
PyFRAP Documentation

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PyFRAP is a extensive Python based FRAP (Fluorescence Recovery After Photobleaching) analysis software, featuring various tools that help analyzing FRAP datasets, such as

- **Import FRAP datasets from timelapse experiments and analyze image data with various options such as**
 - various filters
 - background subtraction
 - illumination correction
- Simulate the FRAP experiment with exact interpolated initial conditions
- Fit simulated experiment to analyzed data and extract diffusion coefficient
- Statistical analysis of fitting results
- Hierarchical data structure making data exchange/sharing easy
- Comprehensive GUI, making almost all PyFRAP tools available

I have tried to keep the API short but clear. If it is unclear, don't hesitate to mail.

Installation (setup.py)

Installing PyFRAP via setup.py

PyFRAP can conveniently be installed via:

```
python setup.py install
```

Since PyFRAP requires on I/O of data files that come with it we recommend using:

```
python setup.py install --user
```

setuptools comes with multiple installation options, to check them out, type:

```
python setup.py install --help
```

PyFRAP has some additional installation options:

Option	Effect
<code>--fiji</code>	Download and install Fiji during PyFRAP installation. Link Fiji with PyFRAP
<code>--gmsk</code>	Download and install Gmsk during PyFRAP installation. Link Gmsk with PyFRAP
<code>--silent</code>	Print out less log messages.

For `--fiji` and `--gmsk` to work, you need to install `wget`. To install `wget`, type:

```
pip install wget
```

or if you use the *Ananconda* distribution:

```
conda install pywget
```

PyFRAP setup.py API

`getOptions()`

Checks options given to script:

- If `--fiji` is in `sys.argv`, will set `dFiji=1`.
- If `--gmsk` is in `sys.argv`, will set `dGmsk=1`.
- If `--silent` is in `sys.argv`, will set `silent=1`.

Note: Makes `dGmsk` and `dFiji` global: Not nice but seems easiest way to get options into `OverrideInstall`.

`getOpt(optStr)`

Checks if `optStr` is in `sys.argv`. If this is the case, returns `1` and removes it from `sys.argv` so `setup.py` will not crash, otherwise returns `0`.

`class OverrideInstall(install)`

Override class subclassing `install` class from `setuptools`.

The Main purpose of this class is to give more possibilities when installing PyFRAP, such as:

- Download Gmsk and enter it automatically into path spec file
- Download Fiji and enter it automatically into path spec file
- Set ownership of data files so that even PyFRAP gets installed as superuser, users will be able to use its full capacities.

Idea taken from [here](#) (thanks a bunch!)

`initOptions()`

Parses options into override class.

`run()`

Runs install.

`addData()`

Adds Datafiles to PyFRAP installation.

Makes sure that `$USER` has proper read/write/execute rights. Note that for Windows it will change rights, since it is not necessary. Also makes sure that `gmsk/Fiji` bin ins properly linked.

`cleanUpExe(fnDL, folderFn, filesBefore, exePath):`

Moves it to executables directory and cleans up afterwards.

Parameters

- `fnDL` (*str*) – Filename of downloaded file.
- `folderFn` (*str*) – Filename of folder containing extracted files.
- `filesBefore` (*list*) – Snapshot of `cwd`.
- `exePath` (*str*) – Path where executables go.

`downloadGmsk()`

Downloads Gmsk, moves it to executables directory and cleans up afterwards.

Note: Only works if `wget` is installed.

downloadGmshWin (*arch*, *gmshVersion*)

Downloads Gmsh from Gmsh website for Windows

Parameters

- **arch** (*str*) – System architecture, e.g. 64/32.
- **gmshVersion** (*str*) – gmshVersion String, e.g. 2.12.0 .

Returns (Download filename, Filename of extracted download files)

Return type (str ,str)

downloadGmshOSX (*arch*, *gmshVersion*)

Downloads Gmsh from Gmsh website for OSX.

Parameters

- **arch** (*str*) – System architecture, e.g. 64/32.
- **gmshVersion** (*str*) – gmshVersion String, e.g. 2.12.0 .

