

Scikit MIT Haystack Data Analysis Pipeline Toolkit

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Chapter 5

Namespace Documentation

5.1 skdiscovery Namespace Reference

Namespaces

- [framework](#)
- [generic](#)
- [series](#)
- [table](#)
- [utilities](#)
- [visualization](#)

5.2 skdiscovery.framework Namespace Reference

Namespaces

- [base](#)
- [discoverypipeline](#)
- [stagecontainers](#)

5.3 skdiscovery.framework.base Namespace Reference

Classes

- class [PipelineItem](#)

5.4 skdiscovery.framework.discoverypipeline Namespace Reference

Classes

- class [DiscoveryPipeline](#)

5.5 skdiscovery.framework.stagecontainers Namespace Reference

Classes

- class [StageContainer](#)
- class [StageContainerAlternative](#)
- class [StageContainerIncrementalAdd](#)

5.6 skdiscovery.generic Namespace Reference

Namespaces

- [accumulators](#)

5.7 skdiscovery.generic.accumulators Namespace Reference

Namespaces

- [data](#)
- [gpsplotter](#)
- [hcluster](#)

5.8 skdiscovery.generic.accumulators.data Namespace Reference

Classes

- class [DataAccumulator](#)

5.9 skdiscovery.generic.accumulators.gpsplotter Namespace Reference

Classes

- class [GPSHPlotter](#)

5.10 skdiscovery.generic.accumulators.hcluster Namespace Reference

Classes

- class [HCluster](#)

5.11 skdiscovery.series Namespace Reference

Namespaces

- [accumulators](#)
- [analysis](#)
- [filters](#)

5.12 skdiscovery.series.accumulators Namespace Reference

Namespaces

- [plotter](#)

5.13 skdiscovery.series.accumulators.plotter Namespace Reference

Classes

- class [Plotter](#)

5.14 skdiscovery.series.analysis Namespace Reference

Namespaces

- [correlate](#)
- [gca](#)
- [mogi](#)

5.15 skdiscovery.series.analysis.correlate Namespace Reference

Classes

- class [Correlate](#)

5.16 skdiscovery.series.analysis.gca Namespace Reference

Classes

- class [General_Component_Analysis](#)

5.17 skdiscovery.series.analysis.mogi Namespace Reference

Classes

- class [Mogi_Inversion](#)

Functions

- def [MogiVectors](#) (mogi_res, station_lat_list, station_lon_list, flag3D=False)

5.17.1 Function Documentation

5.17.1.1 MogiVectors()

```
def skdiscovery.series.analysis.MogiVectors (
    mogi_res,
    station_lat_list,
    station_lon_list,
    flag3D = False )
```

Creates a set of Mogi vectors for plotting.

Parameters

<i>mogi_res</i>	Magma source inversion results
<i>station_lat_list</i>	List of station latitudes
<i>station_lon_list</i>	List of station longitudes
<i>flag3D</i>	Flag for generating 3 dimensional vectors instead of only horizontal

Returns

x and y Mogi vectors scaled by pca amplitude change

5.18 skdiscovery.series.filters Namespace Reference

Namespaces

- [dataremover](#)
- [hyperbolictan](#)
- [interpolate](#)
- [kalman](#)
- [lowpass](#)
- [median](#)
- [offset_detrend](#)
- [trend](#)

5.19 `skdiscovery.series.filters.dataremover` Namespace Reference

Classes

- class [DataRemover](#)

5.20 `skdiscovery.series.filters.hyperbolictan` Namespace Reference

Classes

- class [HTanFilter](#)

5.21 `skdiscovery.series.filters.interpolate` Namespace Reference

Classes

- class [InterpolateFilter](#)

5.22 `skdiscovery.series.filters.kalman` Namespace Reference

Classes

- class [KalmanFilter](#)

5.23 `skdiscovery.series.filters.lowpass` Namespace Reference

Classes

- class [LowPassFilter](#)

5.24 skdiscovery.series.filters.median Namespace Reference

Classes

- class [MedianFilter](#)

5.25 skdiscovery.series.filters.offset_detrend Namespace Reference

Classes

- class [OffsetDetrend](#)

5.26 skdiscovery.series.filters.trend Namespace Reference

Classes

- class [TrendFilter](#)

5.27 skdiscovery.table Namespace Reference

Namespaces

- [accumulators](#)
- [analysis](#)
- [filters](#)
- [fusion](#)
- [generators](#)

5.28 skdiscovery.table.accumulators Namespace Reference

Namespaces

- [plotter](#)

5.29 skdiscovery.table.accumulators.plotter Namespace Reference

Classes

- class [Plotter](#)

5.30 skdiscovery.table.analysis Namespace Reference

Namespaces

- [correlate](#)
- [dbscan](#)
- [gca](#)
- [midas](#)
- [mogi](#)
- [outlier](#)
- [skew](#)

5.31 skdiscovery.table.analysis.correlate Namespace Reference

Classes

- class [Correlate](#)

5.32 skdiscovery.table.analysis.dbscan Namespace Reference

Classes

- class [DBScan](#)

5.33 skdiscovery.table.analysis.gca Namespace Reference

Classes

- class [General_Component_Analysis](#)

5.34 skdiscovery.table.analysis.midas Namespace Reference

Classes

- class [MIDAS](#)

5.35 skdiscovery.table.analysis.mogi Namespace Reference

Classes

- class [Mogi_Inversion](#)

Functions

- def [MogiVectors](#) (mogi_res, station_lat_list, station_lon_list, flag3D=False)

5.35.1 Function Documentation

5.35.1.1 MogiVectors()

```
def skdiscovery.table.analysis.MogiVectors (
    mogi_res,
    station_lat_list,
    station_lon_list,
    flag3D = False )
```

Creates a set of mogi vectors for plotting.

Parameters

<i>mogi_res</i>	Magma source
<i>station_lat_list</i>	List of station latitudes
<i>station_lon_list</i>	List of station longitudes
<i>flag3D</i>	Make vectors 3 dimensional, defaults to False (2D)

5.36 skdiscovery.table.analysis.outlier Namespace Reference

Classes

- class [Outlier](#)

5.37 skdiscovery.table.analysis.skew Namespace Reference

Classes

- class [Skew](#)

5.38 skdiscovery.table.filters Namespace Reference

Namespaces

- [antenna_offset](#)
- [calibrate_grace](#)

- [combine_columns](#)
- [dataremover](#)
- [geolocation](#)
- [hyperbolictan](#)
- [interpolate](#)
- [kalman](#)
- [lowpass](#)
- [median](#)
- [offset_detrend](#)
- [propagate_nans](#)
- [snow_remover](#)
- [stabilization](#)
- [table_filter](#)
- [trend](#)
- [weighted_average](#)

5.39 skdiscovery.table.filters.antenna_offset Namespace Reference

Classes

- class [AntennaOffset](#)

5.40 skdiscovery.table.filters.calibrate_grace Namespace Reference

Classes

- class [CalibrateGRACE](#)

5.41 skdiscovery.table.filters.combine_columns Namespace Reference

Classes

- class [CombineColumns](#)

5.42 skdiscovery.table.filters.dataremover Namespace Reference

Classes

- class [DataRemover](#)

5.43 skdiscovery.table.filters.geolocation Namespace Reference

Classes

- class [GeoLocationFilter](#)

5.44 skdiscovery.table.filters.hyperbolictan Namespace Reference

Classes

- class [HTanFilter](#)

5.45 skdiscovery.table.filters.interpolate Namespace Reference

Classes

- class [InterpolateFilter](#)

5.46 skdiscovery.table.filters.kalman Namespace Reference

Classes

- class [KalmanFilter](#)

5.47 skdiscovery.table.filters.lowpass Namespace Reference

Classes

- class [LowPassFilter](#)

5.48 skdiscovery.table.filters.median Namespace Reference

Classes

- class [MedianFilter](#)

5.49 skdiscovery.table.filters.offset_detrend Namespace Reference

Classes

- class [OffsetDetrend](#)

5.50 skdiscovery.table.filters.propagate_nans Namespace Reference

Classes

- class [PropagateNaNs](#)

5.51 skdiscovery.table.filters.snow_remover Namespace Reference

Classes

- class [SnowRemover](#)

5.52 skdiscovery.table.filters.stabilization Namespace Reference

Classes

- class [StabilizationFilter](#)

5.53 skdiscovery.table.filters.table_filter Namespace Reference

Classes

- class [TableFilter](#)

5.54 skdiscovery.table.filters.trend Namespace Reference

Classes

- class [TrendFilter](#)

5.55 skdiscovery.table.filters.weighted_average Namespace Reference

Classes

- class [WeightedAverage](#)

5.56 skdiscovery.table.fusion Namespace Reference

Namespaces

- [grace](#)
- [snow](#)

5.57 skdiscovery.table.fusion.grace Namespace Reference

Classes

- class [GraceFusion](#)

5.58 skdiscovery.table.fusion.snow Namespace Reference

Classes

- class [SnowFusion](#)

5.59 skdiscovery.table.generators Namespace Reference

Namespaces

- [catalog_generator](#)
- [data_generator](#)

5.60 skdiscovery.table.generators.catalog_generator Namespace Reference

Classes

- class [CatalogGenerator](#)

5.61 skdiscovery.table.generators.data_generator Namespace Reference

Classes

- class [DataGenerator](#)

5.62 skdiscovery.utilities Namespace Reference

Namespaces

- [amazon_control](#)
- [amazon_gui](#)
- [astro_tools](#)
- [config](#)
- [kalman_smoother](#)
- [pbo_tools](#)
- [random_walks](#)
- [spherical_voronoi](#)
- [ssh_reverse](#)
- [trendTools](#)

5.63 skdiscovery.utilities.amazon_control Namespace Reference

Functions

- def [init](#) (in_aws_access_key, in_aws_secret, in_aws_region, in_aws_security_group, in_aws_key_name, in_↵ pem_file)
- def [closeDispyScheduler](#) ()
- def [startDispyScheduler](#) ()
- def [generateInfo](#) (instance)
- def [updateStatus](#) ()
- def [setNumInstances](#) (new_total_instances, instance_type, image_id)
- def [createTunnels](#) ()
- def [startDispyNode](#) ()
- def [resetInstances](#) ()
- def [reset](#) ()
- def [close](#) ()
- def [clearAmazonList](#) ()

Variables

- `aws_access_key` = None
- `aws_secret` = None
- `aws_region` = None
- `aws_security_group` = None
- `aws_key_name` = None
- `pem_file` = None
- `ec2_res` = None
- `ec2_client` = None
- list `amazon_list` = []
- `scheduler` = None
- `popen` = None

5.63.1 Function Documentation

5.63.1.1 `clearAmazonList()`

```
def skdiscovery.utilities.amazon_control.clearAmazonList ( )
```

Shutdown connection tunnels to Amazon instances and clear amazon list.

5.63.1.2 `close()`

```
def skdiscovery.utilities.amazon_control.close ( )
```

Shutdown all instances, close dispy scheduler and clear Amazon list.

5.63.1.3 `closeDispyScheduler()`

```
def skdiscovery.utilities.amazon_control.closeDispyScheduler ( )
```

Close the Dispy Scheduler.

