Approach: Z-score method

The Z-score method, also known as the standard score method, is a statistical technique used to identify anomalies or outliers in a dataset. It measures how far a data point is from the mean of the dataset in terms of standard deviations. A data point with a high Z-score (typically greater than 2 or 3) is considered an outlier, while a data point with a low Z-score (typically less than -2 or -3) is also considered an anomaly.

Methodology:

1. Calculate the mean (μ) of the dataset.

2. Calculate the standard deviation (σ) of the dataset.

3. Calculate the Z-score for each data point (x):

$$Z = (x - \mu) / \sigma$$

4. Set a threshold value (Z-threshold). Data points with Z-scores greater than or equal to the Z-threshold are considered outliers.

Advantages of the Z-score method:

- Simple to understand and implement
- Effective for detecting outliers in normally distributed data
- Can be used to identify outliers in both univariate and multivariate data

Applications of the Z-score method in anomaly detection:

- Fraud detection in financial transactions
- Network intrusion detection
- Sensor data analysis for fault detection
- Medical diagnosis for identifying abnormal patient data