Labtest-3

NAME:DUGYALA ASHMITHA

ENROLLNO:2403A510G5

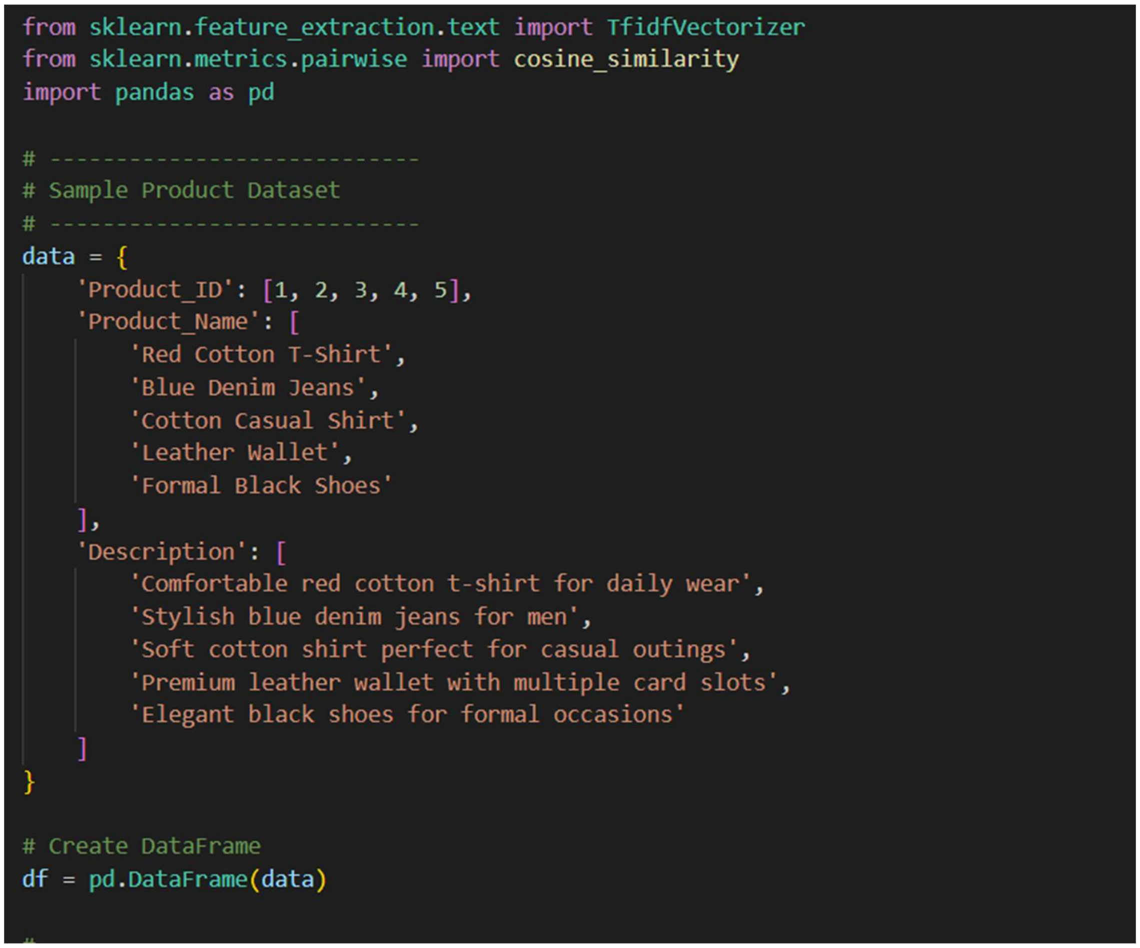
BATCH:06

Q1:

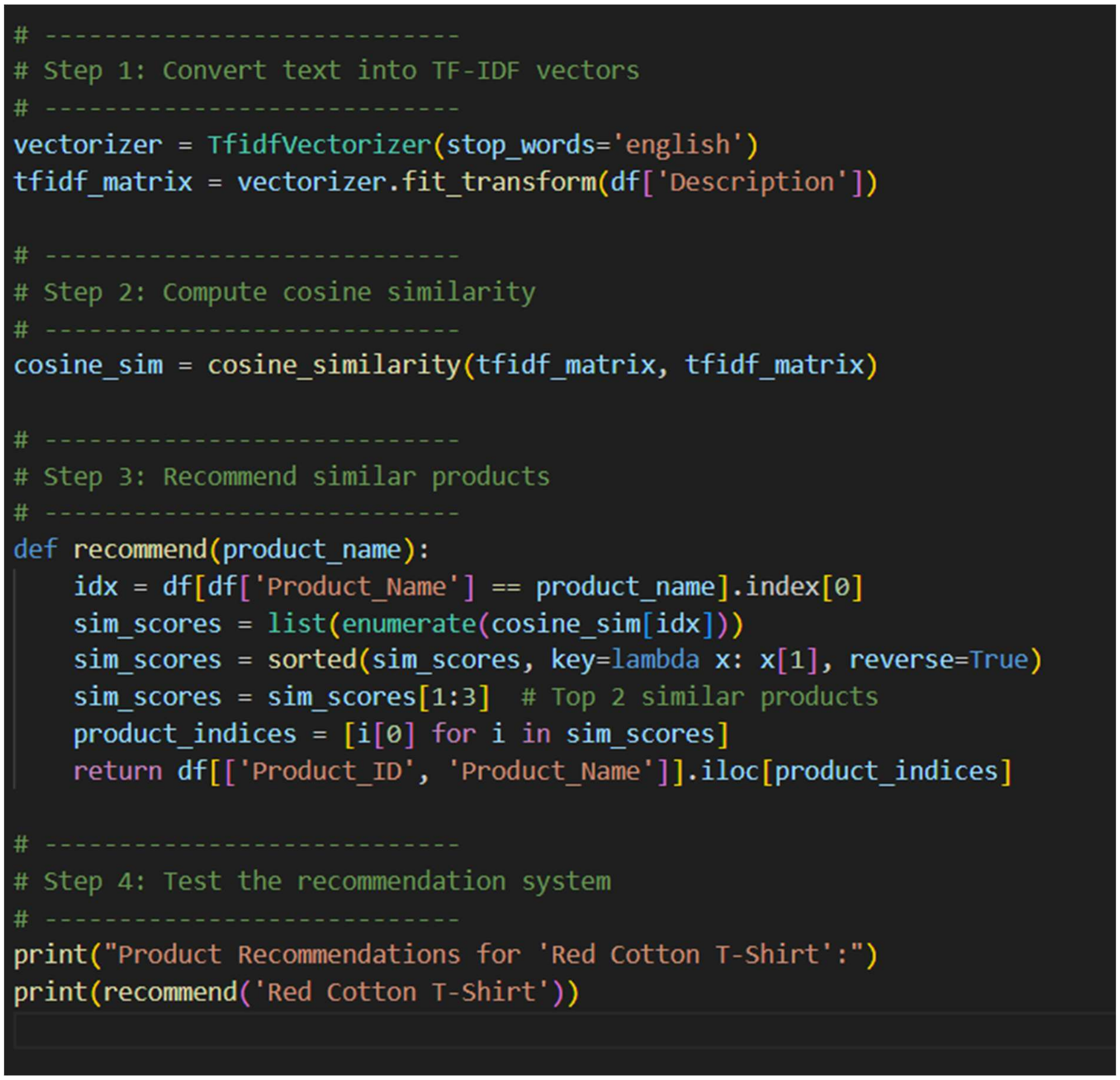
PROMPT:

A retail company wants to use AI to solve a problem with product recommendations. The goal is to help customers find similar products automatically using algorithms like TF-IDF and cosine similarity. Build an AI-assisted system that analyzes product descriptions and suggests related items.