5.63.1.4 `createTunnels()`

```
def skdiscovery.utilities.amazon_control.createTunnels ( )
```

Create reverse ssh tunnels to all instances.

5.63.1.5 generateInfo()

```
def skdiscovery.utilities.amazon_control.generateInfo (
    instance )
```

Read metadata from an Amazon instance.

Returns

metadata for Amazon instance

5.63.1.6 init()

```
def skdiscovery.utilities.amazon_control.init (
    in_aws_access_key,
    in_aws_secret,
    in_aws_region,
    in_aws_security_group,
    in_aws_key_name,
    in_pem_file )
```

The underlying functionality for the Amazon GUI, the user should not need to directly interface with this function.

Parameters

<i>in_aws_access_key</i>	AWS access key
<i>in_aws_secret</i>	AWS Secret Access Key
<i>in_aws_region</i>	AWS region (e.g. us-west-2)
<i>in_aws_security_group</i>	Security Group Name
<i>in_aws_key_name</i>	Name of Key Pair
<i>in_pem_file</i>	Filename of ssh key

5.63.1.7 reset()

```
def skdiscovery.utilities.amazon_control.reset ( )
```

Close and clear Amazon List.

5.63.1.8 resetInstances()

```
def skdiscovery.utilities.amazon_control.resetInstances ( )
```

Reboot Amazon instances.

5.63.1.9 setNumInstances()

```
def skdiscovery.utilities.amazon_control.setNumInstances (
    new_total_instances,
    instance_type,
    image_id )
```

Change the number of running instances.

Parameters

<i>new_total_instances</i>	New number of instances
<i>instance_type</i>	Instance type for new instances
<i>image_id</i>	ID of image (ami-xxxxxxx)

5.63.1.10 startDispyNode()

```
def skdiscovery.utilities.amazon_control.startDispyNode ( )
```

Start dispy on each Amazon instance.

5.63.1.11 startDispyScheduler()

```
def skdiscovery.utilities.amazon_control.startDispyScheduler ( )
```

Start the Dispy Scheduler.

5.63.1.12 updateStatus()

```
def skdiscovery.utilities.amazon_control.updateStatus ( )
```

Update status information in amazon_list.

5.63.2 Variable Documentation

5.63.2.1 amazon_list

```
list skdiscovery.utilities.amazon_control.amazon_list = [ ]
```

5.63.2.2 aws_access_key

```
skdiscovery.utilities.amazon_control.aws_access_key = None
```

5.63.2.3 aws_key_name

```
skdiscovery.utilities.amazon_control.aws_key_name = None
```

5.63.2.4 aws_region

```
skdiscovery.utilities.amazon_control.aws_region = None
```

5.63.2.5 aws_secret

```
skdiscovery.utilities.amazon_control.aws_secret = None
```

5.63.2.6 aws_security_group

```
skdiscovery.utilities.amazon_control.aws_security_group = None
```

5.63.2.7 ec2_client

```
skdiscovery.utilities.amazon_control.ec2_client = None
```

5.63.2.8 ec2_res

```
skdiscovery.utilities.amazon_control.ec2_res = None
```

5.63.2.9 pem_file

```
skdiscovery.utilities.amazon_control.pem_file = None
```

5.63.2.10 popen

```
skdiscovery.utilities.amazon_control.popen = None
```

5.63.2.11 scheduler

```
skdiscovery.utilities.amazon_control.scheduler = None
```

5.64 skdiscovery.utilities.amazon_gui Namespace Reference

Functions

- def [init](#) ()
- def [drawGUI](#) ()
- def [changeButtonState](#) (enabled=True)
- def [checkValidValues](#) ()

Variables

- [widget_dict](#) = OrderedDict()
- list [disable_list](#)
- list [key_value_list](#)

5.64.1 Function Documentation

5.64.1.1 [changeButtonState\(\)](#)

```
def skdiscovery.utilities.amazon_gui.changeButtonState (
    enabled = True )
```

Enable or disable the buttons and slider in the GUI.

Parameters

<i>enabled</i>	State to change the buttons to.
----------------	---------------------------------

5.64.1.2 [checkValidValues\(\)](#)

```
def skdiscovery.utilities.amazon_gui.checkValidValues ( )
```

Check if Amazon information is valid.

Returns

True if all AWS text fields have data in them, false otherwise

5.64.1.3 [drawGUI\(\)](#)

```
def skdiscovery.utilities.amazon_gui.drawGUI ( )
```

Draw the GUI on the screen.

5.64.1.4 init()

```
def skdiscovery.utilities.amazon_gui.init ( )
```

Initialize GUI for controlling Amazon instances.

5.64.2 Variable Documentation

5.64.2.1 disable_list

```
list skdiscovery.utilities.amazon_gui.disable_list
```

Initial value:

```
1 = ['execute_instances_button', 'initialize_button', 'cache_button', 'restore_button',
2   'new_num_instances_widget']
```

5.64.2.2 key_value_list

```
list skdiscovery.utilities.amazon_gui.key_value_list
```

Initial value:

```
1 = ['aws_id_widget', 'aws_secret_widget', 'aws_region_widget', 'aws_security_widget',
2   'aws_keyname_widget', 'aws_pem_widget', 'aws_image_id', 'instance_type_widget']
```

5.64.2.3 widget_dict

```
skdiscovery.utilities.amazon_gui.widget_dict = OrderedDict()
```

5.65 skdiscovery.utilities.astro_tools Namespace Reference

Functions

- def [z_to_v](#) (z)
- def [v_to_z](#) (v)
- def [angular_separation](#) (ra1, dec1, ra2, dec2)
- def [move_point](#) (ra, dec, ang_dist, bearing)
- def [abs_mag](#) ([app_mag](#), z)
- def [app_mag](#) ([abs_mag](#), z)
- def [nfw](#) (R, norm_constant, Rs, Rcore)
- def [lf](#) (x, A, mstar, alpha)
- def [dlf](#) (x, A, m1, a1, m2, a2)
- def [cdf_dlf](#) (x, A, m1, a1, m2, a2, start=-26)
- def [inv_cdf_dlf](#) (p, A, m1, a1, m2, a2, start=-26, end=-15)

5.65.1 Function Documentation

5.65.1.1 `abs_mag()`

```
def skdiscovery.utilities.astro_tools.abs_mag (
    app_mag,
    z )
```

5.65.1.2 `angular_separation()`

```
def skdiscovery.utilities.astro_tools.angular_separation (
    ra1,
    dec1,
    ra2,
    dec2 )
```

5.65.1.3 `app_mag()`

```
def skdiscovery.utilities.astro_tools.app_mag (
    abs_mag,
    z )
```

5.65.1.4 `cdf_dlf()`

```
def skdiscovery.utilities.astro_tools.cdf_dlf (
    x,
    A,
    m1,
    a1,
    m2,
    a2,
    start = -26 )
```

Cumulative Schechter function.

Second LF is set to be 2*A of first LF

Parameters

<i>x</i>	magnitude
<i>A</i>	Scale factor
<i>m1</i>	Knee of distribution 1
<i>a1</i>	Faint-end turnover of first lf
<i>m2</i>	Knee of distribution 2
<i>a2</i>	Faint-end turnover of second lf
<i>start</i>	Brightest magnitude

Returns

Probability that galaxy has a magnitude greater than x

5.65.1.5 dlf()

```
def skdiscovery.utilities.astro_tools.dlf (
    x,
    A,
    m1,
    a1,
    m2,
    a2 )
```

double Schechter function.

Second LF is set to be 2*A of first LF

Parameters

<i>x</i>	magnitude
<i>A</i>	Scale factor
<i>m1</i>	Knee of distribution 1
<i>a1</i>	Faint-end turnover of first lf
<i>m2</i>	Knee of distribution 2
<i>a2</i>	Faint-end turnover of second lf

Returns

float: Double Schechter function at magnitude x

5.65.1.6 inv_cdf_dlf()

```
def skdiscovery.utilities.astro_tools.inv_cdf_dlf (
    p,
    A,
    m1,
    a1,
    m2,
    a2,
    start = -26,
    end = -15 )
```

Inverse Cumulative Schechter function.

Second LF is set to be 2*A of first LF

Parameters

<i>p</i>	probability
<i>A</i>	Scale factor
<i>m1</i>	Knee of distribution 1
<i>a1</i>	Faint-end turnover of first lf
<i>m2</i>	Knee of distribution 2
<i>a2</i>	Faint-end turnover of second lf
<i>start</i>	Brightest magnitude
<i>end</i>	Faintest possible magnitude

Returns

Magnitude associated with cdf probability p

5.65.1.7 lf()

```
def skdiscovery.utilities.astro_tools.lf (
    x,
    A,
    mstar,
    alpha )
```

Schechter function.

Parameters

<i>x</i>	magnitude
<i>A</i>	Scale factor
<i>mstar</i>	Knee of distribution
<i>alpha</i>	Faint-end turnover

Returns

float: Schechter function at magnitude x

5.65.1.8 move_point()

```
def skdiscovery.utilities.astro_tools.move_point (
    ra,
    dec,
    ang_dist,
    bearing )
```

Move a point along a great circle at a particular bearing.

All inputs are in degrees The formula was obtained from <http://www.movable-type.co.uk/scripts/latlong.html>.

Parameters

<i>ra</i>	Starting right ascension
<i>dec</i>	Starting declination
<i>ang_dist</i>	Angular distance to travel
<i>bearing</i>	Direction to travel (0 is north, 90 is positive RA)

Returns

tuple containing updated ra and dec

5.65.1.9 nfw()

```
def skdiscovery.utilities.astro_tools.nfw (
    R,
    norm_constant,
    Rs,
    Rcore )
```

2D Navarro-Frenk-White surface radial profile probability density

See

Navarro, J. F., Frenk, C. S., & White, S. D. M. 1996, ApJ, 462, 563 Bartelmann, M., A&A, 1996, 313, 697 Rykoff, E.S., et al., ApJ, 746, 178

Parameters

<i>R</i>	Radius
<i>norm_constant</i>	Normalization constant
<i>Rs</i>	Scale radius
<i>Rcore</i>	Since NFW profile diverges at R=0, the value at the center is held fixed starting at Rcore

Returns

probability density of profile at R

5.65.1.10 v_to_z()

```
def skdiscovery.utilities.astro_tools.v_to_z (
    v )
```

Convert km/s to redshift assuming all are using special relativity.

Parameters

v	velocity in km/s
-----	------------------

Returns

Redshift of object with speed in km/s

5.65.1.11 `z_to_v()`

```
def skdiscovery.utilities.astro_tools.z_to_v (  
    z )
```

Convert redshift to km/s assuming shift is due to velocity using special relativity.

Parameters

z	Redshift
-----	----------

Returns

speed in km/s assuming shift is due to motion using special relativity

5.66 `skdiscovery.utilities.config` Namespace Reference**Functions**

- def [getConfig](#) ()
- def [writeConfigValue](#) (section, key, value)
- def [getDispyPassword](#) ()
- def [getHostName](#) ()

5.66.1 Function Documentation**5.66.1.1 `getConfig()`**

```
def skdiscovery.utilities.config.getConfig ( )
```

Retrieve skdiscovery configuration.

