

**DEPARTMENT OF  
ARTIFICIAL INTELLIGENCE AND DATA SCIENCE  
ACADEMIC YEAR 2025 - 2026  
SEMESTER III  
ARTIFICIAL INTELLIGENCE LABORATORY  
MINI PROJECT REVIEW**

**AI-BASED CUSTOMER PURCHASE PREDICTION  
USING PROBABILISTIC REASONING**

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# PROBLEM STATEMENT

In e-commerce, predicting if a customer will buy a product is important for better sales and engagement. Traditional models often fail because customer behavior is uncertain and changes often. So, the goal is to create an AI model that predicts purchase chances using user data. This project uses the Naive Bayes algorithm to make accurate and smart predictions.

# THEORETICAL BACKGROUND

## Probabilistic Reasoning under Uncertainty

$$P(H | E) = \frac{P(E | H) \times P(H)}{P(E)}$$

- $P(H | E)$  – Posterior probability (probability of hypothesis  $H$  given evidence  $E$ )
- $P(E | H)$  – Likelihood (probability of evidence  $E$  given hypothesis  $H$ )
- $P(H)$  – Prior probability (initial belief about  $H$  before seeing  $E$ )
- $P(E)$  – Evidence probability (overall probability of observing  $E$ )

## Naive Bayes Classifier

$$P(C | X) = \frac{P(X | C) \times P(C)}{P(X)}$$

- $P(C | X)$  – Probability of class  $C$  given the features  $X$
- $P(X | C)$  – Probability of observing features  $X$  given class  $C$
- $P(C)$  – Prior probability of class  $C$
- $P(X)$  – Probability of observing features  $X$

# IMPLEMENTATION AND CODE

List	Git-hub Repository Links
Implementation of Code Link	<a href="https://github.com/vidhula240348-dotcom/AI-Based-Customer-Purchase-Prediction"><u>https://github.com/vidhula240348-dotcom/AI-Based-Customer-Purchase-Prediction</u></a>
Word Document Report Link	<a href="https://github.com/vidhula240348-dotcom/AI-Based-Customer-Purchase-Prediction/blob/main/AI_Mini_Project_Report_Vidhula_Final.docx"><u>https://github.com/vidhula240348-dotcom/AI-Based-Customer-Purchase-Prediction/blob/main/AI_Mini_Project_Report_Vidhula_Final.docx</u></a>
PPT Link	

# OUTPUT AND RESULTS

AI Customer Purchase Predictor

## Customer Purchase Prediction

Model Accuracy: 100.00%

Age:

Gender (0=Male,1=Female):

Time on Website (hrs):

Pages Viewed:

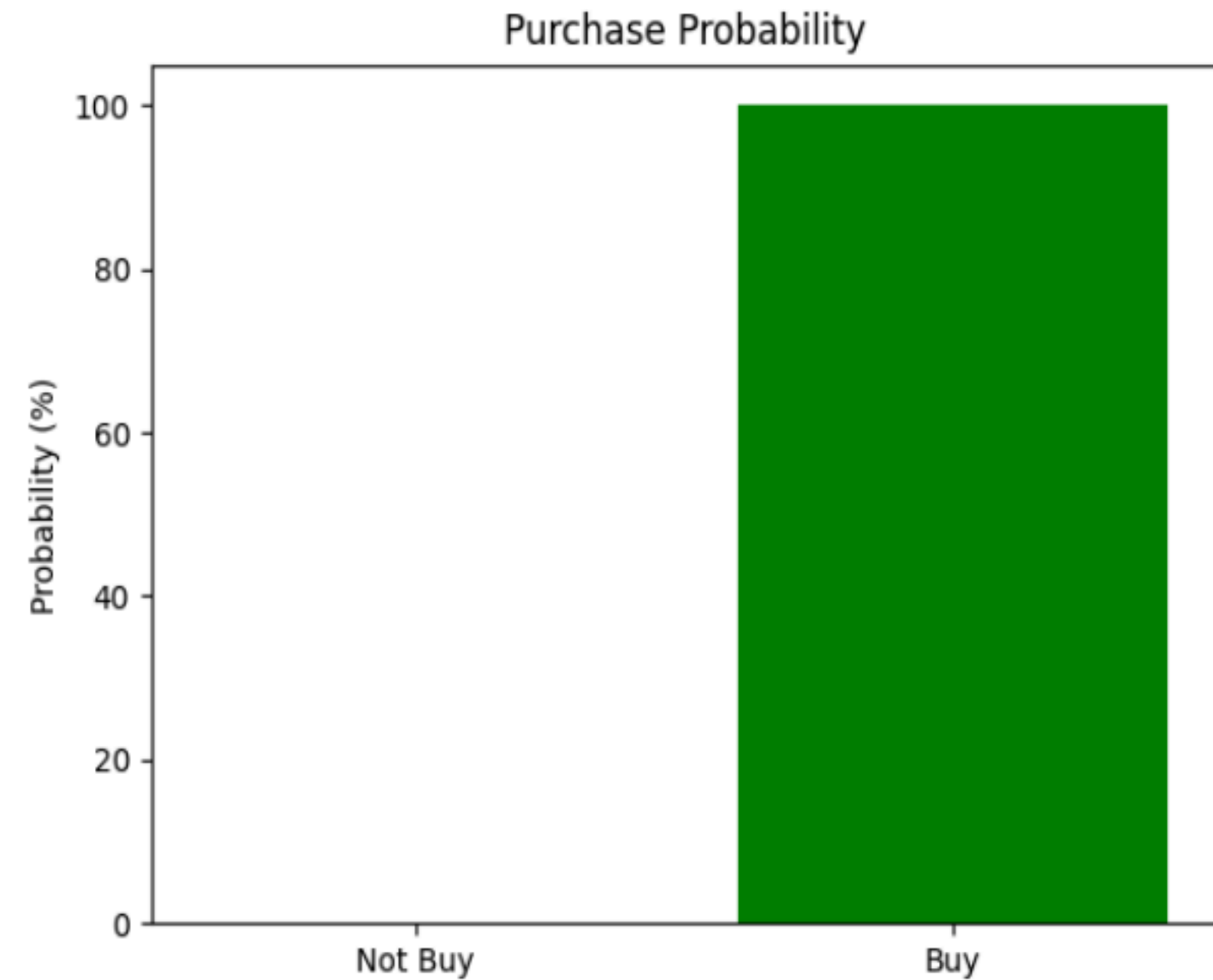
Previous Purchase (1=Yes,0=No):

