# 59. Silhouette Score

- It validates that cluster predicted from the data are right or wrong number of clusters
- Silhouette refers to a method of interpretation and validation of consistency within clusters of data.
- Silhouette Coefficient or Silhouette Score is a metric used to calculate the goodness of a clustering technique
- Its values ranges from -1 to 1

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## Silhouette Score Formula

The Silhouette score is calculated using the following formula:

$$s(i) = \frac{b(i) - a(i)}{\max(a(i), b(i))}$$

where:

- ( s(i) ) is the silhouette score for a data point ( i ).
- ( a(i) ) is the mean distance between ( i ) and all other data points in the same cluster.
- ( b(i) ) is the mean distance between ( i ) and all data points in the nearest neighboring cluster.

The Silhouette score ranges from -1 to 1, where:

- A score of 1 indicates that the data point is well clustered.
- A score of 0 indicates that the data point lies on the boundary between clusters.
- A score of -1 indicates that the data point is poorly clustered.

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