Returns

skdiscovery configparser

5.66.1.2 getDispyPassword()

```
def skdiscovery.utilities.config.getDispyPassword ( )
```

Get dispy password.

Returns

dispy password

5.66.1.3 getHostName()

```
def skdiscovery.utilities.config.getHostName ( )
```

Get Host name for displaying link to dispy status.

Returns

Hostname

5.66.1.4 writeConfigValue()

```
def skdiscovery.utilities.config.writeConfigValue (
    section,
    key,
    value )
```

Write config to disk.

Parameters

<i>section</i>	Name of section
<i>key</i>	Name of key
<i>value</i>	Value to write

5.67 skdiscovery.utilities.kalman_smoother Namespace Reference

Functions

- def [KalmanFilter](#) (in_data, t, sigma_sq, R, Pinit, x0=0, invert=False, clipping=5)
- def [FitFOGMPParameters](#) (data, Pinit=100, R=1, method='brute', x0=0, clipping=5)
- def [IterativeGridSearch](#) (f, args, intervals, max_iter=50, tol=0.1, bounds=None, prev_minimum=None, verbose=False)

- def [KalmanSmoother](#) (in_data, Pinit=1e6, Restimate=1, clipping=5, method='simple', t=None, sigma_sq=None, R=1, verbose=False, max_clip_iter=10)
- def [FOGM](#) (size, t, sigma_sq, R)

5.67.1 Function Documentation

5.67.1.1 FitFOGMPParameters()

```
def skdiscovery.utilities.kalman_smoother.FitFOGMPParameters (
    data,
    Pinit = 100,
    R = 1,
    method = 'brute',
    x0 = 0,
    clipping = 5 )
```

Find best FOGM parameters for a given data set.

Parameters

<i>data</i>	input data
<i>Pinit</i>	Initial updated covariance
<i>R</i>	Noise Variance
<i>method</i>	Method used to fit FOGM parameters. Use "simple", "brute", or "igrid".
<i>x0</i>	Initial value of x0 to use in the kalman filter
<i>clipping</i>	Clipping factor used when computing cost functions

Returns

best fit correlation time
 FOGM variance
 Noise variance
 correlation time from L
 FOGM variance from Chat

5.67.1.2 FOGM()

```
def skdiscovery.utilities.kalman_smoother.FOGM (
    size,
    t,
    sigma_sq,
    R )
```

Generates data from a First Order Gaussian-Markov process.

Parameters

<i>size</i>	Number of data points
<i>t</i>	Correlation time
<i>sigma_sq</i>	FOGM variance
<i>R</i>	Measurement variance

Returns

Data generated from a FOGM

5.67.1.3 IterativeGridSearch()

```
def skdiscovery.utilities.kalman_smoother.IterativeGridSearch (
    f,
    args,
    intervals,
    max_iter = 50,
    tol = 0.1,
    bounds = None,
    prev_minimum = None,
    verbose = False )
```

Find the minimum of f using an iterative grid search with 3 points per dimension.

Parameters

<i>f</i>	Function to be minimized. The function must accept a tuple with coordinates for the first input.
<i>args</i>	additional arguments to pass on to the function.
<i>intervals</i>	Space that contains the minimum. Must be a list of tuples, even if only 1 dimension.
<i>max_iter</i>	Maximum number of iterations before stopping search.
<i>tol</i>	Error tolerance on result.
<i>bounds</i>	Additional set of bounds for ending search.
<i>prev_minimum</i>	Previous minimum of function. If the current minimum is close to the previous minimum the search will stop
<i>verbose</i>	Output debugging information.

Returns

A tuple containing a numpy array with the location of the minimum; and the minimum value of the function.

5.67.1.4 KalmanFilter()

```
def skdiscovery.utilities.kalman_smoother.KalmanFilter (
    in_data,
```

```

    t,
    sigma_sq,
    R,
    Pinit,
    x0 = 0,
    invert = False,
    clipping = 5 )

```

Runs the kalman filter on data.

Parameters

<i>in_data</i>	Input data
<i>t</i>	Correlation time
<i>sigma_sq</i>	FOGM variance
<i>R</i>	Noise variance
<i>Pinit</i>	Initial variance
<i>x0</i>	Intial updated state (default: 0)
<i>invert</i>	Run the filter backwards (boolean flag)
<i>clipping</i>	Clipping factor to use when computing cost functions

Returns

the predicted state
 the predicted covariance
 the updated state
 the updated covariance
 C_hat, the sample innovation variance
 L, a different log variance cost function

5.67.1.5 KalmanSmoother()

```

def skdiscovery.utilities.kalman_smoother.KalmanSmoother (
    in_data,
    Pinit = 1e6,
    Restimate = 1,
    clipping = 5,
    method = 'simple',
    t = None,
    sigma_sq = None,
    R = 1,
    verbose = False,
    max_clip_iter = 10 )

```

Smoother based on a forward and a backward kalman filter.

Parameters

<i>in_data</i>	Data to be smoothed (must be in a Pandas DataFrame)
----------------	---

Parameters

<i>Pinit</i>	Initial updated covariance
<i>Restimate</i>	Initial estimate for noise variance
<i>clipping</i>	Iteratively remove points beyond clipping * MSE.
<i>method</i>	Method used to fit FOGM parameters. Use either "simple", "brute", or "igrid".
<i>t</i>	Fixed correlation time to use. Both sigma_sq and R must also be specified.
<i>sigma_sq</i>	Fixed sigma squared to use. Both t and R must also be specified.
<i>R</i>	Fixed measurement error to use Both t and sigma_sq must also be specified.
<i>verbose</i>	Output additional information.
<i>max_clip_iter</i>	Maximum number of clip iterations.

Returns

values smoothed by the kalman smoother
 associated variance of smoothed result
 t, same as input, might have been altered by fitting parameters
 sigma_sq, same as input, might have been altered by fitting parameters
 R, same as input, might have been altered by fitting parameters

5.68 skdiscovery.utilities.pbo_tools Namespace Reference

Functions

- def [mogi](#) (xdata, lat, lon, source_depth, amplitude)
- def [finite_sphere](#) (xdata, lat, lon, source_depth, amplitude, alpha_rad)
- def [closed_pipe](#) (xdata, lat, lon, source_depth, amplitude, pipe_delta)
- def [constant_open_pipe](#) (xdata, lat, lon, source_depth, amplitude, pipe_delta)
- def [rising_open_pipe](#) (xdata, lat, lon, source_depth, amplitude, pipe_delta, open_pipe_top)
- def [sill](#) (xdata, lat, lon, source_depth, amplitude)
- def [dirEigenvectors](#) (coord_list, pca_comps, pdir='H')
- def [datetimeToNumber](#) (in_time)

5.68.1 Function Documentation

5.68.1.1 closed_pipe()

```

def skdiscovery.utilities.pbo_tools.closed_pipe (
    xdata,
    lat,
    lon,
    source_depth,
    amplitude,
    pipe_delta )

```

5.68.1.2 constant_open_pipe()

```
def skdiscovery.utilities.pbo_tools.constant_open_pipe (
    xdata,
    lat,
    lon,
    source_depth,
    amplitude,
    pipe_delta )
```

5.68.1.3 datetimeToNumber()

```
def skdiscovery.utilities.pbo_tools.datetimeToNumber (
    in_time )
```

Converts input pandas Timestamp or pandas DatetimeIndex to unix time.

Parameters

<i>in_time</i>	Input pandas timestamp or pandas DatetimeIndex
----------------	--

Returns

unix time

5.68.1.4 dirEigenvectors()

```
def skdiscovery.utilities.pbo_tools.dirEigenvectors (
    coord_list,
    pca_comps,
    pdir = 'H' )
```

5.68.1.5 finite_sphere()

```
def skdiscovery.utilities.pbo_tools.finite_sphere (
    xdata,
    lat,
    lon,
    source_depth,
    amplitude,
    alpha_rad )
```

5.68.1.6 mogi()

```
def skdiscovery.utilities.pbo_tools.mogi (
    xdata,
    lat,
    lon,
    source_depth,
    amplitude )
```

Compute the surface deformation due to changes in a mogi source.

Parameters

<i>xdata</i>	List of the position data with each array element containing [direction (x, y, or z), lat, lon]
<i>lat</i>	Latitude of source
<i>lon</i>	Longitude of source
<i>source_depth</i>	Depth of source
<i>amplitude</i>	Amplitude of mogi source

Returns

list of resulting deformation for each point in xdata

5.68.1.7 rising_open_pipe()

```
def skdiscovery.utilities.pbo_tools.rising_open_pipe (
    xdata,
    lat,
    lon,
    source_depth,
    amplitude,
    pipe_delta,
    open_pipe_top )
```

5.68.1.8 sill()

```
def skdiscovery.utilities.pbo_tools.sill (
    xdata,
    lat,
    lon,
    source_depth,
    amplitude )
```

5.69 skdiscovery.utilities.random_walks Namespace Reference

Functions

- def [uniform_walk](#) (pos, grid, step_size=None)
- def [gaussian_walk](#) (pos, grid, step_size=None)
- def [keep_in_bound](#) (pos, grid)

5.69.1 Function Documentation

5.69.1.1 [gaussian_walk\(\)](#)

```
def skdiscovery.utilities.random_walks.gaussian_walk (
    pos,
    grid,
    step_size = None )
```

A gaussian random walk function.

Parameters

<i>pos</i>	tuple of input point
<i>grid</i>	bounds for walk
<i>step_size</i>	maximal step size

Returns

position tuple

5.69.1.2 [keep_in_bound\(\)](#)

```
def skdiscovery.utilities.random_walks.keep_in_bound (
    pos,
    grid )
```

Function for truncating and bounding the random walk to within the defined grid.

Parameters

<i>pos</i>	tuple of the point to be checked
<i>grid</i>	the bounds for limiting the walk

Returns

position tuple after bounding the point

5.69.1.3 uniform_walk()

```
def skdiscovery.utilities.random_walks.uniform_walk (
    pos,
    grid,
    step_size = None )
```

A uniform random walk function.

Parameters

<i>pos</i>	tuple of input point
<i>grid</i>	bounds for walk
<i>step_size</i>	maximal step size

Returns

position tuple

5.70 skdiscovery.utilities.spherical_voronoi Namespace Reference**Functions**

- def [sphericalToXYZ](#) (lat, lon, radius=1)
- def [xyzToSpherical](#) (x, y, z)
- def [find_match](#) (region_index, region_list)
- def [getVoronoiCollection](#) (data, lat_name, lon_name, bmap=None, v_name=None, full_sphere=False, max_v=.3, min_v=-0.3, cmap=matplotlib.cm.get_cmap("jet"))

5.70.1 Function Documentation**5.70.1.1 find_match()**

```
def skdiscovery.utilities.spherical_voronoi.find_match (
    region_index,
    region_list )
```

Find neighboring regions.

