

Phase 3: Implementation of Project

Title: CUSTOMER BEHAVIOUR ANALYSIS

Objective

The goal of Phase 3 is to implement a data-driven **Customer Behaviour Analysis** system based on insights gathered in Phase 2. This includes deploying AI models for behaviour prediction, integrating analytics dashboards, and ensuring data privacy compliance.

1. AI Model Development

Overview

The AI model will analyse customer interactions (purchases, browsing patterns, feedback) to predict future behaviour and segment customers effectively.

Implementation

- **Machine Learning Model:** Uses clustering (e.g., K-means) and classification (e.g., Random Forest) to segment customers based on purchasing habits.
- **Data Source:** Historical transaction data, website interactions, and customer feedback.
- **Predictive Analytics:** Forecasts buying trends and customer lifetime value (CLV).

Outcome

By the end of Phase 3, the AI model will:

- ✓ Segment customers into groups (e.g., high-value, at-risk).
- ✓ Predict purchasing likelihood for targeted marketing.

2. Analytics Dashboard Development

Overview

A **real-time dashboard** will visualize customer behaviour insights for business teams.

Implementation

- **Tools Used:** Power BI/Tableau for visualization.
- **Key Metrics:** Purchase frequency, churn rate, engagement levels.
- **User Access:** Marketing & sales teams can filter data by demographics, region, etc.

Outcome

A functional dashboard displaying:

- ✓ Customer segmentation.
- ✓ Behavioural trends and recommendations.

3. CRM & Marketing Automation Integration

Overview

Connects the AI model with CRM (e.g., Salesforce) and email marketing tools (e.g., Mailchimp) for automated campaigns.

Implementation

- **API Integration:** Syncs customer segments with CRM tags.
- **Automated Triggers:** Sends personalized offers based on predicted behaviour.

Outcome

- ✓ Automated customer engagement workflows.
- ✓ Higher conversion rates through personalized marketing.

4. Data Security & Compliance

Overview

Ensures customer data is handled securely under GDPR/CCPA regulations.

Implementation

- **Encryption:** All customer data is encrypted (AES-256).
- **Anonymization:** Personal identifiers are masked in analytics.

Outcome

- ✓ Secure storage and processing of customer data.

5. Testing & Feedback Collection

Overview

Initial testing with a small customer dataset to validate accuracy.

Implementation

- **A/B Testing:** Compares AI-driven vs. traditional marketing results.
- **Feedback Loop:** Surveys business teams on dashboard usability.

Outcome

✓ Identified areas for model improvement (e.g., better feature engineering).

Challenges & Solutions

| Challenge | Solution |
|----------------------------|--------------------------------------|
| Model bias in segmentation | Use balanced datasets & re-train AI. |
| Dashboard latency | Optimize database queries. |
| CRM integration delays | Use pre-built API connectors. |

Outcomes of Phase 3

- ✓ **AI Model:** Segments customers and predicts behaviour.
- ✓ **Dashboard:** Real-time visualization of insights.
- ✓ **CRM Integration:** Automated marketing triggers.
- ✓ **Data Security:** Compliant with privacy laws.
- ✓ **Feedback:** Ready for scaling in Phase 4.