CODE:

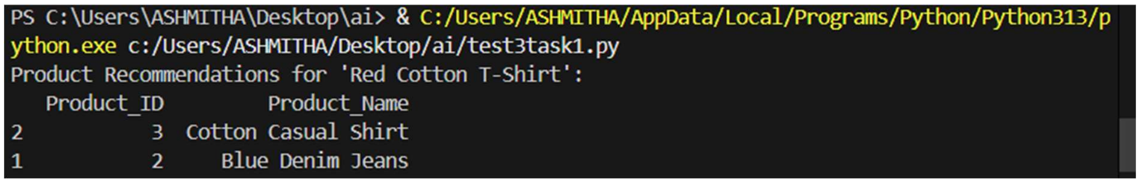


```python
from sklearn.feature_extraction.text import TfidfVectorizer
from sklearn.metrics.pairwise import cosine_similarity
import pandas as pd

# ---------------------------
# Sample Product Dataset
# ---------------------------
data = {
    'Product_ID': [1, 2, 3, 4, 5],
    'Product_Name': [
        'Red Cotton T-Shirt',
        'Blue Denim Jeans',
        'Cotton Casual Shirt',
        'Leather Wallet',
        'Formal Black Shoes'
    ],
    'Description': [
        'Comfortable red cotton t-shirt for daily wear',
        'Stylish blue denim jeans for men',
        'Soft cotton shirt perfect for casual outings',
        'Premium leather wallet with multiple card slots',
        'Elegant black shoes for formal occasions'
    ]
}

# Create DataFrame
df = pd.DataFrame(data)
```



```python
# ---------------------------
# Step 1: Convert text into TF-IDF vectors
# ---------------------------
vectorizer = TfidfVectorizer(stop_words='english')
tfidf_matrix = vectorizer.fit_transform(df['Description'])

# ---------------------------
# Step 2: Compute cosine similarity
# ---------------------------
cosine_sim = cosine_similarity(tfidf_matrix, tfidf_matrix)

# ---------------------------
# Step 3: Recommend similar products
# ---------------------------
def recommend(product_name):
    idx = df[df['Product_Name'] == product_name].index[0]
    sim_scores = list(enumerate(cosine_sim[idx]))
    sim_scores = sorted(sim_scores, key=lambda x: x[1], reverse=True)
    sim_scores = sim_scores[1:3]  # Top 2 similar products
    product_indices = [i[0] for i in sim_scores]
    return df[['Product_ID', 'Product_Name']].iloc[product_indices]

# ---------------------------
# Step 4: Test the recommendation system
# ---------------------------
print("Product Recommendations for 'Red Cotton T-Shirt':")
print(recommend('Red Cotton T-Shirt'))
```

OUTPUT:



```
PS C:\Users\ASHMITHA\Desktop\ai> & C:/Users/ASHMITHA/AppData/Local/Programs/Python/Python313/p
ython.exe c:/Users/ASHMITHA/Desktop/ai/test3task1.py
Product Recommendations for 'Red Cotton T-Shirt':
   Product_ID         Product_Name
2           3  Cotton Casual Shirt
1           2     Blue Denim Jeans
```

OBSERVATION:

Converts text into numerical vectors. Measures closeness between products.