Parameters

<i>region_index</i>	Numeric index of region to find matches for (number between 0 and len(vertices))
<i>region_list</i>	list of lists of vertices that define regions

Returns

Numeric indices of regions that border the region specified by region_index

5.70.1.2 getVoronoiCollection()

```
def skdiscovery.utilities.spherical_voronoi.getVoronoiCollection (
    data,
    lat_name,
    lon_name,
    bmap = None,
    v_name = None,
    full_sphere = False,
    max_v = .3,
    min_v = -0.3,
    cmap = matplotlib.cm.get_cmap('jet') )
```

Perform a Spherical Voronoi Tessellation on the input data.

In the case where the data is restricted to one part of the globe, a polygon will not be returned for all objects, as matplotlib polygons won't be able to stretch over half the globe.

Parameters

<i>data</i>	Input pandas data frame
<i>lat_name</i>	Name of latitude column
<i>lon_name</i>	Name of longitude column
<i>bmap</i>	Basemap instance used to convert from lat, lon coordinates to projection coordinates
<i>v_name</i>	Name of value column. Use this to color each cell according to a value.
<i>full_sphere</i>	Set to true if the data spans the entire globe. If false, a fictional point is created during tessellation and removed later to work around issues when polygons are suppose to span the over half the globe.
<i>max_v</i>	Specify a maximum value to use when assigning values to the tessellation
<i>min_v</i>	Specify a minimum value to use when assigning values to the tessellation
<i>cmap</i>	Matplotlib color map to use

Returns

Matplotlib patch collection of tessellation, scipy.spatial.SphericalVoronoi object, integer index of objects in patch collection.

5.70.1.3 sphericalToXYZ()

```
def skdiscovery.utilities.spherical_voronoi.sphericalToXYZ (
    lat,
    lon,
    radius = 1 )
```

Convert spherical coordinates to x,y,z.

Parameters

<i>lat</i>	Latitude, scalar or array
<i>lon</i>	Longitude, scalar or array
<i>radius</i>	Sphere's radius

Returns

Numpy array of x,y,z coordinates

5.70.1.4 xyzToSpherical()

```
def skdiscovery.utilities.spherical_voronoi.xyzToSpherical (
    x,
    y,
    z )
```

Convert x,y,z to spherical coordinates.

Parameters

<i>x</i>	Cartesian coordinate x
<i>y</i>	Cartesian coordinate y
<i>z</i>	Cartesian coordinate z

Returns

numpy array of latitude,longitude, and radius

5.71 skdiscovery.utilities.ssh_reverse Namespace Reference

Classes

- class [ReverseTunnel](#)

Functions

- def [print_verbose](#) (s, verbose=False)
- def [handler](#) (chan, host, port, verbose=False)
- def [reverse_forward_tunnel](#) (server_port, remote_host, remote_port, transport, check=30, verbose=False)

5.71.1 Function Documentation

5.71.1.1 handler()

```
def skdiscovery.utilities.ssh_reverse.handler (
    chan,
    host,
    port,
    verbose = False )
```

Handler is responsible for sending and receiving data through ssh tunnel.

Parameters

<i>chan</i>	SSH Channel for transferring data
<i>host</i>	Address of remote host
<i>port</i>	Port to forward
<i>verbose</i>	Print status information

5.71.1.2 print_verbose()

```
def skdiscovery.utilities.ssh_reverse.print_verbose (
    s,
    verbose = False )
```

Print statement if verbose is True.

Parameters

<i>s</i>	Statement to print
<i>verbose</i>	Print only if verbose is True

5.71.1.3 reverse_forward_tunnel()

```
def skdiscovery.utilities.ssh_reverse.reverse_forward_tunnel (
    server_port,
    remote_host,
    remote_port,
```



```

    transport,
    check = 30,
    verbose = False )

```

Creates a reverse ssh tunnel.

Parameters

<i>server_port</i>	Port on local host
<i>remote_host</i>	Address of remote host
<i>remote_port</i>	Port of remote host
<i>transport</i>	SSH Transport
<i>check</i>	Amount of time to wait in seconds when opening up a channel
<i>verbose</i>	Print status information

Returns

Thread running reverse ssh tunnel, event used to close ssh tunnel, list of child threads started by main thread

5.72 skdiscovery.utilities.trendTools Namespace Reference

Functions

- def [getTrend](#) (xdata)
- def [sinuFits](#) (xdata, fitN=2, rmve=1)
- def [interpNaN](#) (data)
- def [medianFilter](#) (data, window, interpolate=True)

5.72.1 Function Documentation

5.72.1.1 [getTrend\(\)](#)

```

def skdiscovery.utilities.trendTools.getTrend (
    xdata )

```

5.72.1.2 [interpNaN\(\)](#)

```

def skdiscovery.utilities.trendTools.interpNaN (
    data )

```

5.72.1.3 [medianFilter\(\)](#)

```

def skdiscovery.utilities.trendTools.medianFilter (
    data,
    window,
    interpolate = True )

```

5.72.1.4 sinuFits()

```
def skdiscovery.utilities.trendTools.sinuFits (
    xdata,
    fitN = 2,
    rmve = 1 )
```

5.73 skdiscovery.visualization Namespace Reference

Namespaces

- [multi_ca_plot](#)
- [multi_dist](#)

5.74 skdiscovery.visualization.multi_ca_plot Namespace Reference

Functions

- def [multiCaPlot](#) (pipeline, mogiFlag=False, offset=.15, direction='H', pca_comp=0, scaleFactor=2.5, map_res='i')

5.74.1 Function Documentation

5.74.1.1 multiCaPlot()

```
def skdiscovery.visualization.multiCaPlot (
    pipeline,
    mogiFlag = False,
    offset = .15,
    direction = 'H',
    pca_comp = 0,
    scaleFactor = 2.5,
    map_res = 'i' )
```

The multiCaPlot function generates a geographic eigenvector plot of several pipeline runs.

This function plots multiple pipeline runs over perturbed pipeline parameters. The various perturbations are plotted more transparently (alpha=.5), while the median eigen_vector and Mogi inversion are plotted in solid blue and red

Parameters

<i>pipeline</i>	The pipeline object with multiple runs
<i>mogiFlag</i>	Flag to indicate plotting the Mogi source as well as the PCA
<i>offset</i>	Offset for padding the corners of the generated map
<i>direction</i>	Indicates the eigenvectors to plot. Only Horizontal component is currently supported ('H')
<i>pca_comp</i>	Choose the PCA component to use (integer)
<i>scaleFactor</i>	Size of the arrow scaling factor

5.75 skdiscovery.visualization.multi_dist Namespace Reference

Functions

- def [calc_distance_map](#) (pipeline, ap_name, ca_name, ca_type, plotFlag=True, histIdx=False, fontsize=10)

Variables

- [font](#)

5.75.1 Function Documentation

5.75.1.1 [calc_distance_map\(\)](#)

```
def skdiscovery.visualization.calc_distance_map (  
    pipeline,  
    ap_name,  
    ca_name,  
    ca_type,  
    plotFlag = True,  
    histIdx = False,  
    fontsize = 10 )
```

5.75.2 Variable Documentation

5.75.2.1 [font](#)

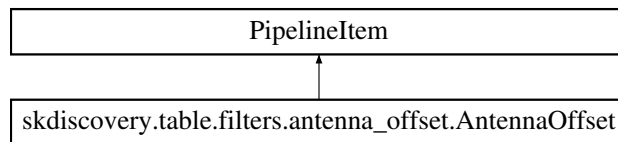
```
skdiscovery.visualization.font
```


Chapter 6

Class Documentation

6.1 skdiscovery.table.filters.antenna_offset.AntennaOffset Class Reference

Inheritance diagram for skdiscovery.table.filters.antenna_offset.AntennaOffset:



Public Member Functions

- def `__init__` (self, str_description, [antenna_data](#), [min_diff](#)=0.0, [column_list](#)=None)
- def [process](#) (self, obj_data)

Public Attributes

- [antenna_data](#)
- [column_list](#)
- [min_diff](#)

6.1.1 Detailed Description

Applies corrections to fix offsets in PBO GPS data induced by antenna changes.

6.1.2 Constructor & Destructor Documentation

6.1.2.1 `__init__()`

```
def skdiscovery.table.filters.antenna_offset.AntennaOffset.__init__ (
    self,
    str_description,
    antenna_data,
    min_diff = 0.0,
    column_list = None )
```

Initialize [AntennaOffset](#) function.

Parameters

<i>str_description</i>	String describing the filter
<i>antenna_data</i>	Data containing the log of antenna changes
<i>min_diff</i>	Difference in position needed to be considered an offset
<i>column_list</i>	Names of the columns to apply the function to

6.1.3 Member Function Documentation

6.1.3.1 `process()`

```
def skdiscovery.table.filters.antenna_offset.AntennaOffset.process (
    self,
    obj_data )
```

Applies the function to the data, updating in place.

Parameters

<i>obj_data</i>	Table data wrapper
-----------------	--------------------

6.1.4 Member Data Documentation

6.1.4.1 `antenna_data`

```
skdiscovery.table.filters.antenna_offset.AntennaOffset.antenna_data
```

6.1.4.2 `column_list`

```
skdiscovery.table.filters.antenna_offset.AntennaOffset.column_list
```

6.1.4.3 min_diff

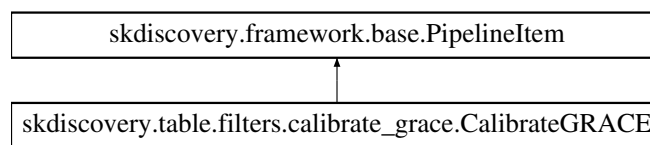
skdiscovery.table.filters.antenna_offset.AntennaOffset.min_diff

The documentation for this class was generated from the following file:

- table/filters/[antenna_offset.py](#)

6.2 skdiscovery.table.filters.calibrate_CalibrateGRACE Class Reference

Inheritance diagram for skdiscovery.table.filters.calibrate_CalibrateGRACE:



Public Member Functions

- def [__init__](#) (self, [str_description](#), [ewd_column_name](#)='EWD', [round_dates](#)=True)
- def [process](#) (self, obj_data)
- def [perturbParams](#) (self)
- def [resetParams](#) (self)
- def [__str__](#) (self)
- def [getMetadata](#) (self)

Public Attributes

- [ewd_column_name](#)
- [round_dates](#)
- [str_description](#)
- [ap_paramList](#)
- [ap_paramNames](#)

6.2.1 Constructor & Destructor Documentation

6.2.1.1 __init__()

```

def skdiscovery.table.filters.calibrate_CalibrateGRACE.__init__ (
    self,
    str_description,
    ewd_column_name = 'EWD',
    round_dates = True )

```

Initialize GRACE calibration filter.

Parameters

<i>str_description</i>	String describing filter
<i>ewd_column_name</i>	Name of new column for the calibrated GRACE data
<i>round_dates</i>	Option for rounding to dates to the nearest day

6.2.2 Member Function Documentation**6.2.2.1 __str__()**

```
def skdiscovery.framework.PipelineItem.__str__ (
    self ) [inherited]
```

String representation of object.

Returns

String listing all current parameters

6.2.2.2 getMetadata()

```
def skdiscovery.framework.PipelineItem.getMetadata (
    self ) [inherited]
```

Retrieve metadata about filter.

Returns

String containing the item description and current parameters for filter.

