**Assignment No. 4**

**Problem Statement:** Implement normal distribution in python and visualize it for Mean =100, standard \_deviation =4, dataset size=100000

**Objective:** The objective is to generate a dataset following a normal (Gaussian) distribution using specified parameters and visualize it to understand its characteristics

**Prerequisite :**

1. Understanding of normal distribution and its properties.

2. Basic knowledge of Python and libraries such as NumPy and Matplotlib.

3.Familiarity with the probability density function (PDF) of a normal distribution.

**Theory :**

The normal distribution, also known as the Gaussian distribution, is a continuous probability distribution characterized by its bell-shaped curve. It is determined by two parameters: the mean (μ) and the standard deviation (σ). The normal distribution is widely used in various fields, such as statistics, physics, and machine learning, due to its natural occurrence in many processes.

For this assignment, we'll implement the normal distribution using Python, visualize it, and explore reading and writing datasets in .txt, .csv, and .xml formats. We'll use libraries such as numpy, matplotlib, pandas, and xml.etree.ElementTree for data processing, visualization, and file handling.

**Algorithm (if any to achieve the objective ):**

To achieve the objective:

1. Import the necessary libraries: Use numpy for generating the dataset and matplotlib for visualization.

2. Generate the dataset: Using numpy, generate random data points that follow a normal distribution using the provided mean, standard deviation, and dataset size.

3. Visualize the data: Plot the histogram of the generated data to visualize the distribution and overlay the probability density function (PDF).

4. Calculate theoretical PDF: Using the formula for normal distribution, plot the theoretical curve over the histogram to compare.

**Conclusion** : By implementing the normal distribution in Python, you’ve created a dataset of 100,000 data points centered around the mean of 100 with a standard deviation of 4. The resulting histogram demonstrates the bell-shaped curve characteristic of the normal distribution, and the theoretical probability density function (PDF) matches the distribution, confirming the correctness of the implementation