skfda.misc.metrics.norm_lp

skfda.misc.metrics.norm_lp(*fdatagrid, p=2, p2=2*) [source]

Calculate the norm of all the samples in a FDataGrid object.

For each sample sample f the Lp norm is defined as:

$$\|f\| = \left(\int_D |f|^p dx \right)^{\frac{1}{p}}$$

Where D is the domain over which the functions are defined.

The integral is approximated using Simpson's rule.

In general, if f is a multivariate function $(f_1, \ldots, f_d)$, and $D \subset \mathbb{R}^n$, it is applied the following generalization of the Lp norm.

$$\|f\| = \left(\int_D \|f\|_*^p dx \right)^{\frac{1}{p}}$$

Where $\| \cdot \|_*$ denotes a vectorial norm. See `vectorial_norm()` to more information.

For example, if $f : \mathbb{R}^2 \to \mathbb{R}^2$, and $\| \cdot \|_*$ is the euclidean norm $\|(x, y)\|_* = \sqrt{x^2 + y^2}$, the lp norm applied is

$$\|f\| = \left(\int \int_D \left(\sqrt{|f_1(x, y)|^2 + |f_2(x, y)|^2} \right)^p dxdy \right)^{\frac{1}{p}}$$

Parameters:

- **fdatagrid** (*FDataGrid*) – FDataGrid object.
- **p** (*int*, *optional*) – p of the lp norm. Must be greater or equal than 1. Defaults to 2.
- **p2** (*int*, *optional*) – p index of the vectorial norm applied in case of multivariate objects. Defaults to 2.

Returns: Matrix with as many rows as samples in the first object and as many columns as samples in the second one. Each element (i, j) of the matrix is the inner product of the ith sample of the first object and the jth sample of the second one.

Return type: numpy.darray

Examples