6.2.2.3 perturbParams()

```
def skdiscovery.framework.PipelineItem.perturbParams (
    self ) [inherited]
```

choose other random value for all parameters

6.2.2.4 process()

```
def skdiscovery.table.filters.calibrate_CalibrateGRACE.process (
    self,
    obj_data )
```

Calibrates GRACE, updating in place.

Parameters

<i>obj_data</i>	Table data wrapper
-----------------	--------------------

6.2.2.5 resetParams()

```
def skdiscovery.framework.PipelineItem.resetParams (
    self ) [inherited]
```

set all parameters to initial value

6.2.3 Member Data Documentation

6.2.3.1 ap_paramList

```
skdiscovery.framework.PipelineItem.ap_paramList [inherited]
```

6.2.3.2 ap_paramNames

```
skdiscovery.framework.PipelineItem.ap_paramNames [inherited]
```

6.2.3.3 ewd_column_name

```
skdiscovery.table.filters.calibrate_CalibrateGRACE.ewd_column_name
```

6.2.3.4 round_dates

```
skdiscovery.table.filters.calibrate_CalibrateGRACE.round_dates
```

6.2.3.5 str_description

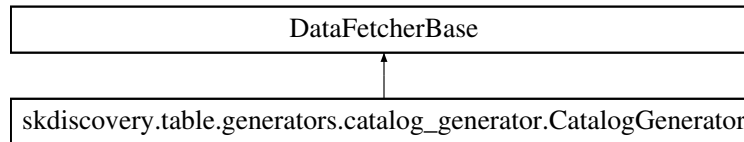
```
skdiscovery.framework.PipelineItem.str_description [inherited]
```

The documentation for this class was generated from the following file:

- [table/filters/calibrate_py](#)

6.3 skdiscovery.table.generators.catalog_generator.CatalogGenerator Class Reference

Inheritance diagram for skdiscovery.table.generators.catalog_generator.CatalogGenerator:



Public Member Functions

- `def __init__(self, ap_paramList, ra1, dec1, ra2, dec2, background_density, z)`
- `def output(self)`
- `def nfw_cumulative(self, R)`
- `def inverse_nfw_cumulative(self, p)`

Public Attributes

- `ra1`
- `dec1`
- `ra2`
- `dec2`
- `background_density`
- `z`

6.3.1 Detailed Description

Generates galaxy catalogs for use in DiscoveryPipeline.

6.3.2 Constructor & Destructor Documentation

6.3.2.1 __init__()

```

def skdiscovery.table.generators.catalog_generator.CatalogGenerator.__init__(
    self,
    ap_paramList,
    ra1,
    dec1,
    ra2,
    dec2,
    background_density,
    z )

```

Parameters

<i>ap_paramList[seed]</i>	Seed for random number generator
<i>ra1</i>	Left right ascension
<i>dec1</i>	Bottom declination
<i>ra2</i>	Right right ascension
<i>dec2</i>	Top declination
<i>background_density</i>	galaxy background density in galaxies/square degree
<i>z</i>	Redshift of galaxy cluster

6.3.3 Member Function Documentation

6.3.3.1 inverse_nfw_cumulative()

```
def skdiscovery.table.generators.catalog_generator.CatalogGenerator.inverse_nfw_cumulative (
    self,
    p )
```

inverse of radial nfw cumulative distribution

Parameters

<i>p</i>	Probability
----------	-------------

Returns

float: Radius corresponding to probability p

6.3.3.2 nfw_cumulative()

```
def skdiscovery.table.generators.catalog_generator.CatalogGenerator.nfw_cumulative (
    self,
    R )
```

Cumulative radial NFW distribution.

Parameters

<i>R</i>	Radius
----------	--------

Returns

float: Probability of being within R

6.3.3.3 output()

```
def skdiscovery.table.generators.catalog_generator.CatalogGenerator.output (
    self )
```

Generates galaxy catalog.

Returns

DataWrapper: Table data wrapper of galaxy catalog

6.3.4 Member Data Documentation

6.3.4.1 background_density

```
skdiscovery.table.generators.catalog_generator.CatalogGenerator.background_density
```

6.3.4.2 dec1

```
skdiscovery.table.generators.catalog_generator.CatalogGenerator.dec1
```

6.3.4.3 dec2

```
skdiscovery.table.generators.catalog_generator.CatalogGenerator.dec2
```

6.3.4.4 ra1

```
skdiscovery.table.generators.catalog_generator.CatalogGenerator.ra1
```

6.3.4.5 ra2

```
skdiscovery.table.generators.catalog_generator.CatalogGenerator.ra2
```

6.3.4.6 z

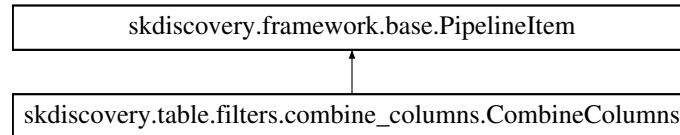
```
skdiscovery.table.generators.catalog_generator.CatalogGenerator.z
```

The documentation for this class was generated from the following file:

- table/generators/[catalog_generator.py](#)

6.4 skdiscovery.table.filters.combine_columns.CombineColumns Class Reference

Inheritance diagram for skdiscovery.table.filters.combine_columns.CombineColumns:



Public Member Functions

- `def __init__(self, str_description, column_1, column_2, new_column_name)`
- `def process(self, obj_data)`
- `def perturbParams(self)`
- `def resetParams(self)`
- `def __str__(self)`
- `def getMetadata(self)`

Public Attributes

- `column_1`
- `column_2`
- `new_column_name`
- `str_description`
- `ap_paramList`
- `ap_paramNames`

6.4.1 Constructor & Destructor Documentation

6.4.1.1 __init__()

```

def skdiscovery.table.filters.combine_columns.CombineColumns.__init__(
    self,
    str_description,
    column_1,
    column_2,
    new_column_name )
  
```

Initialize a `CombineColumns` object.

Parameters

<i>str_description</i>	String describing filter
<i>column_1</i>	Name of primary column
<i>column_2</i>	Name of secondary column to be used when data from the primary column is not available
<i>new_column_name</i>	Name of resulting column

Generated by Doxygen

6.4.2 Member Function Documentation

6.4.2.1 __str__()

```
def skdiscovery.framework.PipelineItem.__str__ (
    self ) [inherited]
```

String representation of object.

Returns

String listing all current parameters

6.4.2.2 getMetadata()

```
def skdiscovery.framework.PipelineItem.getMetadata (
    self ) [inherited]
```

Retrieve metadata about filter.

Returns

String containing the item description and current parameters for filter.

6.4.2.3 perturbParams()

```
def skdiscovery.framework.PipelineItem.perturbParams (
    self ) [inherited]
```

choose other random value for all parameters

6.4.2.4 process()

```
def skdiscovery.table.filters.combine_columns.CombineColumns.process (
    self,
    obj_data )
```

Apply combine column filter to data set, operating on the data_obj.

Parameters

<i>obj_data</i>	Table data wrapper.
-----------------	---------------------

6.4.2.5 resetParams()

```
def skdiscovery.framework.PipelineItem.resetParams (
    self ) [inherited]
```

set all parameters to initial value

6.4.3 Member Data Documentation

6.4.3.1 ap_paramList

```
skdiscovery.framework.PipelineItem.ap_paramList [inherited]
```

6.4.3.2 ap_paramNames

```
skdiscovery.framework.PipelineItem.ap_paramNames [inherited]
```

6.4.3.3 column_1

```
skdiscovery.table.filters.combine_columns.CombineColumns.column_1
```

6.4.3.4 column_2

```
skdiscovery.table.filters.combine_columns.CombineColumns.column_2
```

6.4.3.5 new_column_name

```
skdiscovery.table.filters.combine_columns.CombineColumns.new_column_name
```

6.4.3.6 str_description

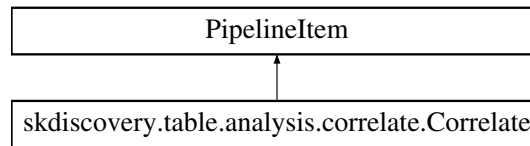
```
skdiscovery.framework.PipelineItem.str_description [inherited]
```

The documentation for this class was generated from the following file:

- [table/filters/combine_columns.py](#)

6.5 skdiscovery.table.analysis.Correlate Class Reference

Inheritance diagram for skdiscovery.table.analysis.Correlate:



Public Member Functions

- `def __init__(self, str_description, column_names=None, local_match=False, correlation_type='pearson')`
- `def process(self, obj_data)`

Public Attributes

- `column_names`
- `local_match`
- `corr_type`

6.5.1 Detailed Description

Computes the correlation for table data and stores the result as a matrix.

6.5.2 Constructor & Destructor Documentation

6.5.2.1 __init__()

```

def skdiscovery.table.analysis.Correlate.__init__(
    self,
    str_description,
    column_names = None,
    local_match = False,
    correlation_type = 'pearson' )
  
```

Initialize `Correlate` analysis item for use on tables.

Parameters

<i>str_description</i>	String describing analysis item
<i>column_names</i>	List of column names to correlate
<i>local_match</i>	Only correlate data on the same frames
<i>correlation_type</i>	Type of correlation to be passed to pandas ('pearson', 'kendall', 'spearman')

6.5.3 Member Function Documentation

6.5.3.1 process()

```
def skdiscovery.table.analysis.Correlate.process (
    self,
    obj_data )
```

Computes the correlation between columns and stores the results in obj_

Parameters

<i>obj_data</i>	Data wrapper
-----------------	--------------

6.5.4 Member Data Documentation

6.5.4.1 column_names

```
skdiscovery.table.analysis.Correlate.column_names
```

6.5.4.2 corr_type

```
skdiscovery.table.analysis.Correlate.corr_type
```

6.5.4.3 local_match

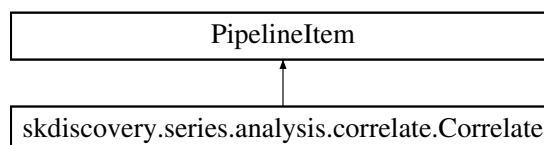
```
skdiscovery.table.analysis.Correlate.local_match
```

The documentation for this class was generated from the following file:

- table/analysis/[correlate.py](#)

6.6 skdiscovery.series.analysis.Correlate Class Reference

Inheritance diagram for skdiscovery.series.analysis.Correlate:



Public Member Functions

- `def __init__ (self, str_description, labels=None, column_names=None)`
- `def process (self, obj_data)`

Public Attributes

- `labels`
- `column_names`

6.6.1 Detailed Description

Computes the correlation for series data.

Stores the result as a matrix

6.6.2 Constructor & Destructor Documentation

6.6.2.1 __init__()

```
def skdiscovery.series.analysis.Correlate.__init__ (
    self,
    str_description,
    labels = None,
    column_names = None )
```

Initialize `Correlate` analysis item.

