dist.Symbolic(clusterSim)

Ichino and Yaguchi dissimilarity measure for variables

$$\varphi(A_j, B_j) = \left|A_j \oplus B_j\right| - \left|A_j \otimes B_j\right| + \gamma\left(2 \cdot \left|A_j \otimes B_j\right| - \left|A_j\right| - \left|B_j\right|\right),$$

where: $\varphi(A_j, B_j)$ – dissimilarity measure of symbolic variables,
A_j, B_j – symbolic variables of any type,
$\oplus$ – Cartesian join,
$\otimes$ – Cartesian meet,
$\|$ – means the length of an interval for continuous data or the number of elements of an set of values,
γ– parameter <0, ½ >.

Ichino and Yaguchi measure for objects (U_2)

$$d_q(a_1, b_1) = \left(\sqrt[q]{\sum_{j=1}^{p} \phi(A_j, B_j)^q}\right),$$

where: $d_q(a_1, b_1)$ – Ichino and Yaguchi measure (sometimes called extended Minkowski metric – see Diday [2000]),
q – integer number greater or equal 1,
$a_1 = (A_1, A_2, \dots, A_p)$, $b_1 = (B_1, B_2, \dots, B_p)$ – two symbolic objects containing p symbolic variables,
$\phi(A_j, B_j)$ – Ichino and Yaguchi dissimilarity measure for variables.

Hausdorff distance measure (H)

$$max\left\{\max_{\alpha \in [\underline{A}, \overline{A}]}\left\{\min_{\beta \in [\underline{B}, \overline{B}]} d(\alpha, \beta)\right\}, \max_{\beta \in [\underline{B}, \overline{B}]}\left\{\min_{\alpha \in [\underline{A}, \overline{A}]} d(\alpha, \beta)\right\}\right\},$$

where: $H(a_1, b_1)$ – Hausdorff distance,
$a_1 = (A_1, A_2, \dots, A_p)$, $b_1 = (B_1, B_2, \dots, B_p)$ – two symbolic objects containing p symbolic interval-valued variables. Each variable A_i is an interval in a form $[\underline{A_i}, \overline{A_i}]$,
$d(\dots)$– Euclidean distance.

References

Billard, L., Diday, E. (2006), *Symbolic data analysis. Conceptual statistics and data mining*, Wiley, Chichester.

Bock H.H., Diday E. (Eds.) (2000), *Analysis of symbolic data. Explanatory methods for extracting statistical information from complex data*, Springer Verlag, Berlin.