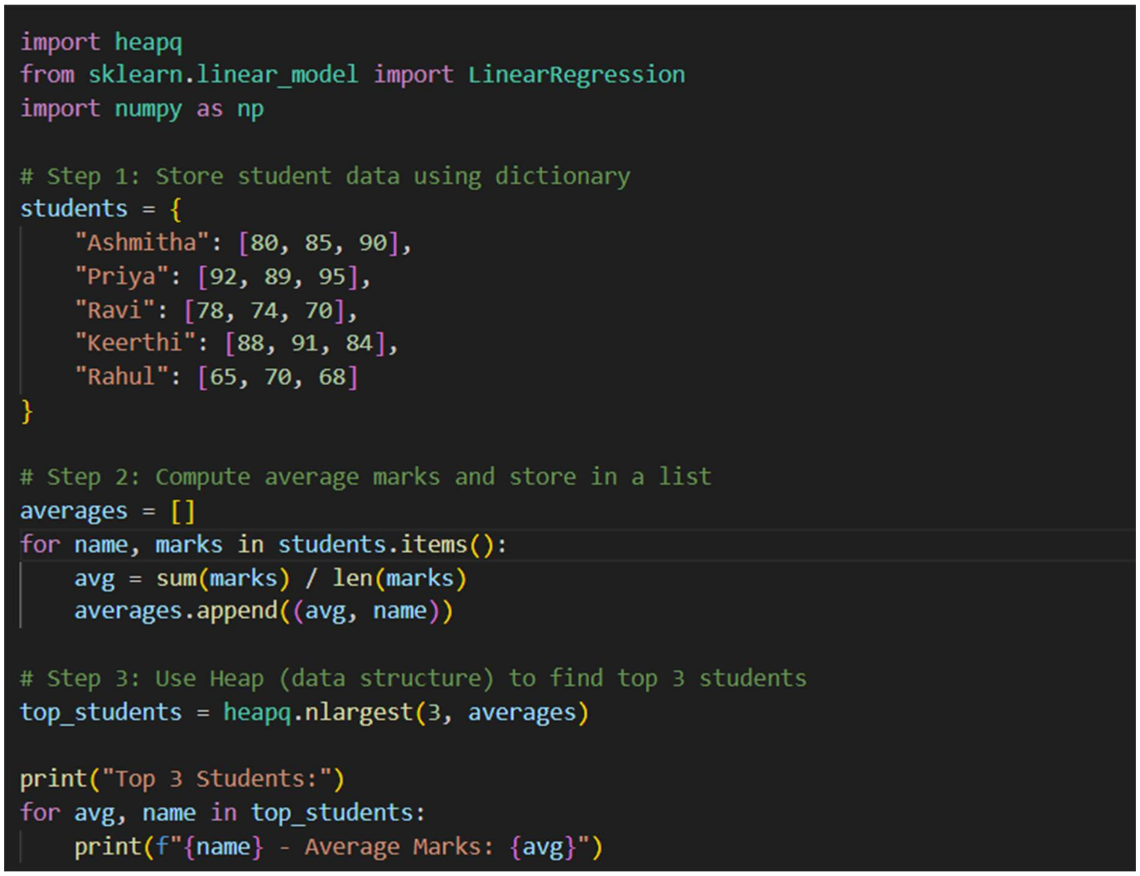
Items score higher for cotton casual shirt query. The algorithm can scale for large product catalogs easily.

Q2:

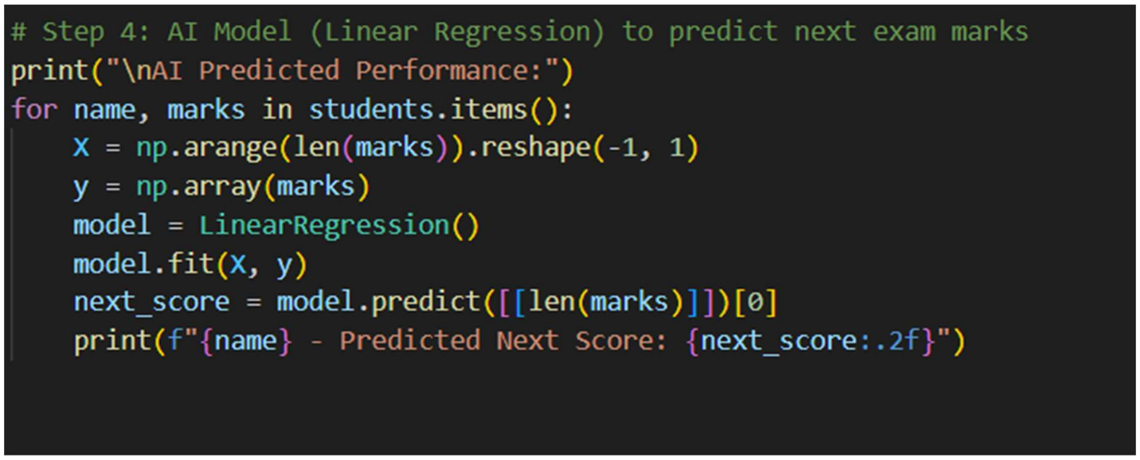
PROMPT:

A school wants to use AI to analyze and predict student performance. Using data structures and algorithms, build a Python program that finds the top-performing students and uses an AI model to predict their next exam marks based on past scores.