Parameters

<i>str_description</i>	String describing analysis item
<i>labels</i>	List of labels used to select data
<i>column_names</i>	List of column names used to select data

6.6.3 Member Function Documentation

6.6.3.1 process()

```
def skdiscovery.series.analysis.Correlate.process (
    self,
    obj_data )
```

6.6.4 Member Data Documentation

6.6.4.1 column_names

`skdiscovery.series.analysis.Correlate.column_names`

6.6.4.2 labels

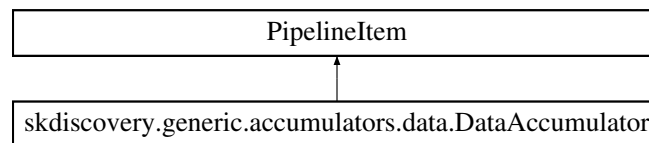
`skdiscovery.series.analysis.Correlate.labels`

The documentation for this class was generated from the following file:

- `series/analysis/correlate.py`

6.7 skdiscovery.generic.accumulators.DataAccumulator Class Reference

Inheritance diagram for `skdiscovery.generic.accumulators.DataAccumulator`:



Public Member Functions

- `def process (self, obj_data)`

6.7.1 Detailed Description

Stores a copy of the data in its current state in the pipeline.

6.7.2 Member Function Documentation

6.7.2.1 process()

```
def skdiscovery.generic.accumulators.DataAccumulator.process (
    self,
    obj_data )
```

Store a copy of the data in the object wrapper results.

Parameters

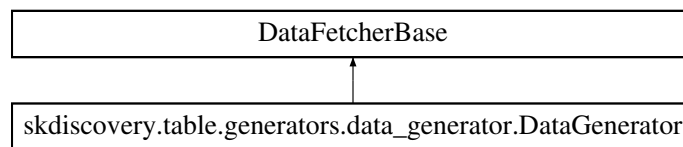
<i>obj_data</i>	Data Wrapper to be copied
-----------------	---------------------------

The documentation for this class was generated from the following file:

- generic/accumulators/[data.py](#)

6.8 skdiscovery.table.generators.data_generator.DataGenerator Class Reference

Inheritance diagram for skdiscovery.table.generators.data_generator.DataGenerator:



Public Member Functions

- def `__init__`(self, [length](#), [args](#), [seed](#)=None, [final_function](#)=None)
- def [output](#)(self)

Public Attributes

- [length](#)
- [seed](#)
- [args](#)
- [final_function](#)

6.8.1 Detailed Description

Class for generating random data.

6.8.2 Constructor & Destructor Documentation

6.8.2.1 `__init__()`

```
def skdiscovery.table.generators.data_generator.DataGenerator.__init__ (
    self,
    length,
    args,
    seed = None,
    final_function = None )
```

Initialize Random data generator.

Parameters

<i>length</i>	Number of rows to generate
---------------	----------------------------

6.8.3 Member Function Documentation

6.8.3.1 output()

```
def skdiscovery.table.generators.data_generator.DataGenerator.output (
    self )
```

6.8.4 Member Data Documentation

6.8.4.1 args

```
skdiscovery.table.generators.data_generator.DataGenerator.args
```

6.8.4.2 final_function

```
skdiscovery.table.generators.data_generator.DataGenerator.final_function
```

6.8.4.3 length

```
skdiscovery.table.generators.data_generator.DataGenerator.length
```

6.8.4.4 seed

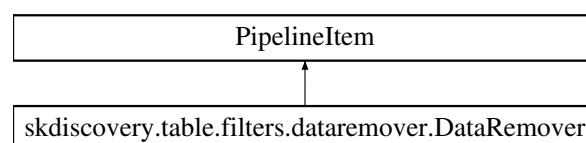
```
skdiscovery.table.generators.data_generator.DataGenerator.seed
```

The documentation for this class was generated from the following file:

- table/generators/[data_generator.py](#)

6.9 skdiscovery.table.filters.DataRemover Class Reference

Inheritance diagram for skdiscovery.table.filters.DataRemover:



Public Member Functions

- `def __init__ (self, str_description, column_names, start=None, end=None, labels=None)`
- `def process (self, obj_data)`

Public Attributes

- `labels`
- `column_names`
- `start`
- `end`

6.9.1 Detailed Description

Sets specified table data to NaN.

6.9.2 Constructor & Destructor Documentation

6.9.2.1 __init__()

```
def skdiscovery.table.filters.DataRemover.__init__ (
    self,
    str_description,
    column_names,
    start = None,
    end = None,
    labels = None )
```

Initialize [DataRemover](#).

Parameters

<i>str_description</i>	String describing filter column_names: List of column names to select data to be removed (using None will apply to all columns)
<i>start</i>	Starting index value
<i>end</i>	Ending index value (inclusive)
<i>labels</i>	List of labels used to select data to be removed (using None will apply to all labels)

6.9.3 Member Function Documentation

6.9.3.1 process()

```
def skdiscovery.table.filters.DataRemover.process (
    self,
    obj_data )
```

NaN's data from DataWrapper.

Parameters

<i>obj_data</i>	Input DataWrapper, will be modified in place
-----------------	--

6.9.4 Member Data Documentation

6.9.4.1 column_names

```
skdiscovery.table.filters.DataRemover.column_names
```

6.9.4.2 end

```
skdiscovery.table.filters.DataRemover.end
```

6.9.4.3 labels

```
skdiscovery.table.filters.DataRemover.labels
```

6.9.4.4 start

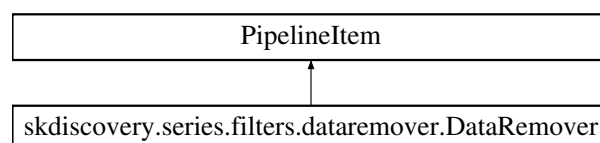
```
skdiscovery.table.filters.DataRemover.start
```

The documentation for this class was generated from the following file:

- table/filters/[dataremover.py](#)

6.10 skdiscovery.series.filters.DataRemover Class Reference

Inheritance diagram for skdiscovery.series.filters.DataRemover:



Public Member Functions

- `def __init__ (self, str_description, start=None, end=None, labels=None, column_names=None)`
- `def process (self, obj_data)`

Public Attributes

- `labels`
- `column_names`
- `start`
- `end`

6.10.1 Detailed Description

Sets specified series data to NaN.

6.10.2 Constructor & Destructor Documentation

6.10.2.1 __init__()

```
def skdiscovery.series.filters.DataRemover.__init__ (
    self,
    str_description,
    start = None,
    end = None,
    labels = None,
    column_names = None )
```

Initialize [DataRemover](#).

Parameters

<i>str_description</i>	String describing filter
<i>start</i>	Starting index value
<i>end</i>	Ending index value (inclusive)
<i>labels</i>	List of labels used to select data to be removed (None will operate on all labels)
<i>column_names</i>	List of column names to select data to be removed (None will operate on all columns)

6.10.3 Member Function Documentation

6.10.3.1 process()

```
def skdiscovery.series.filters.DataRemover.process (
    self,
    obj_data )
```


NaN's data from DataWrapper.

Parameters

<i>obj_data</i>	Input DataWrapper, which will be modified in place
-----------------	--

6.10.4 Member Data Documentation

6.10.4.1 column_names

```
skdiscovery.series.filters.DataRemover.column_names
```

6.10.4.2 end

```
skdiscovery.series.filters.DataRemover.end
```

6.10.4.3 labels

```
skdiscovery.series.filters.DataRemover.labels
```

6.10.4.4 start

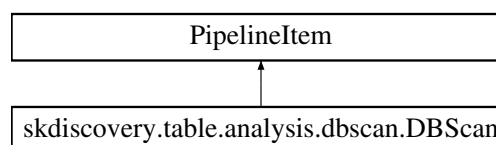
```
skdiscovery.series.filters.DataRemover.start
```

The documentation for this class was generated from the following file:

- series/filters/[dataremoover.py](#)

6.11 skdiscovery.table.analysis.dbscan.DBScan Class Reference

Inheritance diagram for skdiscovery.table.analysis.dbscan.DBScan:



Public Member Functions

- def `__init__` (self, str_description, ap_paramList, [column_names](#))
- def [process](#) (self, obj_data)

Public Attributes

- [column_names](#)

6.11.1 Detailed Description

Runs [DBScan](#) on table data.

Adds cluster information column to data

6.11.2 Constructor & Destructor Documentation

6.11.2.1 `__init__()`

```
def skdiscovery.table.analysis.dbscan.DBScan.__init__ (
    self,
    str_description,
    ap_paramList,
    column_names )
```

Initialize [DBScan](#) pipeline item.

Parameters

<i>str_description</i>	Description of item
<i>ap_paramList[epsilon]</i>	Distance between two nodes for them to be considered connected
<i>ap_paramList[min_points]</i>	Minimum number of points for a cluster
<i>column_names</i>	List of column names to use

6.11.3 Member Function Documentation

6.11.3.1 `process()`

```
def skdiscovery.table.analysis.dbscan.DBScan.process (
    self,
    obj_data )
```

Run [DBScan](#) on data.

Stores result in data wrapper

```
@param obj_data: Data wrapper to be processed
```

6.11.4 Member Data Documentation

6.11.4.1 column_names

`skdiscovery.table.analysis.dbscan.DBScan.column_names`

The documentation for this class was generated from the following file:

- [table/analysis/dbscan.py](#)

6.12 skdiscovery.DiscoveryPipeline Class Reference

Public Member Functions

- `def __init__ (self, data_fetcher, list_StageContainers)`
- `def run (self, num_runs=1, perturb_data=False, num_cores=1, amazon=False, verbose=False)`
- `def perturb (self)`
- `def reset (self)`
- `def getMetadata (self)`
- `def getMetadataHistory (self)`
- `def perturbData (self)`
- `def getResults (self, index=None)`
- `def resultIter (self)`
- `def plotPipelineInstance (self)`
- `def plotPipelineStructure (self)`
- `def getMetadataNestedTypes (self)`
- `def getMetadataNestedGraph (self)`
- `def __str__ (self)`

Public Attributes

- [stage_containers](#)
- [data_fetcher](#)
- [stageConfigurationHistory](#)
- [RA_results](#)

6.12.1 Detailed Description

Pipeline for running the analysis.

6.12.2 Constructor & Destructor Documentation

6.12.2.1 __init__()

```
def skdiscovery.DiscoveryPipeline.__init__ (
    self,
    data_fetcher,
    list_StageContainers )
```

Initialize a new pipeline.

Parameters

<i>data_fetcher</i>	Data fetcher to use as a data source (from skdaccess)
<i>list_StageContainers</i>	List of stage containers

6.12.3 Member Function Documentation**6.12.3.1 __str__()**

```
def skdiscovery.DiscoveryPipeline.__str__ (
    self )
```

String representation of the pipeline.

Returns

String of current metadata of pipeline containers.

6.12.3.2 getMetadata()

```
def skdiscovery.DiscoveryPipeline.getMetadata (
    self )
```

Retrieve Metadata from stage containers.

Returns

list of metadata for the current run

6.12.3.3 getMetadataHistory()

```
def skdiscovery.DiscoveryPipeline.getMetadataHistory (
    self )
```

Get the metadata for each run in the pipeline.

Returns

list of metadata configurations for all runs

6.12.3.4 getMetadataNestedGraph()

```
def skdiscovery.DiscoveryPipeline.getMetadataNestedGraph (
    self )
```

Retrieve the metadata nested graph.

