

Day 4

Mini Project:

You are given daily sales data (in USD) of 6 products over 10 days. Perform the following tasks.

```
import numpy as np
sales_data = np.array([ [200, 220, 250, 210, 180, 190], # Day 1 [230, 240, 260, 200, 195, 205], # Day 2 [210, 215, 255, 220, 185, 200], # Day 3 [205, 225, 270, 215, 190, 195], # Day 4 [215, 230, 265, 225, 200, 210], # Day 5 [225, 235, 275, 230, 205, 215], # Day 6 [235, 245, 280, 240, 210, 220], # Day 7 [245, 255, 290, 250, 215, 225], # Day 8 [255, 265, 300, 260, 220, 230], # Day 9 [265, 275, 310, 270, 225, 235] # Day 10 ])
```

Q1. Mathematical Operations

- a. Calculate the **total sales per product** over 10 days.
- b. Calculate the **average daily sales per product**.
- c. Increase each sale by a **5% commission** using broadcasting.
- d. Apply the **square root** to all sales values (for testing purposes).

Q2. Broadcasting Concepts

- a. Create a 1D `bonus_array = np.array([10, 20, 15, 25, 30, 5])` and add it to each day's sales using broadcasting.
- b. Add a **\$50 flat bonus** to each sale using broadcasting.

Q3. Statistical Analysis

- a. Find the **mean, median, variance, and standard deviation** of the entire dataset.
- b. Find the **maximum and minimum sale value** and calculate the **range**.
- c. Calculate the **interquartile range (IQR)** of all values.

Q4. Logical & Comparison Operations

- a. Identify and list all sales **greater than \$250**.
- b. Replace all values **greater than \$300** with `300` (cap the max sale).
- c. Count how many times sales were **between \$200 and \$250**.
- d. Create a new array showing only the sales **below the mean**.

Q5. Searching, Sorting, and Final Summary

- a. Sort the sales of **Day 5** in ascending order.
- b. Find the **day (row index)** with the highest total sales.
- c. Calculate **column-wise means** (average per product).
- d. Calculate **row-wise means** (average per day).
- e. Print the **overall average sales**.

Q6. Bonus

Create a function `highlight_outliers(data)` that returns all values **2 standard deviations above or below** the mean.