# The Function of Feature Selection

Feature selection based on six methods.

## Description

The function of feature selection returns the required features and dimensions of the signal. Here are six methods for feature selection: Correlation, monotonicity, singular value decomposition (SVD), principal component analysis (PCA), Fisher discriminant analysis (FDA), and autoencoder (AE), and the user can select one of them. "File Upload" is used to load the required data set and label set, and the required parameters should be set in the position corresponding to the selected method.

## Parameter introduction

Parameters of feature selection:

* Feature Selection: Six methods for feature selection: ''Correlation'', ''Monotonicity'', ''SVD'', ''PCA'', ''FDA'', and ''AE''.

Monotonicity:

* ~~Features: Select whether the feature values are ''in Row'' or ''in Column'' based on the uploaded data.~~
* Threshold: Retain feature values that are greater than or equal to this threshold. (data type: float)

Correlation:

* ~~Features: Select whether the feature values are ''in Row'' or ''in Column'' based on the uploaded data.~~
* Threshold: Retain feature values that are greater than or equal to this threshold. (data type: float)

SVD:

* ~~Features: Select whether the feature values are ''in Row'' or ''in Column'' based on the uploaded data.~~
* Dimension: Retained feature dimensions. (data type: int)

AE:

* ~~Features: Select whether the feature values are ''in Row'' or ''in Column'' based on the uploaded data.~~
* Dimension: Retained feature dimensions. (data type: int)

FDA:

* ~~Features: Select whether the feature values are ''in Row'' or ''in Column'' based on the uploaded data.~~
* Dimension: Retained feature dimensions. (data type: int)

PCA

* ~~Features: Select whether the feature values are ''in Row'' or ''in Column'' based on the uploaded data.~~
* PCA Method: Select EIG (eigenvalue decomposition) or SVD (singular value decomposition).
* Dimension Method: Dimensional reduction approach.
* Dimension: Retained feature dimensions. (data type: int)
* Percent: Percentage of data retained after dimensionality reduction. (data type: float)

**Functional description of the main components**

The overall view of the function of feature selection is divided into "File Upload", "Feature Selection", "Monotonicity", "Correlation", "SVD", "AE", "FDA", "PCA", and "Result".

图形用户界面, 应用程序

描述已自动生成

### File Upload

The user needs to upload the data file and the label file. The uploaded data files support ".mat", ".txt", ".csv", ".xls", and ".npy" format files.

图形用户界面, 文本, 应用程序

描述已自动生成

### Feature Selection

Here are 6 methods for feature selection: ''Correlation'', ''Monotonicity'', ''SVD'', ''PCA'', ''FDA'', and ''AE'' and the user can select one of them.

文本

中度可信度描述已自动生成

### Parameter

Here are 6 parameter fields. The user only needs to select one method and set the parameters in the corresponding parameter field.

图形用户界面, 文本, 应用程序

描述已自动生成

图形用户界面, 文本, 应用程序

描述已自动生成

图形用户界面, 文本, 应用程序

描述已自动生成

图形用户界面, 文本, 应用程序, 电子邮件

描述已自动生成

图形用户界面, 文本, 应用程序

描述已自动生成

图形用户界面, 文本, 应用程序

描述已自动生成

### Result

After the user has selected one method and the software has been run, then the user needs to click the "Show Result" button to display the diagram. (Only Monotonicity and Correlation have the result image)

图表, 条形图, 直方图

描述已自动生成

The "Download" button downloads the relevant result images and data.

图形用户界面, 文本, 聊天或短信

描述已自动生成

**Examples**

The process of using feature selection to achieve signal reduction.

**Step 1: Configure the procedure**

Select "Feature Extraction and Reduction" from the process bar on the left side of the web page.



Then select the procedure that needs to be configured from the process display area.

图形用户界面, 文本, 应用程序, 聊天或短信

描述已自动生成

**Step 2: Upload the data file and the label file**

Select the data file and the label file to be applied from the local path.

图形用户界面, 文本, 应用程序

描述已自动生成

Click "Upload" after successfully selecting the upload data file, and then click "Save".

**Step 3: Select the function**

The ''Feature Selection'' function is chosen for signal reduction.

图形用户界面, 文本, 应用程序, 电子邮件

描述已自动生成

**Step 4: Set and save the parameters**

Firstly, the user needs to select one method in "Feature Selection". Then set parameters in the corresponding parameter field. Here is an example of PCA.

The user selects one method of PCA in "PCA Method". In "Dimension Method", if the user selects "Dimension", then set the parameter in "Dimension"; if the user selects "Percent", then set the parameter in "Percent"; if the user selects "Mle", there is no more parameter to set.

图形用户界面, 文本, 应用程序

描述已自动生成

Finally, click "Save" after all parameters are configured.

**Step 5: Execute the configured procedure**

Before executing the configured function, the user also needs to set the selected output image and file format.

**图形用户界面, 文本, 应用程序, 聊天或短信

描述已自动生成**

Finally, select "Run".

**Step 6: Show the result**

**图形用户界面, 文本

描述已自动生成**

When the progress bar reaches the end, the task is completed.

**图片包含 文本

描述已自动生成**

Select "Show Result" to simply view the graphical results of the function.

图表, 条形图, 直方图

描述已自动生成

As an example of monotonicity, the horizontal coordinate is the selected features, and the vertical coordinate is the monotonicity coefficients.

**Step 7: Download**

Click "Download" to download the file of data and image.

