ECOLE NATIONALE DE LA STATISTIQUE
ET DE L'ANALYSE DE L'INFORMATION

PROJECT TITLE

Project Description

TITLE

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rédigé par
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22 Mai 2022

Résumé

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contribution

si jamais vous apercevez des fautes dans le polycopié, merci de rédiger une issue sur Github à l'adresse :

correctif

LaTeX-Template/issues

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A.1 with subsection

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Code Examples

```
    # --- install --- #
    install.packages(c("fda", "fda.usc"))
    # --- general packages --- #
    library(data.table)
    # --- FDA packages --- #
    library(fda)
    library(fda.usc)
```

```
# |     date      | $X_1$ | $X_2$ | $\cdots$ | $X_p$ |
# | Jan 1st 12:00 | ⋮     | ⋮     |          | ⋮     |
data <- fread("data.csv")


# un individu = une ligne
# donc pour une série temporelle, il faut transposer les observations et avoir la suite des données disposées sur une ligne.
fdata_standard_index <- fda.usc::fdata(
    mdata = t(X),
    argvals = to_unit_interval(
    #               ↑
    # on doit ramener les dates dans l'intervalle [0,1]
        data[, .(date)]
    )
)
```

```
nb_points <- ncol(fdata)
nb_ts <- nrow(fdata)

fda_optim_basis <- fda.usc::optim.basis(
    fdataobj = select_representative_observations_for_mean_function_fdata(fdata_ts = fdata, is_iid = is_iid),
    type.CV = fda.usc::GCV.S,
    W = NULL,
    lambda = lambda_CV_look_list,
```

```
    numbasis = num_basis__seq,
    type.basis = "bspline",
    verbose = TRUE
)
```

```
fda_optimal_basis <- ...
fdata_obj_temp <- fda_optimal_basis[["fdata.est"]]
fdata_obj <- fda.usc::fdata2fd(fdata_obj_temp)
fpca_result <- fda::pca.fd(
    fdobj = fdata_obj,
    nharm = 3,
    # centrer les données
    centerfns = TRUE
)
```

Regardons désormais à quoi ressemble la sortie :

$$\texttt{fpca\_result\$scores} = \quad \downarrow [X_i] \quad \begin{bmatrix} \ddots & \longrightarrow [\phi_k] & \\ & \cdots & \vdots \\ \vdots & \xi_i^{[k]} = \langle X_i - \mu | \phi_k \rangle & \vdots \\ \cdots & \cdots & \ddots \end{bmatrix}$$

```
list(
        fpca_result = fpca_result,
        scores = fpca_result$scores,
        eigenfunctions = fpca_result$harmonics,
        explained_variance = fpca_result$varprop
    )
```

Bibliographie

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