

Reference

`class PHETS.PH.Filtration(sig, params[, filename='none'])`

- Parameters:**
- **sig** (*ndarray* or *str*) - Input trajectory as numpy array or path to .txt file.
 - **params** (*dict*) - Options for computation of filtration.
 - **filename** (*str*) - If sig is an ndarray, a filename may be provided for labelling in visualizations.

`PHETS.PH.make_movie(filtration, out_filename[, color_scheme='none', camera_angle=(135, 55), alpha=1, dpi=150, save_frames=False, framerate=1])`

Make filtration movie.

- Parameters:**
- **filtration** ([Filtration](#)) -
 - **out_filename** (*str*) - Path/filename for movie. Should end in “.mp4” or other video format.
 - **color_scheme** (*str*) - ‘none’, ‘highlight new’, or ‘birth_time gradient’
 - **camera_angle** (*tuple*) - for 3D mode. (azimuthal, elevation) in degrees.
 - **alpha** (*float*) - opacity of simplexes. 0...1 : transparent...opaque
 - **dpi** (*int*) - dots per inch (resolution)
 - **save_frames** (*bool*) - save frames to PH/frames/frame*.png for debugging
 - **framerate** (*int*) - frames per second

`PHETS.PH.make_PD(filtration, out_filename)`

Plot persistence diagram.

- Parameters:**
- **filtration** ([Filtration](#)) -
 - **out_filename** (*str*) - Image path and filename. Should end in “.png” or other image format.

`PHETS.PH.make_PRF_plot(filt, out_filename[, PRF_res=50])`

Plot persistent rank function.

- Parameters:**
- **filtration** ([Filtration](#)) -
 - **out_filename** (*str*) - Image path and filename. Should end in “.png” or other image format.
 - **PRF_res** (*int*) - number of divisions per epsilon axis

Todo:

a function for a single frame of the filtration (i.e. fixed epsilon) as an image. (For now, a single frame movie can be used.)

`PHETS.DCE.Movies.slide_window(in_filename, out_filename, window_size=.5, step_size=.1, tau=10, ds_rate=1, max_frames=0, save_worms=True, save_movie=True)`

Show embedding of in_filename with window start point varied over time.

- Parameters:**
- **window_size** (*float*) - seconds
 - **step_size** - window start point step size (seconds)
 - **tau** (*float*) - seconds ?

`PHETS.DCE.Movies.vary_tau(in_filename, out_filename, tau_lims=(1, 15), tau_inc=1, embed_crop=(1, 2), ds_rate=1, save_worms=True, save_movie=True, m=2)`

Show embedding of in_filename with tau varied over time.

- Parameters:**
- **in_filename** (*str*) - Path/filename for text file time series.
 - **out_filename** (*str*) - Path/filename for movie. Should end in “.mp4” or other video format.
 - **tau_lims** (*tuple*) - tau range (seconds)
 - **tau_inc** (*int*) - tau stepsize (seconds)
 - **embed_crop** (*tuple*) - Limits for window from input time series (seconds)
 - **ds_rate** (*int*) - time series downsample rate
 - **save_worms** (*bool*) - save embeddings to text files in output/DCE /saved_worms
 - **save_movie** (*bool*) - If False, no movie will be created. Useful for saving embeddings quickly.
 - **m** (*int*) - target embedding dimension

PHETS.DCE.Movies.**compare_vary_tau**(*in_filename_1, in_filename_2, out_filename, tau_lims, tau_inc=1, embed_crop=(1, 2), ds_rate=1, m=2, save_worms=True, save_movie=True*)

Like vary_tau(), but shows embeddings for two time series side by side.

PHETS.DCE.Movies.**compare_multi**(*dir1, dir1_base, dir2, dir2_base, out_filename, i_lims=(1, 89), embed_crop_1='auto', embed_crop_2='auto', auto_crop_length=.3, tau_1='auto ideal', tau_2='auto ideal', tau_T=1/np.pi, save_worms=True, save_movie=True, normalize_volume=True, waveform_zoom=None, ds_rate=1, dpi=200, m=2*)

Takes two directories of (eg one with piano notes, another with range of viol notes), and generates a movie over a range note indexes (pitch). Tau and crop may be set explicitly or automatically.

- Parameters:**
- **dir1** (*str*) - Path of first directory to be iterated over
 - **dir1_base** (*str*) - Base filename for files in dir1
 - **dir2** (*str*) -
 - **dir2_base** (*str*) -
 - **out_filename** (*str*) -
 - **i_lims** (*tuple*) - (start, stop) index. Default is (1, 89).
 - **embed_crop_1** (*tuple or str*) - (start, stop) in seconds or ‘auto’
 - **embed_crop_2** (*tuple or str*) -
 - **auto_crop_length=.3** (*float*) - seconds
 - **tau_1** (*str*) - explicit (seconds) or ‘auto detect’ or ‘auto ideal’
 - **tau_2** (*str*) -
 - **tau_T** (*float*) - For use with auto tau: tau = period * tau_T
 - **save_worms** (*bool*) -
 - **save_movie** (*bool*) -
 - **normalize_volume** (*bool*) -
 - **waveform_zoom** -
 - **ds_rate** (*int*) -
 - **dpi** (*int*) -

Todo:

function for plotting embeddings without varying a parameter or input, as an image. (For now, a single frame movies can be used.)

