TASK:12

Implementation of AI-based recommendation system

CO4, CO5   S3

PROBLEM STATEMENT :

In e-commerce platforms, users often face difficulty finding products that match their preferences from vast catalogs. The challenge is to design an AI-based recommendation system that suggests relevant products based on user behavior, purchase history, and preferences.

AIM :

To develop an AI-based recommendation system that predicts and recommends products to users in an e-commerce environment, improving customer experience and sales.

OBJECTIVE :

- To analyze user purchase history and browsing patterns.
- To recommend products using machine learning algorithms.
- To enhance personalization and user engagement.
- To improve conversion rates through intelligent suggestions.

DESCRIPTION :

AI recommendation systems in e-commerce analyze user data such as previous purchases, ratings, and browsing behavior. The system then applies machine learning or deep learning algorithms to predict user interests and recommend items they are likely to purchase.

Common recommendation techniques include:

- Content-based filtering: Recommends products similar to ones the user liked.
- Collaborative filtering: Suggests products liked by similar users.
- Hybrid approach: Combines both for better accuracy.

This system is widely used in platforms like Amazon, Flipkart, Netflix, and Spotify.

ALGORITHM :

1. Start
2. Collect user-item interaction data (ratings, purchases, etc.).
3. Create a user-item matrix.
4. Calculate similarity between users (or items) using cosine similarity.
5. Identify top-N similar users/items.
6. Predict missing ratings based on similar users' preferences.
7. Recommend the top-K products to the target user.
8. End

PROGRAM :

```python
import pandas as pd

from sklearn.metrics.pairwise import cosine_similarity

data = {

    'User': ['A', 'A', 'B', 'B', 'C', 'C', 'D'],

    'Item': ['Shoes', 'Watch', 'Shoes', 'Bag', 'Bag', 'Watch', 'Shoes'],

    'Rating': [5, 4, 4, 5, 5, 4, 3]

}

df = pd.DataFrame(data)

pivot = df.pivot_table(index='User', columns='Item', values='Rating').fillna(0)

similarity = cosine_similarity(pivot)

user = 'D'

similar_users = similarity_df[user].sort_values(ascending=False)

print("Similar Users:\n", similar_users)

recommendations = pivot.loc['C'][(pivot.loc['C'] > 0) & (pivot.loc[user] == 0)]

print("\nRecommended items for User D:\n", recommendations.index.tolist())
```

OUTPUT :

```
C:\Users\nammu\PycharmProjects\PythonProject1\.venv\Scripts\python.exe C:\Users\nammu\PycharmProjects\PythonProject1\VTU26845.py
Similar Users:
 User
D    1.000000
A    0.780869
B    0.624695
C    0.000000
Name: D, dtype: float64

Recommended items for User D:
 ['Bag', 'Watch']

Process finished with exit code 0
```

CONCLUSION:

The AI recommendation system effectively identifies user preferences and provides personalized product suggestions. This improves customer satisfaction, engagement, and boosts overall sales performance.Machine learning-based recommendations form the backbone of modern e-commerce personalization strategies.