# The Function of Occurrence Probability of Fault Characteristic Frequency (OPFCF)

Feature extraction based on OPFCF.

## Description

OPFCF is a frequency feature of the signal, which is as an indicator to describe the current health of the bearing and has a mathematical mapping to the RUL (Remaining Useful Life). "Data Upload" is used to load the required data set and label set, and the required parameters should be set in the "Parameter" field.

## Parameter introduction

Parameters of OPFCF:

Sample parameters:

* Sampling frequency: Sampling frequency of the bearing. (data type: float)

Here are four types of bearing faults:

* BPFO: Ball Passing Frequency of Outer Race.
* BPFI: Ball Passing Frequency of Inner Race.
* BSF: Ball Spin Frequency.
* FTF: Fundamental Train Frequency.

Bearing parameters:

* Rotation frequency: Rotation frequency of the bearing. (data type: float)
* Number of rolling elements: Number of balls. (data type: int)
* Ball diameter: Diameter of balls. (data type: float)
* Pitch diameter: Pitch diameter. (data type: float)
* Initial contact angle: Initial contact angle. (data type: float)

Function parameters:

* Order: The order of the fault frequency. (data type: int)
* Interval: Two methods for determining the actual fault characteristic frequency capture interval.
* Fixed frequency interval: Capture interval with fixed frequency interval. (data type: float)
* Threshold: Coefficient of variance discrimination for the occurrence of actual faults. (data type: float)
* Percent: Capture interval with fixed percentage. (data type: float)
* ~~RUL Image: Whether to draw the OPFCF-RUL diagram. The RUL means the remaining useful lifetime.~~

**Functional description of the main components**

The overall view of the function of OPFCF is divided into "Data Upload", and "Parameter".

图形用户界面, 应用程序

描述已自动生成

### Data Upload

The user needs to upload the data file and the label file. The uploaded data files and label 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

### Parameter

The user can set the parameters here.

图形用户界面

描述已自动生成

### Result

After the software has been run, click the "Download" button to download the relevant result data.

图形用户界面, 文本, 应用程序, 聊天或短信

描述已自动生成

**Examples**

The process of using OPFCF in feature extraction.

**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 ''OPFCF'' function is chosen for feature extraction.

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**

**图形用户界面

描述已自动生成**

Firstly, the user needs to select the fault type: "BPFO", "BPFI", "BSF", and "FTF". Then select one interval in "Interval".

Next, set the parameters in the blank box. ~~The user can select "True" or "False" based on whether to draw the OPFCF-RUL diagram.~~ For details about the parameters of the function, see "Parameter introduction".

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 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: Download**

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

**图形用户界面, 文本

描述已自动生成**

~~If the user selects "True" in "RUL Image", the OPFCF-RUL diagram will be drawn and saved.~~ In the following OPFCF trend diagram, as the RUL decreases, the OPFCF value becomes larger, which means the occurrence probability of failure becomes larger, and eventually it can converge to 1.

**图表, 折线图, 直方图

描述已自动生成**

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

