Registration

We see often that variation in functional observations involves phase and amplitude variation, which may hinder further analysis. That problem is treated during the registration process. This module contains procedures for the registration of the data.

Shift Registration

Many of the issues involved in registration can be solved by considering the simplest case, a simple shift in the time scale. This often happens because the time at which the recording process begins is arbitrary, and is unrelated to the beginning of the interesting segment of the data. In the Shift Registration Example it is shown the basic usage of this methods applied to periodic data.

`skfda.preprocessing.registration.shift_registration`(fd, *)	Perform shift registration of
`skfda.preprocessing.registration.shift_registration_deltas`(fd, *)	Return the lists of shifts usec

Landmark Registration

Landmark registration aligns features applying a transformation of the time that takes all the times of a given feature into a common value.

The simplest case in which each sample presents a unique landmark can be solved by performing a translation in the time scale. See the Landmark Shift Example.

`skfda.preprocessing.registration.landmark_shift`(fd, ...)	Perform a shift of the curves to
`skfda.preprocessing.registration.landmark_shift_deltas`(fd, ...)	Returns the corresponding shifts

The general case of landmark registration may present multiple landmarks for each sample and a non-linear transformation in the time scale should be applied. See the Landmark Registration Example

`skfda.preprocessing.registration.landmark_registration`(fd, ...)	Perform landmark regist
`skfda.preprocessing.registration.landmark_registration_warping`(fd, ...)	Calculate the transform

Elastic Registration

The elastic registration is a novel approach to this problem that uses the properties of the Fisher-Rao metric to perform the alignment of the curves. In the examples of pairwise alignment and elastic registration is shown a brief introduction to this topic along the usage of the corresponding functions.

`skfda.preprocessing.registration.elastic_registration`(...)	Align a FDatagrid using the
`skfda.preprocessing.registration.elastic_registration_warping`(...)	Calculate the warping to alig

The module contains some routines related with the elastic registration, making a transformation of the sampling, computing different means or distances based on the elastic framework.

`skfda.preprocessing.registration.elastic_mean`(...)	Compute the karcher mean under the elastic
`skfda.preprocessing.registration.warping_mean`(...)	Compute the karcher mean of a set of warpi
`skfda.preprocessing.registration.to_srsf`(...)	Calculate the square-root slope function (SR
`skfda.preprocessing.registration.from_srsf`(...)	Given a SRSF calculate the corresponding fu

Amplitude and Phase Decomposition

The amplitude and phase variation may be quantified by comparing a sample before and after registration. The package contains an implementation of the decomposition procedure developed by *Kneip and Ramsay (2008)*.

`skfda.preprocessing.registration.mse_decomposition`(...)	Compute mean square error measures f

Utility functions

There are some other method related with the registration problem in this module.

`skfda.preprocessing.registration.invert_warping`(...)	Compute the inverse of a diffeom
`skfda.preprocessing.registration.normalize_warping`(warping)	Rescale a warping to normalize th

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