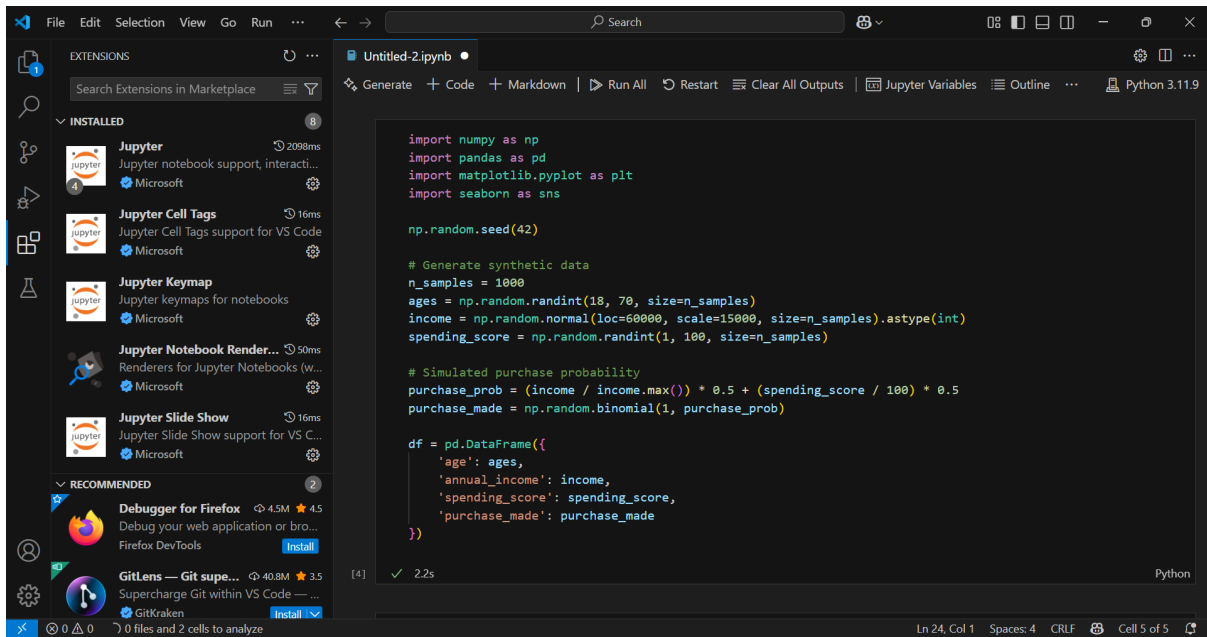
Next Steps (Phase 4)

1. **Enhance AI Accuracy:** Add sentiment analysis from social media.
2. **Expand Integrations:** Include loyalty program data.
3. **Scalability Testing:** Handle larger datasets.

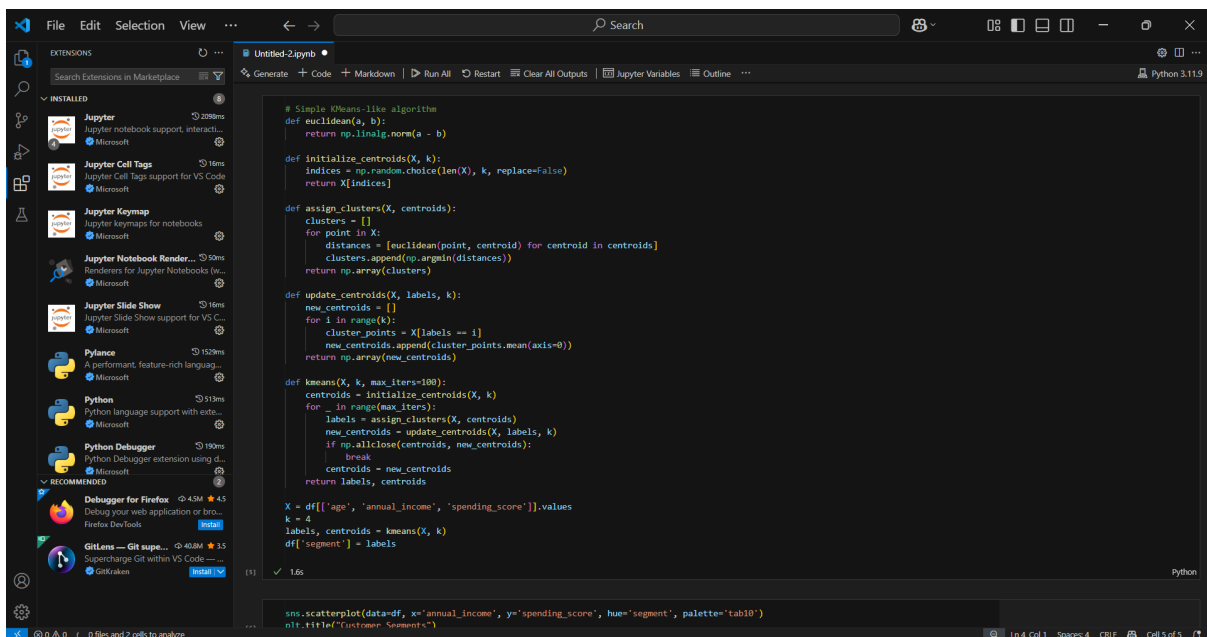
SCREENSHOTS OF CODE AND PROGRESS-MUST BE ADDED HERE FOR PHASE 3

CODE:

