ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

DAY – 9 3 July 2025

Mean, Median, and Mode in Python

We can use the **statistics** module from the Python standard library.

1. Mean

The mean is the average:

- Adds all elements.
- Divides by number of elements.

2. Median

The median is the middle value when the list is sorted:

- If odd number of elements: returns middle one.
- If even: returns the average of the two middle numbers.

3. Mode

The mode is the value that appears most frequently:

- In this list, 20 appears **twice**, more than any other number.
- So, mode = 20

Standard Deviation in Python

The standard deviation measures the spread (how much the values deviate from the mean).

What does statistics.stdev(data) do?

- It calculates the sample standard deviation.
    - Formula:

$$s = \sqrt{\frac{1}{n-1}\sum(x_i - \bar{x})^2}$$

    - $\bar{x}$ = mean of the data
    - x_i = each data point
    - n = number of data points

```
import statistics

d = [10,20,30,40,40,40]
std=statistics.stdev(d)
mean=statistics.mean(d)
mode=statistics.mode(d)
median=statistics.median(d)

print("Data : ",d)
print("Standard Deviation is : ",std)
print("Mode is : ",mode)
print("Mean is : ",mean)
print("Median is : ",median)
~
~
```

```
step@step-HP-ProDesk-400-G5-SFF:~$ vim mean.py
step@step-HP-ProDesk-400-G5-SFF:~$ python3 mean.py
Data :  [10, 20, 30, 40, 40, 40]
Standard Deviation is :  12.649110640673518
Mode is :  40
Mean is :  30
Median is :  35.0
step@step-HP-ProDesk-400-G5-SFF:~$
```

Percentile in Python

A percentile indicates the value below which a given percentage of observations in a dataset falls.

```
numbers = [20, 25, 10, 40]
percent = 100*len(numbers)
result= sum(numbers)
percentile=(result/percent)*100
print("Percentile is : ",percentile)
~
```

```
step@step-HP-ProDesk-400-G5-SFF:~$ vim m.py
step@step-HP-ProDesk-400-G5-SFF:~$ python3 m.py
Percentile is :  23.75
step@step-HP-ProDesk-400-G5-SFF:~$
```

Scatter Plot in Python

A scatter plot is used to visualize the relationship between two numerical variables.

What is matplotlib.pyplot?

- matplotlib is a popular Python library used for data visualization.
- pyplot is a submodule in matplotlib that provides a MATLAB-like interface to create plots easily.

- The common alias plt is used so you can call functions like plt.plot(), plt.show(), etc.

Installation :

pip install matplotlib

```
import matplotlib.pyplot as plt

# Sample data
x = [6, 2,8, 4, 5]
y = [2,9, 3, 8, 7]

# Create scatter plot
plt.scatter(x, y)
plt.title("Simple Scatter Plot")
plt.xlabel("X-Axis")
plt.ylabel("Y-Axis")
plt.grid(True)
plt.show()
```