CODE:

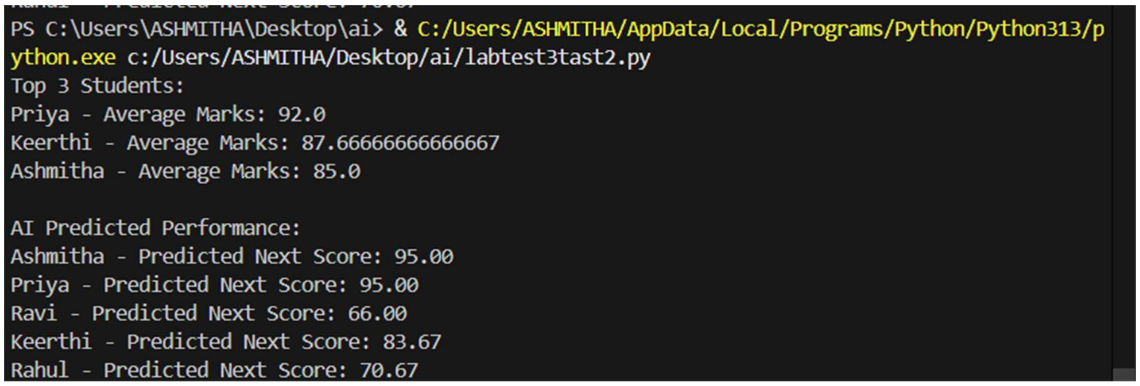


```python
import heapq
from sklearn.linear_model import LinearRegression
import numpy as np

# Step 1: Store student data using dictionary
students = {
    "Ashmitha": [80, 85, 90],
    "Priya": [92, 89, 95],
    "Ravi": [78, 74, 70],
    "Keerthi": [88, 91, 84],
    "Rahul": [65, 70, 68]
}

# Step 2: Compute average marks and store in a list
averages = []
for name, marks in students.items():
    avg = sum(marks) / len(marks)
    averages.append((avg, name))

# Step 3: Use Heap (data structure) to find top 3 students
top_students = heapq.nlargest(3, averages)

print("Top 3 Students:")
for avg, name in top_students:
    print(f"{name} - Average Marks: {avg}")
```



```python
# Step 4: AI Model (Linear Regression) to predict next exam marks
print("\nAI Predicted Performance:")
for name, marks in students.items():
    X = np.arange(len(marks)).reshape(-1, 1)
    y = np.array(marks)
    model = LinearRegression()
    model.fit(X, y)
    next_score = model.predict([[len(marks)]])[0]
    print(f"{name} - Predicted Next Score: {next_score:.2f}")
```

OUTPUT:



```
PS C:\Users\ASHMITHA\Desktop\ai> & C:/Users/ASHMITHA/AppData/Local/Programs/Python/Python313/p
ython.exe c:/Users/ASHMITHA/Desktop/ai/labtest3tast2.py
Top 3 Students:
Priya - Average Marks: 92.0
Keerthi - Average Marks: 87.66666666666667
Ashmitha - Average Marks: 85.0

AI Predicted Performance:
Ashmitha - Predicted Next Score: 95.00
Priya - Predicted Next Score: 95.00
Ravi - Predicted Next Score: 66.00
Keerthi - Predicted Next Score: 83.67
Rahul - Predicted Next Score: 70.67
```

OBSERVATION:

1. Student records are stored efficiently using a dictionary data structure.
2. AI regression model predicts student’s next score automatically.
3. Data structures improve efficiency in handling multiple student records.
4. AI helps discover patterns and future performance trends.
5. The algorithm can be scaled for thousands of students easily.
6. Reduces manual effort in analyzing large performance datasets.