Returns

String: Metadata nested graph

6.12.3.5 getMetadataNestedTypes()

```
def skdiscovery.DiscoveryPipeline.getMetadataNestedTypes (
    self )
```

Get the Metadata Nested Types.

Returns

String: Metadata Nested types

6.12.3.6 getResults()

```
def skdiscovery.DiscoveryPipeline.getResults (
    self,
    index = None )
```

Return results from previous runs.

Parameters

<i>index</i>	Index of run. If None, return all previous results
--------------	--

Returns

results from a run at index. If index=None, returns list of all results

6.12.3.7 perturb()

```
def skdiscovery.DiscoveryPipeline.perturb (
    self )
```

Perturb the paramters in the stage containers.

6.12.3.8 perturbData()

```
def skdiscovery.DiscoveryPipeline.perturbData (
    self )
```

Perturb the input data.

6.12.3.9 plotPipelineInstance()

```
def skdiscovery.DiscoveryPipeline.plotPipelineInstance (
    self )
```

Plot current instance of pipeline stages with metadata.

Returns

iPython display object

6.12.3.10 plotPipelineStructure()

```
def skdiscovery.DiscoveryPipeline.plotPipelineStructure (
    self )
```

Plot pipeline structure.

Returns

iPython display object

6.12.3.11 reset()

```
def skdiscovery.DiscoveryPipeline.reset (
    self )
```

Reset the stage containers to their default values and clear previous runs.

6.12.3.12 resultIter()

```
def skdiscovery.DiscoveryPipeline.resultIter (
    self )
```

Retrieves and iterator to the results and history of the pipeline.

Returns

A 2 component iterator to the results and history of previous runs

6.12.3.13 run()

```
def skdiscovery.DiscoveryPipeline.run (
    self,
    num_runs = 1,
    perturb_data = False,
    num_cores = 1,
    amazon = False,
    verbose = False )
```

Run the pipeline.

Parameters

<i>num_runs</i>	Number of times to run the pipeline
<i>perturb_data</i>	Boolean flag. If running the pipeline multiple times then perturb the data instead of the pipeline
<i>num_cores</i>	Number of cores on the local machine to use. Defaults to 1 core. Use 0 to select the minimum between the number of runs and cpu cores.
<i>amazon</i>	Offload the pipeline on amazon
<i>verbose</i>	Display the pipeline for each run

6.12.4 Member Data Documentation

6.12.4.1 data_fetcher

```
skdiscovery.DiscoveryPipeline.data_fetcher
```

6.12.4.2 RA_results

```
skdiscovery.DiscoveryPipeline.RA_results
```

6.12.4.3 stage_containers

```
skdiscovery.DiscoveryPipeline.stage_containers
```

6.12.4.4 stageConfigurationHistory

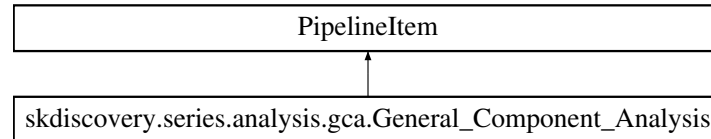
```
skdiscovery.DiscoveryPipeline.stageConfigurationHistory
```

The documentation for this class was generated from the following file:

- framework/[discoverypipeline.py](#)

6.13 skdiscovery.series.analysis.General_Component_Analysis Class Reference

Inheritance diagram for skdiscovery.series.analysis.General_Component_Analysis:



Public Member Functions

- def `__init__` (self, `str_description`, `ap_paramList`)
- def `process` (self, `obj_data`)

Public Attributes

- `str_description`
- `ap_paramList`
- `ap_paramNames`
- `results`

6.13.1 Detailed Description

Performs either ICA or PCA analysis on series data.

6.13.2 Constructor & Destructor Documentation

6.13.2.1 `__init__`()

```
def skdiscovery.series.analysis.General_Component_Analysis.__init__ (
    self,
    str_description,
    ap_paramList )
```

Initialize Analysis object.

Parameters

<code>str_description</code>	String description of analysis
<code>ap_paramList[num_components]</code>	Number of components
<code>ap_paramList[component_type]</code>	Type of component analysis (CA); either PCA or ICA
<code>ap_paramList[start_time]</code>	Starting time for CA
<code>ap_paramList[end_time]</code>	ending time for CA
<code>ap_paramList[labels]</code>	Optional list of label names

6.13.3 Member Function Documentation

6.13.3.1 process()

```
def skdiscovery.series.analysis.General_Component_Analysis.process (
    self,
    obj_data )
```

Perform component analysis on data:

Results are added to the data wrapper as a dictionary with results['CA'] = Eigenvenctors results['Projection'] = Projection on to the eigenvectors

Parameters

<i>obj_data</i>	Data wrapper containing the data
-----------------	----------------------------------

6.13.4 Member Data Documentation

6.13.4.1 ap_paramList

```
skdiscovery.series.analysis.General_Component_Analysis.ap_paramList
```

6.13.4.2 ap_paramNames

```
skdiscovery.series.analysis.General_Component_Analysis.ap_paramNames
```

6.13.4.3 results

```
skdiscovery.series.analysis.General_Component_Analysis.results
```

6.13.4.4 str_description

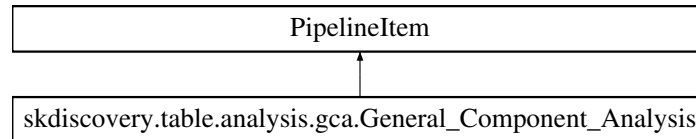
```
skdiscovery.series.analysis.General_Component_Analysis.str_description
```

The documentation for this class was generated from the following file:

- [series/analysis/gca.py](#)

6.14 skdiscovery.table.analysis.General_Component_Analysis Class Reference

Inheritance diagram for skdiscovery.table.analysis.General_Component_Analysis:



Public Member Functions

- `def __init__(self, str_description, ap_paramList, n_components, column_names)`
- `def process(self, obj_data)`

Public Attributes

- `str_description`
- `ap_paramList`
- `ap_paramNames`
- `n_components`
- `column_names`
- `results`

6.14.1 Constructor & Destructor Documentation

6.14.1.1 __init__()

```

def skdiscovery.table.analysis.General_Component_Analysis.__init__(
    self,
    str_description,
    ap_paramList,
    n_components,
    column_names )
  
```

Initialize Analysis object.

Parameters

<i>str_description</i>	String description of analysis
<i>ap_paramList[component_type]</i>	Type of CA; either PCA or ICA
<i>ap_paramList[start_time]</i>	Starting time for CA
<i>ap_paramList[end_time]</i>	ending time for CA
<i>n_components</i>	Number of components to compute
<i>column_names</i>	Columns names to use

6.14.2 Member Function Documentation

6.14.2.1 process()

```
def skdiscovery.table.analysis.General_Component_Analysis.process (
    self,
    obj_data )
```

Perform component analysis on data.

Results are added to the data wrapper as a dictionary with results['CA'] = Eigenvenctors results['Projection'] = Projection on to the eigenvectors

Parameters

<i>obj_data</i>	Data wrapper
-----------------	--------------

6.14.3 Member Data Documentation

6.14.3.1 ap_paramList

```
skdiscovery.table.analysis.General_Component_Analysis.ap_paramList
```

6.14.3.2 ap_paramNames

```
skdiscovery.table.analysis.General_Component_Analysis.ap_paramNames
```

6.14.3.3 column_names

```
skdiscovery.table.analysis.General_Component_Analysis.column_names
```

6.14.3.4 n_components

```
skdiscovery.table.analysis.General_Component_Analysis.n_components
```

6.14.3.5 results

```
skdiscovery.table.analysis.General_Component_Analysis.results
```

6.14.3.6 str_description

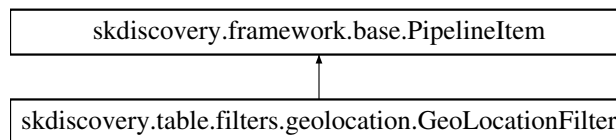
`skdiscovery.table.analysis.General_Component_Analysis.str_description`

The documentation for this class was generated from the following file:

- [table/analysis/gca.py](#)

6.15 skdiscovery.table.filters.geolocation.GeoLocationFilter Class Reference

Inheritance diagram for `skdiscovery.table.filters.geolocation.GeoLocationFilter`:



Public Member Functions

- `def __init__(self, str_description, ap_paramList)`
- `def process(self, obj_data)`
- `def perturbParams(self)`
- `def resetParams(self)`
- `def __str__(self)`
- `def getMetadata(self)`

Public Attributes

- `str_description`
- `ap_paramList`
- `ap_paramNames`

6.15.1 Constructor & Destructor Documentation

6.15.1.1 __init__()

```
def skdiscovery.table.filters.geolocation.GeoLocationFilter.__init__(
    self,
    str_description,
    ap_paramList )
```

Initialize `GeoLocationFilter`.

Parameters

<i>str_description</i>	String describing filter
<i>ap_paramList[ap_lat]</i>	Latitude coordinate
<i>ap_paramList[ap_lon]</i>	Longitude coordinate
<i>ap_paramList[ap_radius]</i>	cut objects whose distance from lat/lon is greater than ap_radius

6.15.2 Member Function Documentation

6.15.2.1 __str__()

```
def skdiscovery.framework.PipelineItem.__str__ (
    self ) [inherited]
```

String represntation of object.

Returns

String listing all current parameters

6.15.2.2 getMetadata()

```
def skdiscovery.framework.PipelineItem.getMetadata (
    self ) [inherited]
```

Retrieve metadata about filter.

Returns

String containing the item description and current parameters for filter.

6.15.2.3 perturbParams()

```
def skdiscovery.framework.PipelineItem.perturbParams (
    self ) [inherited]
```

choose other random value for all parameters

6.15.2.4 process()

```
def skdiscovery.table.filters.geolocation.GeoLocationFilter.process (
    self,
    obj_data )
```

Apply geolocation filter to data set.

Parameters

<i>obj_data</i>	Table data wrapper
-----------------	--------------------

6.15.2.5 resetParams()

```
def skdiscovery.framework.PipelineItem.resetParams (
    self ) [inherited]
```

set all parameters to initial value

6.15.3 Member Data Documentation

6.15.3.1 ap_paramList

```
skdiscovery.framework.PipelineItem.ap_paramList [inherited]
```

6.15.3.2 ap_paramNames

```
skdiscovery.framework.PipelineItem.ap_paramNames [inherited]
```

6.15.3.3 str_description

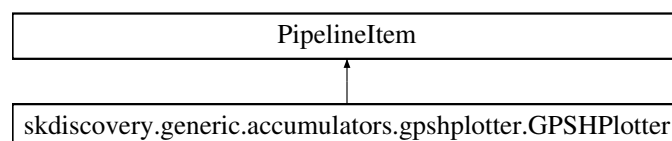
```
skdiscovery.framework.PipelineItem.str_description [inherited]
```

The documentation for this class was generated from the following file:

- [table/filters/geolocation.py](#)

6.16 skdiscovery.generic.accumulators.GPSHPlotter Class Reference

Inheritance diagram for skdiscovery.generic.accumulators.GPSHPlotter:



Public Member Functions

- `def __init__` (self, str_description, comp_name, mogi_name=None, pca_dir='H', pca_comp=0, scaleFactor=2.5, offset=.15, KF_tau=0, errorEllipses=False, map_resolution='i')
- `def process` (self, obj_data)

Public Attributes

- `dir_sign`
- `pca_dir`
- `pca_comp`
- `scaleFactor`
- `offset`
- `errorE`
- `KF_tau`
- `comp_name`
- `mogi_name`

6.16.1 Detailed Description

Plots results from General_Component_Analysis, for the GPS horizontal or vertical components.