Income Level (0=Low,1=Med,2=High):

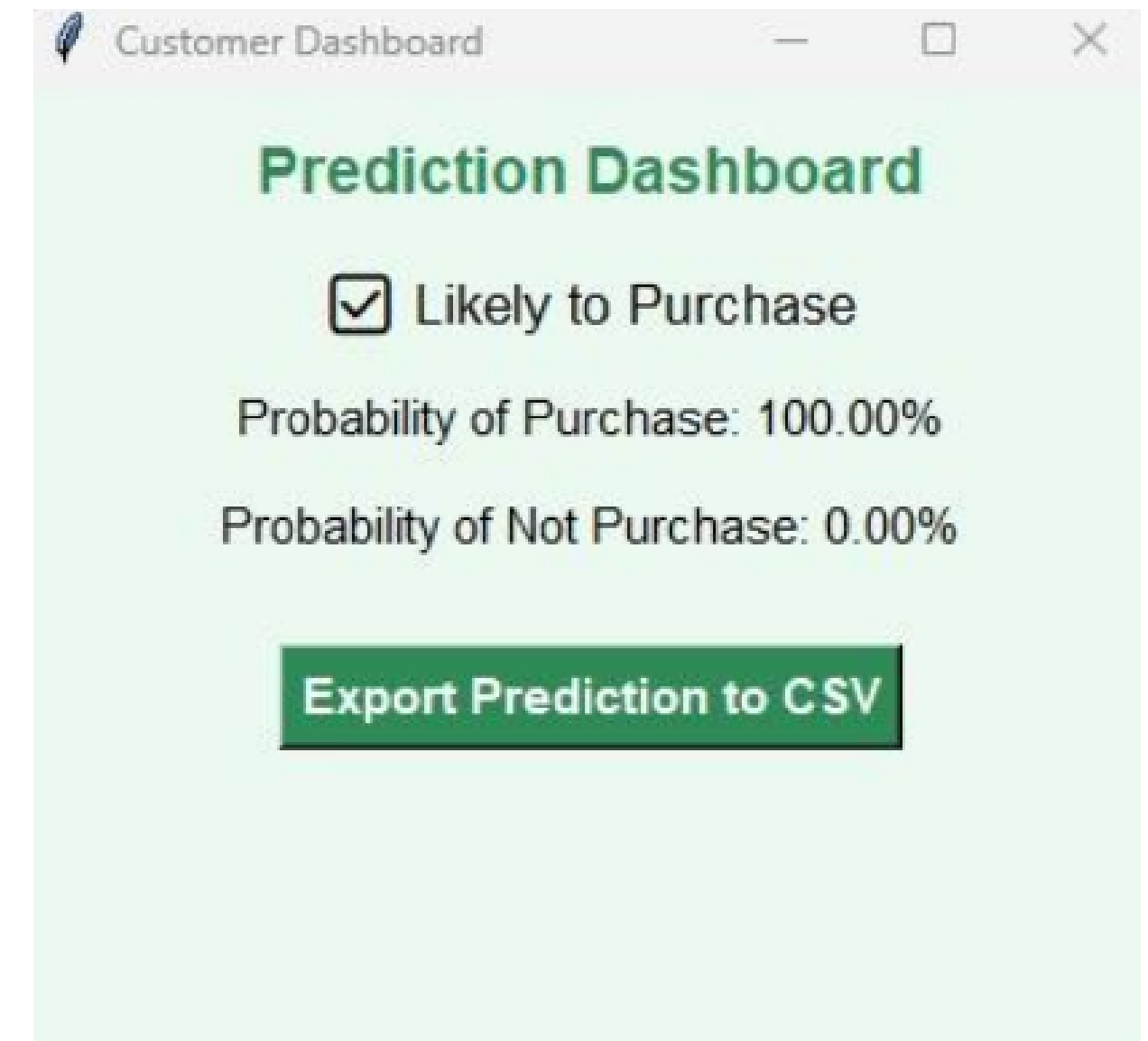
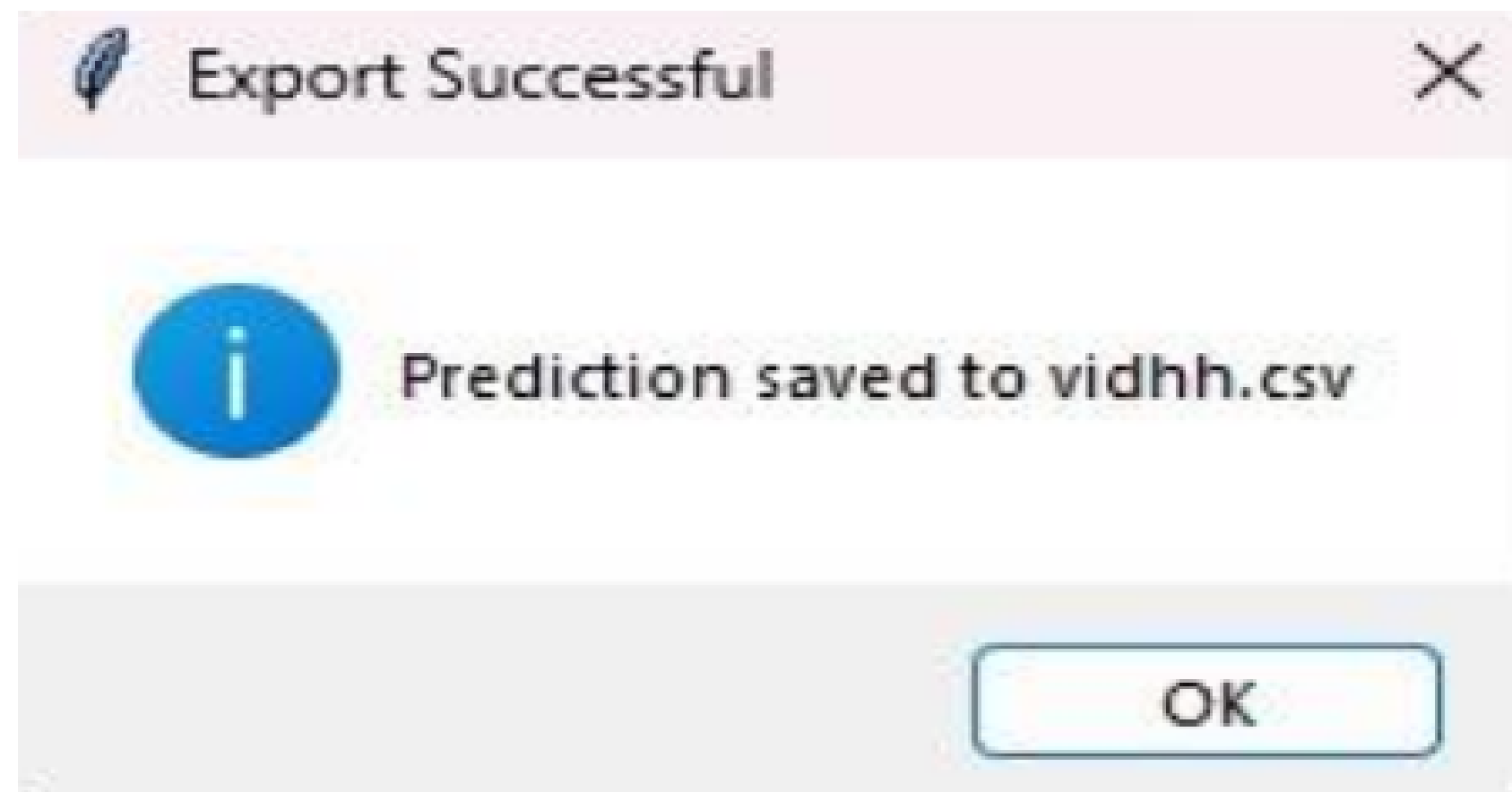
Ad Clicked (1=Yes,0=No):

Device (0=Mobile,1=Desktop):

AI-based Customer Prediction | Naive Bayes Model



# OUTPUT AND RESULTS



# REFERENCES

1. Russell, S., & Norvig, P. (2021). Artificial Intelligence: A Modern Approach.
2. Jason Brownlee, Machine Learning Mastery with Python.
3. Scikit-learn Documentation: <https://scikit-learn.org/stable/>
4. GeeksforGeeks - Naive Bayes Classifier.
5. Towards Data Science - Probabilistic Reasoning in AI.