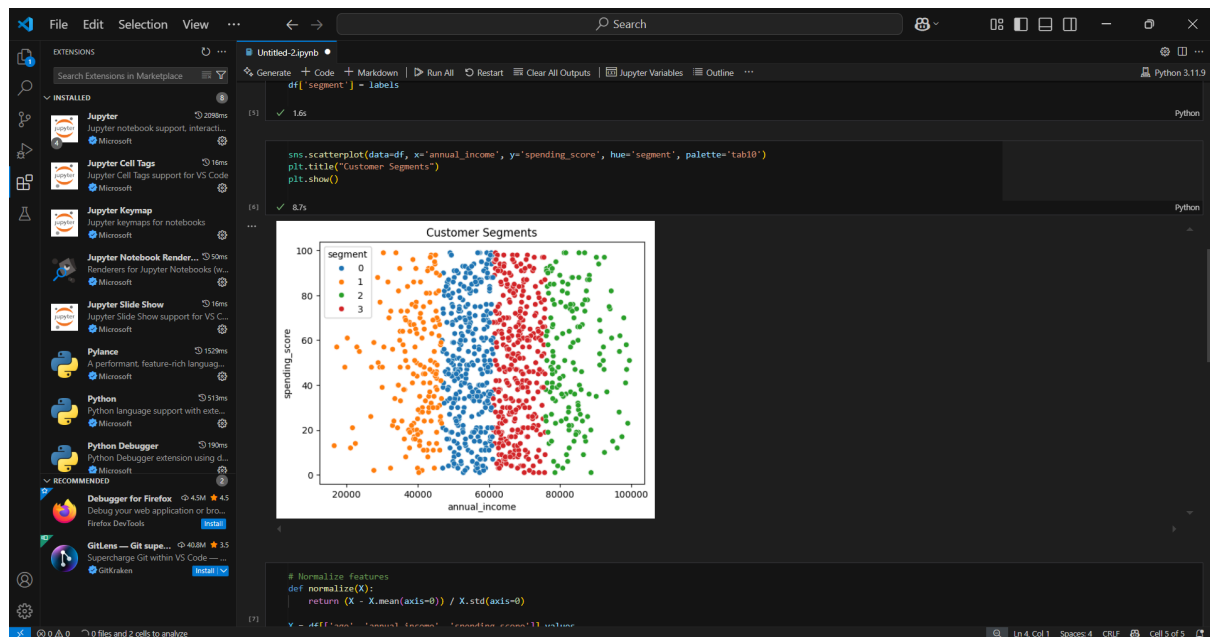
Cell 1: Imports & Synthetic Data Generation



