Lab Assignment 7

UCS420 Cognitive Computing

Q1. You are a data analyst at an e-commerce company. Your task is to analyze sales data, clean and process it, perform statistical analysis, and generate visual insights to help the business make informed decisions.

1. Use your roll number as the random seed to generate unique data for each student.
2. Follow the questions step by step, as each part builds upon the previous one.
3. Submit the assignment as a Jupyter Notebook (.ipynb) with:
    - Well-documented code and clear comments.
    - Markdown explanations for each step.
    - Screenshots of the plots and outputs.

Part I: Randomized Sales Data Generation (NumPy)

1. Initialize Random Seed
2. Generate Sales Data
    - Create a NumPy array of random sales data for 12 months (shape = (12, 4)), where each column represents a product category:
    - Electronics, Clothing, Home & Kitchen, Sports.
    - Sales values should be between 1000 and 5000 units per month.
    - The range should be randomized using the seed.
3. Convert to DataFrame
    - Convert the cleaned NumPy array into a Pandas DataFrame with:
        i. Columns: Electronics, Clothing, Home & Kitchen, Sports
        ii. Index: Months from Jan to Dec

Part II: Data Manipulation and Analysis (Pandas)

1. Display the first 5 rows and summary statistics of the DataFrame.
2. Calculate the total sales per category and total sales per month.
3. Calculate the average sales growth between consecutive months for each category.
4. Add the following columns to the DataFrame:
    - Total Sales: Sum of all categories per month.
    - Growth Rate: Percentage change in Total Sales from the previous month.
5. Apply a randomized discount:
    - If your roll number is even, apply a 10% discount to the Electronics category.

- If odd, apply a 15% discount to the Clothing category.

Part III: Visualizations (Matplotlib and Seaborn)

1. Plot monthly sales trends for each category using line plots.
2. Create the following plots:
    - Box plots to show the sales distribution for each category.

Q.2 For the array: array = np.array([[1, -2, 3],[-4, 5, -6]])

i. Find element-wise absolute value

ii. Find the 25th, 50th, and 75th percentile of flattened array, for each column, for each row.

iii. Mean, Median and Standard Deviation of flattened array, of each column, and each row

Q.3 For the array: a = np.array([-1.8, -1.6, -0.5, 0.5,1.6, 1.8, 3.0]).

i. Find floor, ceiling and truncated value, rounded values

Q.4 WAP to swap two elements in a list in Python Using a Temporary Variable.

Q.5 Write a Python program to swap two elements in a set by converting it to a list first.