Standard Scaler (Z-Score Normalization)

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2. Standard Scaler (Z-Score Normalization)

How it works:

Centers the data at 0 and scales it to have a standard deviation of 1. This method standardizes the data to a normal distribution.

Steps:

1. **Find the mean and standard deviation of the data:**

$$\mu = \frac{1}{N}\sum_{i=1}^{N} x_i, \quad \sigma = \sqrt{\frac{1}{N}\sum_{i=1}^{N}(x_i - \mu)^2}$$

2. **Standardize each data point:**
   For every x_i in the dataset:

$$x_i' = \frac{x_i - \mu}{\sigma}$$

Use Case: When data follows a Gaussian (bell curve) distribution, or for algorithms like PCA, linear regression, or SVM that work better with standardized data.