# RCAT

We provide a python code of RCAT for all operating systems (OS). Users can execute the source code (fft2.py) by following this tutorial.

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## Installation

### Install Python or Anaconda

Download: <https://www.python.org/downloads/>

<https://www.anaconda.com/download/>

### Install python packages

We recommend pip (detail: <https://pip.pypa.io/en/stable/user_guide/>). For instance of Windows OS, execute the command prompt and input the following codes to install packages.

pip install Numpy

pip install Scipy

pip install Pandas

pip install Matplotlib

pip install PyQt4

pip install Shutil

pip install Pyinstaller

### Download RCAT

Users can directly download RCAT at:

<https://github.com/lzbbest/Rhythmic-Component-Analysis-Tool/releases>

RCAT\_win.rar is Windows version.

RCAT\_py.rar is source code version.

## Prepare input file

File must be in CSV format:

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Time(hour) | 2 | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 22 | 24 |
| sample 1 | 0.1 | 0.2 | 0.3 | 0.4 | 0.5 |  | 0.7 | 0.8 | 0.9 | 1 | 1.1 | 1.2 |
| sample 2 | 0.1 |  | 0.3 | 0.4 |  | 0.6 | 0.7 | 0.8 | 0.9 |  | 1.1 |  |
| sample 3 |  | 0.2 | 0.3 | 0.4 | 0.5 | 0.6 | 0.7 |  |  | 1 |  | 1.2 |
| sample 4 | 0.1 | 0.2 |  | 0.4 | 0.5 |  | 0.7 | 0.8 | 0.9 | 1 |  | 1.2 |

**1st row:** time points (must be in hours)

**1st column:** samples names

**Others:** an M\*N matrix of values, which represents each of M samples has N expression values/counts over time.

\*\*\*Note: array must not contain zero values, which should be deleted.

## Modify fft2.py

Open fft2.py with text editor and change "file path", "Points per day" and "Analysis interval" in the last two lines.



**f:** file path

**pic:** if pic = ‘no’, the result image will not be output. Change to ‘yes’ if user wants to output images.

**1st number (144) :** “Points per day” represents data points collected in 24 hour (onr day). For example, we collect a data point every 10 minutes, and the total points per day are 144 points.

**2nd and 3rd number (40, 148) :** “Analysis interval” is to reduce the effect of low-quality data. Assuming that the entire time period is 0-240 hours collected in a experiment and the “Analysis interval” is set to 40-148 hours, then 40-148 hours of data points are subset from 0-240 hours.

## Run fft2.py

For instance of Windows OS, execute the command prompt and input the following codes to run program.

python fft2.py

Results will be generated in the same folder where your input file exists.

## Output files

Results are exported as CSV format which is easy to open and analyze. And result images are saved as PNG format.

**All results.csv** contains Amp (Amplitude), Period, Phase, RAE (Relative Amplitude Error).

**Fitted data.csv** is the final curve data.

**PartA.png** is for comparing curve of "raw data" and curve of "detrend data".

**PartB.png** is for comparing curve of "detrend data" and curve of "fitted data".

\*\*\*Note: Change the interval in multiple times to get the best results.

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