PHETS.PRFFCompare.**plot_dists_vs_ref**(*dir, base_filename, fname_format, out_filename, filt_params, i_ref=15, i_arr=np.arange(10, 20, 1), weight_func=lambda i, j: 1, metric='L2', dist_scale='none', PRF_res=50, load_saved_PRFs=False, see_samples=5*)

Takes range of time-series files and a reference file. Generates PRF for each, and finds distances to reference PRF, plots distance vs index.

Parameters:

- **dir** (*str*) - input directory
- **base_filename** (*str*) - input base filename
- **fname_format** (*str*) - input filename format: 'base i or 'i base'
- **out_filename** (*str*) - output filename
- **filt_params** -
- **i_ref** (*int*) -
- **i_arr** (*arr*) -
- **weight_func** (*lambda*) - Default is $\lambda_{i,j}$
- **metric** (*str*) - 'L1' (abs) or 'L2' (euclidean). Default is 'L2'.
- **dist_scale** (*str*) - 'none', 'a', or 'a + b'. Default is 'none'.
- **PRF_res** (*int*) - number of divisions used for PRF. Default is 50.
- **load_saved_PRFs** (*bool*) - reuse previously computed PRF set. Default is False.
- **see_samples** (*int*) - interval to generate PRF plots, PDs, and filtration movies when generating PRF set. 0 is none, 1 is all samples, 2 is every other sample, etc.

PHETS.PRFFCompare.**plot_dists_vs_mean**(*filename_1*, *filename_2*, *out_filename*, *filt_params*, *load_saved_PRFs*=False, *time_units*='seconds', *crop_1*='auto', *crop_2*='auto', *auto_crop_length*=.3, *window_size*=.05, *num_windows*=10, *mean_samp_num*=5, *tau_1*=.001, *tau_2*=.001, *tau_T*=np.pi, *note_index*=None, *normalize_volume*=True, *PRF_res*=50, *dist_scale*='none', *metric*='L2', *weight_func*= $\lambda_{i,j}$, *see_samples*=5)

Takes two time-series or 2D trajectory files. For each input, slices each into a number of windows. If inputs are time-series, embeds each window. Generates PRF for each window. selects subset of window PRFs, computes their mean, plots distance to mean PRF vs time.

Parameters:

- **filename_1** (*str*) -
- **filename_2** (*str*) -
- **out_filename** (*str*) -
- **filt_params** (*dict*) -
- **load_saved_PRFs** (*bool*) -
- **time_units** (*str*) -
- **crop_1** (*str or tuple*) -
- **crop_2** (*str or tuple*) -
- **auto_crop_length** (*float*) -
- **window_size** (*float*) - (time units)
- **num_windows** (*int*) - per file
- **mean_samp_num** (*int*) - per file
- **tau_1** (*str or float*) -
- **tau_2** (*str or float*) -
- **tau_T** (*float*) -
- **note_index** (*int*) -
- **normalize_volume** (*bool*) -
- **PRF_res** (*int*) - number of divisions used for PRF
- **dist_scale** (*str*) - 'none', 'a', or 'a + b'
- **metric** (*str*) - 'L1' (abs) or 'L2' (euclidean)
- **weight_func** (*lambda*) -
- **see_samples** (*int*) -

PHETS.PRFFCompare.**plot_clusters**(*args, **kwargs)

See `plot_dists_vs_mean` for call signature.

```
PHETS.PRFFCompare.plot_variances(filename, out_filename, filt_params, vary_param_1,  
vary_param_2, load_saved_PRFs=False, time_units='seconds', crop=(100, 1100),  
auto_crop_length=.3, window_size=1000, num_windows=5, tau=.001, tau_T=np.pi,  
note_index=None, normalize_volume=True, PRF_res=50, dist_scale='none', metric='L2',  
weight_func=lambda i, j: 1, see_samples=5)
```

Parameters:

- **filename** (*str*) -
- **out_filename** (*str*) -
- **filt_params** (*dict*) -
- **vary_param_1** (*str*) -
- **vary_param_2** (*str*) -
- **load_saved_PRFs** (*bool*) -
- **time_units='seconds'** (*str*) -
- **crop=(100, 1100)** (*tuple*) -
- **auto_crop_length=.3** (*float*) -
- **window_size=1000** -
- **num_windows** (*int*) -
- **tau** (*float*) -
- **tau_T** (*float*) -
- **note_index** (*int*) -
- **normalize_volume** (*bool*) -
- **PRF_res** (*int*) -
- **dist_scale** (*str*) - 'none', 'a', or 'a + b'
- **metric** (*str*) - 'L1' (abs) or 'L2' (euclidean)
- **weight_func** (*lambda*) -
- **see_samples** (*bool*) -