E-Commerce Product Recommendation System — Project Report

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Project Title: E-Commerce Product Recommendation System

Problem Statement:

The objective of this project is to build a **product recommendation system** for an e-commerce platform to suggest relevant products to users based on their purchase history. This aims to improve user experience, increase engagement, and boost sales through personalized recommendations.

Dataset Description:

The dataset is sourced from the **Retailrocket e-commerce dataset** and includes:

- **Events Data:** user transactions (transaction events only)
- **Item Properties Data:** product properties and attributes
- **Category Tree Data:** product category hierarchy

Tools and Technologies Used:

- Python 3
- Pandas
- NumPy
- scikit-learn
- Cosine Similarity
- Jupyter Notebook

Project Workflow:

1. Data Loading:

- Loaded events, item properties, and category data into Pandas DataFrames.

2. Data Exploration:

- Checked dataset structure, unique users and items.
- Verified event types (only transaction events were present).

3. Data Cleaning:

- Removed null values if necessary.

- Filtered only transaction events for recommendation modeling.

4.User-Item Matrix Creation:

- Created a pivot table with users as rows, items as columns, and purchase counts as values.

5. Item-Item Cosine Similarity Calculation:

- Computed cosine similarity between items based on purchase patterns.

6. Recommendation Function Development:

- Built a function to recommend the top N similar products to any given product.

7. Testing the Recommendation System:

- Successfully recommended similar items for selected products.

Sample Code Snippet:

```
def get_similar_items(item_id, top_n=5):
    if item_id in item_similarity_df:
        similar_scores = item_similarity_df[item_id].sort_values(ascending=False)
        similar_scores = similar_scores.drop(item_id)
        return similar_scores.head(top_n)
    else:
        return "Item not found in data"
```

Project Outcome:

Successfully developed a functional **Item-Based Collaborative Filtering Recommendation System** using cosine similarity.
The system suggests relevant products to users based on other users' purchase behavior.

Future Enhancements:

- Add User-User Collaborative Filtering
- Integrate Product Metadata for Hybrid Recommendations
- Deploy using Streamlit or Flask
- Connect recommendations to a Power BI dashboard

Project Created By:

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