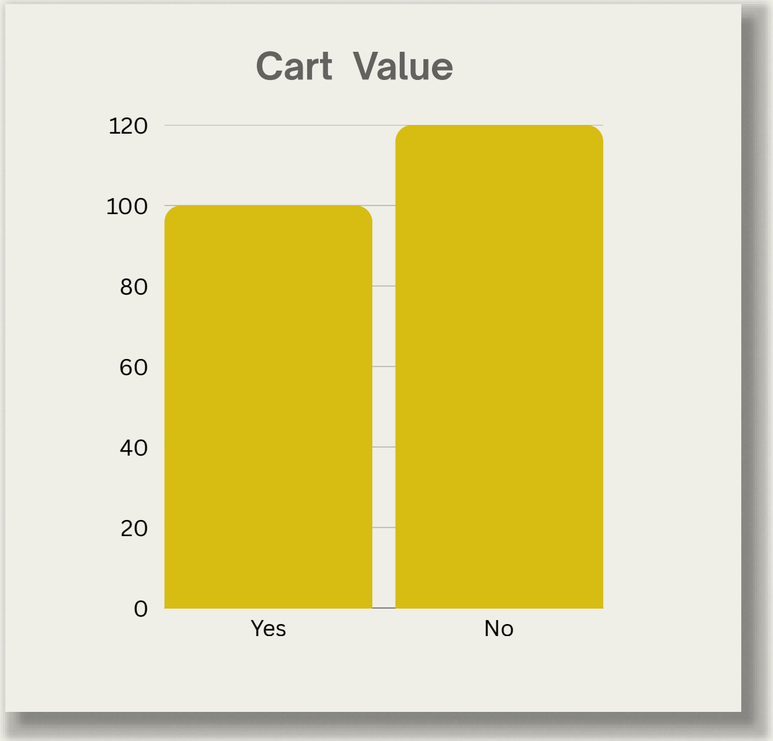
Decision Tree Classifier for Cart Abandonment Prediction and K-Means Clustering for Customer Segmentation

Data Processing Pipeline

1. Raw Data
2. Cleaning
3. Feature Engineering
4. Model Training
5. Evaluation

Data Analysis & Insights





9.8 %

Abandonment Rate

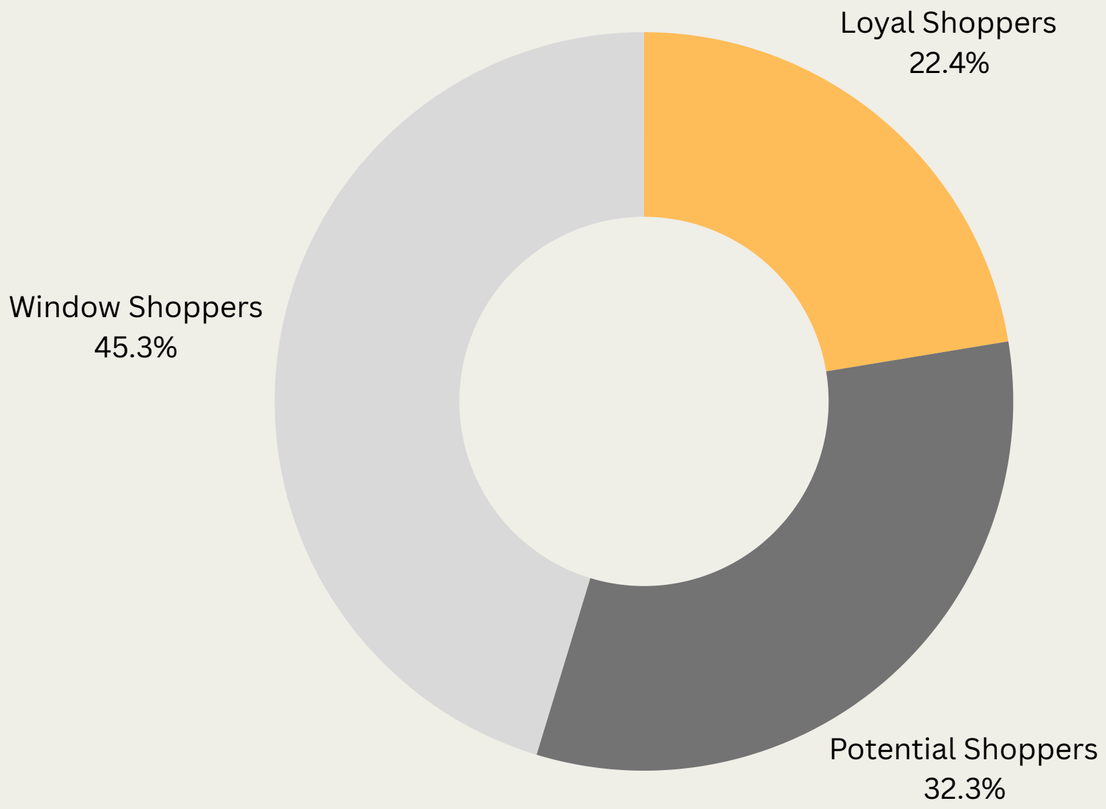
~$3.67 million

Potential Lost Revenue

7.43 minutes

Avg Session Duration

Customer Segmentation Results



Loyal Customers (22.4%)

Repeat buyers, brand loyal, high value

Potential Customers (32.3%)

Compare prices, read reviews,

Window Shoppers (45.3%)

Browse extensively, rarely purchase

Customer Segment Characteristics

Segment	Avg Cart Value	Session Duration	Abandonment Rate
Loyal Shoppers	₹211	10.8 min	~45% (estimated)
Potential Shoppers	₹113	9.2 min	~65% (estimated)
Window Shopper	₹86	4.5 min	~80%+ (estimated)

Model Performance & Results

Logistic Regression

84.0%

accuracy

Decision Tree Classifier

89.3%

accuracy

DT with Oversampling

89.6%

accuracy

Class	Precision	Recall
0	0.97	0.92
1	0.46	0.68

250
True Positives

22
False Positives

9
False Negatives

19
True Negatives

Model Performance & Results

E-commerce Online Platform

We developed a Cart Abandonment Prediction Model for an e-commerce platform (similar to Amazon) to identify at-risk customers, reduce lost sales, and enhance the overall shopping experience.

- **Real-time abandonment risk scoring**
- **Personalized intervention strategies**

Implementation Results

Cart Abandonment Rate	**9.3%** →	**13.7%**
Conversion Rate	**90.7%** →	**86.3%**

Conclusions & Future Work

Key Findings

- Decision Tree model achieved **90% accuracy** in predicting cart abandonment
- Detected **68%** of true cart abandoners, enabling proactive interventions
- **Top drivers**: time-on-site, pages visited, and cart value
- Potential business impact: up to **20–25%** reduction in lost sales through targeted reminders and offers

Future Enhancements

- More Advanced ML model or Deep learning models for improved accuracy
- Real-time personalization algorithms
- Integration with marketing automation platforms
- Cross-platform behavior analysis

Thank You !

Questions & Discussion

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