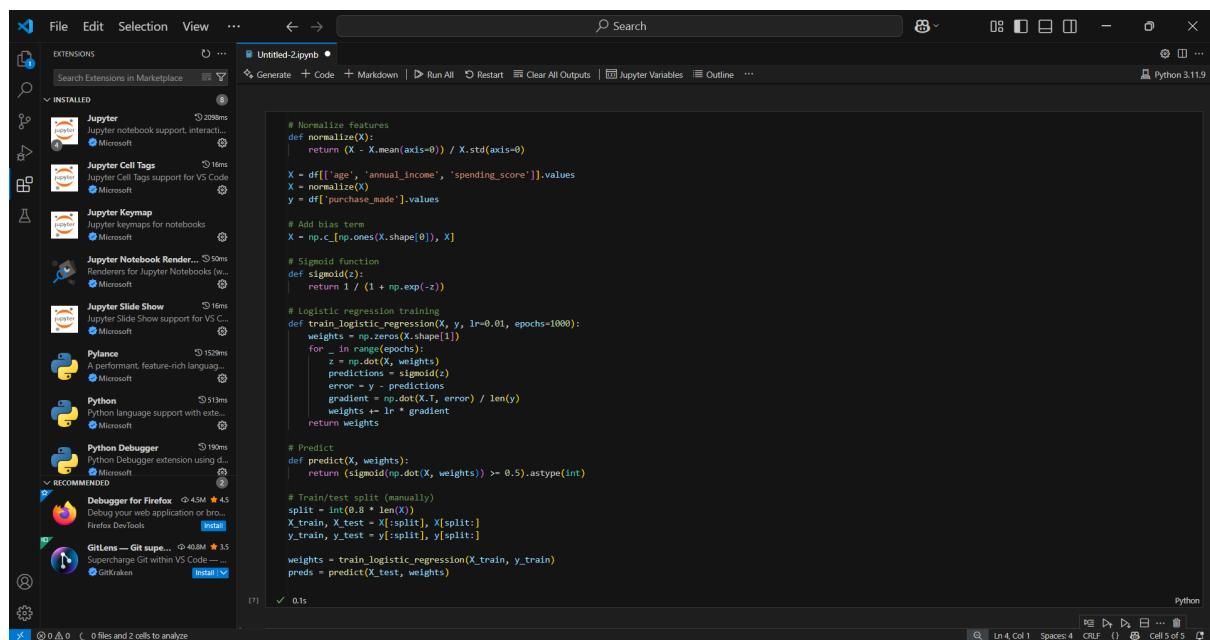
Cell 2: Manual KMeans Clustering (Customer Segmentation)



Cell 3: Segment Visualization



Cell 4: Logistic Regression (From Scratch) for Purchase Prediction



Cell 5: Evaluation (Accuracy & Confusion Matrix)

File Edit Selection View ... Search

EXTENSIONS

Search Extensions in Marketplace

INSTALLED

- Jupyter** 208ms
Jupyter notebook support, interacti...
Microsoft
- Jupyter Cell Tags** 16ms
Jupyter Cell Tags support for VS Code
Microsoft
- Jupyter Keymap**
Jupyter keymaps for notebooks
Microsoft
- Jupyter Notebook Render...** 50ms
Renderers for Jupyter Notebooks (w...
Microsoft
- Jupyter Slide Show** 16ms
Jupyter Slide Show support for VS C...
Microsoft
- Pylance** 152ms
A performant, feature-rich languag...
Microsoft
- Python** 513ms
Python language support with exte...
Microsoft
- Python Debugger** 190ms
Python Debugger extension using d...
Microsoft

RECOMMENDED

- Debugger for Firefox** 4.5M 4.5
Debug your web application or bro...
Firefox DevTools [Install](#)
- GitLens — Git supe...** 40.8M 3.5
Supercharge Git within VS Code — ...
GitKraken [Install](#)

Untitled-2.ipynb

Generate + Code + Markdown | Run All Restart Clear All Outputs | Jupyter Variables Outline ...

Python 3.11.9

```
accuracy = (preds == y_test).mean()
print(f"Accuracy: {accuracy * 100:.2f}%")

from collections import Counter

def confusion_matrix(y_true, y_pred):
    tp = sum((y_true == 1) & (y_pred == 1))
    tn = sum((y_true == 0) & (y_pred == 0))
    fp = sum((y_true == 0) & (y_pred == 1))
    fn = sum((y_true == 1) & (y_pred == 0))
    return np.array([[tp, fn], [fp, tn]])

cm = confusion_matrix(y_test, preds)
print("Confusion Matrix:")
print(cm)
```

[1] ✓ 0.0s Python

... Accuracy: 63.50%
Confusion Matrix:
[[71 29]
[44 56]]

Ln 4, Col 1 Spaces: 4 Spaces: 4 CRLF (1) Cell 4 of 5

0 files and 2 cells to analyze