Functional discriminant coordinates

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Abstract

Let be y_{lij} the observed value of the tested statistical feature on the the i-th individual belogning to the l-th class in the j-th time point, where $i = 1, 2, \ldots, N_l$, $j = 1, 2, \ldots, J_i$, $l = 1, 2, \ldots, L$, $N_1 + N_2 + \ldots + N_L = N$.

The moments of observation t_{lij} of the statistical feature can vary from individual to individual and intervals between observation moments need not be identical. Then our data consist of pairs $\{t_{lij}, y_{lij}\}$, where $t_{lij} \in I$, $i = 1, 2, \ldots, N_l$, $j = 1, 2, \ldots, J_i$, $l = 1, 2, \ldots, L$.

We convert discrete data $\{t_{lij}, y_{lij}\}$ to functional data:

$$\{x_{li}(t),\ i = 1, 2, \ldots, N_l,\ l = 1, 2, \ldots, L,\ t \in I\},\ \text{where}$$

$$x_{li}(t) = \sum_{k=0}^{N-1} c_k \varphi_k(t),\ t \in I,$$

$\{\varphi_k(t)\}$ is the chosen orthonormal base system. The coefficients c_k are estimated from the data by least squares method.

The method of construction of discriminant coordinates in $L_2(I)$-space for functional data is described in the mongraph [1]. In this paper we propose a new method of construction of discriminant coordinates and its kernel variant.

Keywords

Functional data, Orthonormal basis, Discriminant coordinate, Reproducing kernel Hilbert space, Kernel.

References

[1] Ramsay, J.O. and B.W. Silverman (2005). *Functional Data Analysis* (2nd Edition). Springer.