Project Title	**Consider a random vector, a collection of random values of n-dimension [min 'n' = 100]. Fit Poisson's distribution and Gaussian distribution for these collected values.**
Student Details	1. CSE214002, Rajasree Laha 2. CSE214007, Rupesh Thakur 3. CSE214013, Jishan Alam
Machine Configuration	GPU: N/A RAM: 8.00 GB (7.65 GB usable) OS: 22631.4317 Processor: 11th Gen Intel(R) Core(TM) i5-1155G7 @ 2.50GHz 2.50 GHz
Database description	**Database name:** Random Vector Data **Number of samples:** 100 (minimum), here it is 150(dimention of the vector with random values in between 1 & 100) **Number of features for each sample:** 1 (since we are fitting distributions to a collection of random values) **Number of classes:** N/A (this is not a classification problem) **Type:** Regression (since we are fitting continuous distributions like Poisson and Gaussian)
Objectives	In this analysis, we aim to fit both **Poisson** and **Gaussian (Normal)** distributions to a set of randomly generated values. The goal is to compare how well each distribution models the data, visualize the fit, and interpret the results.
Methodology	We will use the following techniques: • **Poisson Distribution:** Fitting using the mean of the data as the Poisson parameter λ. • **Gaussian Distribution:** Fitting by calculating the mean (μ) and

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<tr><td></td><td>standard deviation (σ) of the data.

• Data Visualization: Plotting both the Poisson PMF and Gaussian PDF on top of the data's histogram to visually assess the fit.</td></tr>
<tr><td>Process</td><td>1. Data Generation: We generate a random vector containing 150 values, where each value is a random integer between 1 and 100.

2. Fitting Distributions:
● Poisson: We compute the mean of the data to set the Poisson parameter λ.

● Gaussian: We calculate both the mean (μ) and standard deviation (σ) of the data to fit the Gaussian distribution.

3. Visualization: A histogram of the data is plotted, and both the Poisson PMF and Gaussian PDF are overlaid on the plot for comparison.

4. Analysis: We visually assess how well each distribution fits the data based on the plotted curves.</td></tr>
<tr><td>Experimental Results</td><td><table><tr><th>Distribution</th><th>Parameters</th><th>Fit (Visual Assessment)</th></tr><tr><td>Poisson</td><td>$\lambda = 49.95$</td><td>Moderate fit</td></tr><tr><td>Gaussian</td><td>$\mu = 49.95, \sigma = 28.09$</td><td>Better fit</td></tr></table></td></tr>
<tr><td>Discussion</td><td>The Gaussian distribution shows a better fit to the data compared to the Poisson distribution, which is expected because the Gaussian distribution is typically more suitable for continuous data. The Poisson distribution works better for discrete event counts, which may not fully represent this dataset. The smoother nature of the Gaussian curve reflects the variation in the data more accurately.</td></tr>
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