Returns (Download filename, Filename of extracted download files)

Return type (str ,str)

downloadGmshLinux (*arch*, *gmshVersion*)

Downloads Gmsh from Gmsh website for Linux.

Parameters

- **arch** (*str*) – System architecture, e.g. 64/32.
- **gmshVersion** (*str*) – gmshVersion String, e.g. 2.12.0 .

Returns (Download filename, Filename of extracted download files)

Return type (str ,str)

makeExeFolder ()

Make executables folder if it doesn't exist yet

downloadFiji ()

Downloads Gmsh, moves it to executables directory and cleans up afterwards.

Note: Only works if `wget` is installed.

downloadFijiLinux (*arch*)

Downloads Fiji from Fiji website for Linux.

Parameters **arch** (*str*) – System architecture, e.g. 64/32.

Returns (Download filename, Filename of extracted download files)

Return type (str ,str)

downloadFijiWin (*arch*)

Downloads Fiji from Fiji website for Windows.

Parameters **arch** (*str*) – System architecture, e.g. 64/32.

Returns (Download filename, Filename of extracted download files)

Return type (str ,str)

downloadFijiOSX()

Downloads Fiji from Fiji website for OSX.

Returns (Download filename, Filename of extracted download files)

Return type (str, str)

setExePath (*fn, identifier, exePath*)

Enters executable path into path spec file.

Parameters

- **fn** (*str*) – Path to gmsh executable.
- **identifier** (*str*) – Identifier in spec file.
- **exePath** (*str*) – Path to exe file

setGmshPath (*fn*)

Enters gmsh executable path into path spec file.

Parameters **fn** (*str*) – Path to gmsh executable.

setFijiPath (*fn*)

Enters fiji executable path into path spec file.

Parameters **fn** (*str*) – Path to fiji executable.

changePermissions (*filepath, uid, gid, mode*)

Sets File Permissions.

Parameters

- **filepath** (*str*) – Path to file.
- **uid** (*int*) – user ID.
- **gid** (*int*) – group ID.
- **mode** (*int*) – Permission mode.

Returns True if success

Return type bool

makeAdditionalDataFolders (*folder, fn, uid, gid, mode*)

Tries to generate additional data folders.

Parameters

- **folder** (*str*) – Path to containing folder.
- **fn** (*str*) – New folder name
- **uid** (*int*) – user ID.
- **gid** (*int*) – group ID.
- **mode** (*int*) – Permission mode.

Returns True if success

Return type bool

CHAPTER 2

The modules package

pyfrp.modules package

Submodules

pyfrp.modules.pyfrp_IO_module module
pyfrp.modules.pyfrp_fit_module module
pyfrp.modules.pyfrp_geometry_module module
pyfrp.modules.pyfrp_gmsh_IO_module module
pyfrp.modules.pyfrp_gmsh_geometry module
pyfrp.modules.pyfrp_gmsh_module module
pyfrp.modules.pyfrp_idx_module module
pyfrp.modules.pyfrp_img_module module
pyfrp.modules.pyfrp_integration_module module
pyfrp.modules.pyfrp_misc_module module
pyfrp.modules.pyfrp_openscad_module module
pyfrp.modules.pyfrp_optimization_module module
pyfrp.modules.pyfrp_plot_module module
pyfrp.modules.pyfrp_sim_module module
pyfrp.modules.pyfrp_stats_module module

The subclasses package

pyfrp.subclasses package

Submodules

pyfrp.subclasses.pyfrp_ROI module

pyfrp.subclasses.pyfrp_analysis module

pyfrp.subclasses.pyfrp_conf module

pyfrp.subclasses.pyfrp_embryo module

pyfrp.subclasses.pyfrp_fit module

pyfrp.subclasses.pyfrp_geometry module

pyfrp.subclasses.pyfrp_mesh module

pyfrp.subclasses.pyfrp_molecule module

pyfrp.subclasses.pyfrp_simulation module

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