

index.S(clusterSim)

### Rousseeuw Silhouette internal cluster quality index

$$S(u) = \sum_{i=1}^n S(i)/n$$
$$S(u) \in [-1, 1],$$

where:  $S(i) = \frac{b(i) - a(i)}{\max\{a(i); b(i)\}}$ ,

$i, k = 1, \dots, n$  – number of object,

$P_r, P_s$  –  $r$ -th,  $s$ -th cluster,

$u$  – number of clusters,

$n_r, n_s$  – number of objects in cluster  $P_r, P_s$ ,

$a(i) = \sum_{k \in \{P_r \setminus i\}} d_{ik} / (n_r - 1)$  – average dissimilarity of  $i$ -th object to all other objects of  $P_r$  cluster;

ter;

$b(i) = \min_{s \neq r} \{d_{iP_s}\}$ ,

$d_{iP_s} = \sum_{k \in P_s} d_{ik} / n_s$  – average dissimilarity of  $i$ -th object to all objects of  $P_s$  cluster.

The value of  $u$ , which maximizes  $S(u)$ , is regarded as specifying the number of clusters.

### References

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