6.16.2 Constructor & Destructor Documentation

6.16.2.1 __init__()

```
def skdiscovery.generic.accumulators.GPSHPlotter.__init__ (
    self,
    str_description,
    comp_name,
    mogi_name = None,
    pca_dir = 'H',
    pca_comp = 0,
    scaleFactor = 2.5,
    offset = .15,
    KF_tau = 0,
    errorEllipses = False,
    map_resolution = 'i' )
```

Initialize GPSHPlotter.

Parameters

<i>str_description</i>	String describing accumulator
<i>comp_name</i>	Name of the GPCA results for accessing the GPCA output
<i>mogi_name</i>	Name of the Mogi results (optional)
<i>pca_dir</i>	PCA direction to plot, horizontal (H) or vertical (V)
<i>pca_comp</i>	The PCA component that will be plotted
<i>scaleFactor</i>	Scale factor for arrows
<i>offset</i>	Offset for plotting larger area on map
<i>KF_tau</i>	Tau used in kalman filter
<i>errorEllipses</i>	Boolean indicating whether or not to plot errorEllipses

6.16.3 Member Function Documentation

6.16.3.1 process()

```
def skdiscovery.generic.accumulators.GPSHPlotter.process (
    self,
    obj_data )
```

6.16.4 Member Data Documentation

6.16.4.1 comp_name

```
skdiscovery.generic.accumulators.GPSHPlotter.comp_name
```

6.16.4.2 dir_sign

```
skdiscovery.generic.accumulators.GPSHPlotter.dir_sign
```

6.16.4.3 errorE

```
skdiscovery.generic.accumulators.GPSHPlotter.errorE
```

6.16.4.4 KF_tau

```
skdiscovery.generic.accumulators.GPSHPlotter.KF_tau
```

6.16.4.5 mogi_name

```
skdiscovery.generic.accumulators.GPSHPlotter.mogi_name
```

6.16.4.6 offset

```
skdiscovery.generic.accumulators.GPSHPlotter.offset
```

6.16.4.7 pca_comp

```
skdiscovery.generic.accumulators.GPSHPlotter.pca_comp
```


6.16.4.8 `pca_dir`

```
skdiscovery.generic.accumulators.GPSHPlotter.pca_dir
```

6.16.4.9 `scaleFactor`

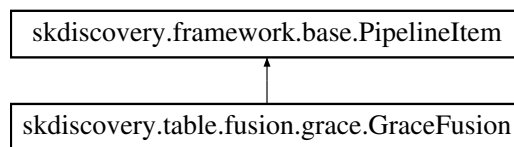
```
skdiscovery.generic.accumulators.GPSHPlotter.scaleFactor
```

The documentation for this class was generated from the following file:

- [generic/accumulators/gpshplotter.py](#)

6.17 `skdiscovery.table.fusion.GraceFusion` Class Reference

Inheritance diagram for `skdiscovery.table.fusion.GraceFusion`:



Public Member Functions

- `def __init__ (self, str_description, metadata, column_data_name='Grace', column_error_name='Grace_↔ Uncertainty', gldas="Off")`
- `def process (self, obj_data)`
- `def perturbParams (self)`
- `def resetParams (self)`
- `def __str__ (self)`
- `def getMetadata (self)`

Public Attributes

- [metadata](#)
- [column_data_name](#)
- [column_error_name](#)
- [gldas](#)
- [str_description](#)
- [ap_paramList](#)
- [ap_paramNames](#)

6.17.1 Detailed Description

Fuses GRACE equivalent water depth time series.

Works on table data (original data from <http://grace.jpl.nasa.gov/data/get-data/monthly-mass-grids-land/>)

6.17.2 Constructor & Destructor Documentation

6.17.2.1 `__init__()`

```
def skdiscovery.table.fusion.GraceFusion.__init__ (
    self,
    str_description,
    metadata,
    column_data_name = 'Grace',
    column_error_name = 'Grace_Uncertainty',
    gldas = "Off" )
```

Initialize Grace Fusion item.

Parameters

<i>str_description</i>	String describing item
<i>metadata</i>	Metadata that contains lat,lon coordinates based on data labels
<i>column_data_name</i>	Name of column for GRACE data
<i>column_error_name</i>	Grace Uncertainty column name
<i>gldas</i>	Indicating use of the global land data assimilation water model

6.17.3 Member Function Documentation

6.17.3.1 `__str__()`

```
def skdiscovery.framework.PipelineItem.__str__ (
    self ) [inherited]
```

String representation of object.

Returns

String listing all current parameters

6.17.3.2 getMetadata()

```
def skdiscovery.framework.PipelineItem.getMetadata (
    self ) [inherited]
```

Retrieve metadata about filter.

Returns

String containing the item description and current parameters for filter.

6.17.3.3 perturbParams()

```
def skdiscovery.framework.PipelineItem.perturbParams (
    self ) [inherited]
```

choose other random value for all parameters

6.17.3.4 process()

```
def skdiscovery.table.fusion.GraceFusion.process (
    self,
    obj_data )
```

Adds columns for GRACE data and uncertainties.

Parameters

<i>obj_data</i>	Input DataWrapper, will be modified in place
-----------------	--

6.17.3.5 resetParams()

```
def skdiscovery.framework.PipelineItem.resetParams (
    self ) [inherited]
```

set all parameters to initial value

6.17.4 Member Data Documentation

6.17.4.1 ap_paramList

```
skdiscovery.framework.PipelineItem.ap_paramList [inherited]
```

6.17.4.2 `ap_paramNames`

`skdiscovery.framework.PipelineItem.ap_paramNames` [inherited]

6.17.4.3 `column_data_name`

`skdiscovery.table.fusion.GraceFusion.column_data_name`

6.17.4.4 `column_error_name`

`skdiscovery.table.fusion.GraceFusion.column_error_name`

6.17.4.5 `gldas`

`skdiscovery.table.fusion.GraceFusion.gldas`

6.17.4.6 `metadata`

`skdiscovery.table.fusion.GraceFusion.metadata`

6.17.4.7 `str_description`

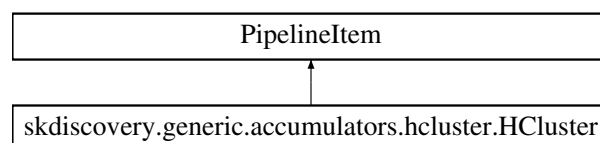
`skdiscovery.framework.PipelineItem.str_description` [inherited]

The documentation for this class was generated from the following file:

- [table/fusion/grace.py](#)

6.18 `skdiscovery.generic.accumulators.HCluster` Class Reference

Inheritance diagram for `skdiscovery.generic.accumulators.HCluster`:



Public Member Functions

- def `__init__` (self, str_description, [obj_name](#))
- def [process](#) (self, obj_data)

Public Attributes

- [obj_name](#)

6.18.1 Detailed Description

Hierarchical Clustering function that produces a cluster map of the distance matrix.

6.18.2 Constructor & Destructor Documentation

6.18.2.1 `__init__()`

```
def skdiscovery.generic.accumulators.HCluster.__init__ (
    self,
    str_description,
    obj_name )
```

Initialize [HCluster](#).

Parameters

<i>str_description</i>	String describing accumulator
<i>obj_name</i>	Name of distance matrix parameter in the <i>obj_data</i> results

6.18.3 Member Function Documentation

6.18.3.1 `process()`

```
def skdiscovery.generic.accumulators.HCluster.process (
    self,
    obj_data )
```

Produces a cluster map and stores the linkage results.

Parameters

<i>obj_data</i>	Data wrapper
-----------------	--------------

6.18.4 Member Data Documentation

6.18.4.1 obj_name

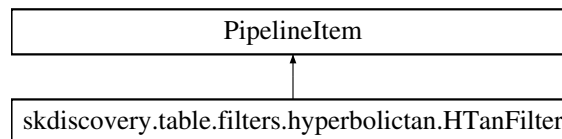
`skdiscovery.generic.accumulators.HCluster.obj_name`

The documentation for this class was generated from the following file:

- [generic/accumulators/hcluster.py](#)

6.19 skdiscovery.table.filters.HTanFilter Class Reference

Inheritance diagram for `skdiscovery.table.filters.HTanFilter`:



Public Member Functions

- `def __init__ (self, str_description, t0, amplitude=5, timescale=1., offset=0, slope=0, labels=None, column_names=None, start_time_limit=None, end_time_limit=None, start=None, end=None)`
- `def process (self, obj_data)`

Public Attributes

- [a](#)
- [t0](#)
- [c](#)
- [slope](#)
- [offset](#)
- [labels](#)
- [column_names](#)
- [start_time_limit](#)
- [end_time_limit](#)
- [start](#)
- [end](#)

6.19.1 Detailed Description

Filter to subtract an arctan fit from data.

6.19.2 Constructor & Destructor Documentation

6.19.2.1 __init__()

```
def skdiscovery.table.filters.HTanFilter.__init__ (
    self,
    str_description,
    t0,
    amplitude = 5,
    timescale = 1.,
    offset = 0,
    slope = 0,
    labels = None,
    column_names = None,
    start_time_limit = None,
    end_time_limit = None,
    start = None,
    end = None )
```

Fit and remove hyperbolic tangent function from data.

Parameters

<i>str_description</i>	String description of data
<i>t0</i>	Initial time offset of arctangent
<i>amplitude</i>	initial amplitude of arctangent
<i>timescale</i>	Timescale of fit
<i>offset</i>	Initial Y offset of arctangent
<i>slope</i>	Slope of the data
<i>labels</i>	Labels to apply arctangent function to
<i>column_names</i>	Column names to apply arctanget function to
<i>start_time_limit</i>	Starting time bound for fit to arctan (default: no bound)
<i>end_time_limit</i>	Ending time bound for fit to arctan (default: no bound)
<i>start</i>	Index of the first data point to fit (default: index of first data point)
<i>end</i>	Index of the last data point to fit (default: index of last data point)

6.19.3 Member Function Documentation

6.19.3.1 process()

```
def skdiscovery.table.filters.HTanFilter.process (
    self,
    obj_data )
```

Apply Arctangent filter to data param.

obj_data: Input data. Changes are made in place.

6.19.4 Member Data Documentation

6.19.4.1 a

`skdiscovery.table.filters.HTanFilter.a`

6.19.4.2 c

`skdiscovery.table.filters.HTanFilter.c`

6.19.4.3 column_names

`skdiscovery.table.filters.HTanFilter.column_names`

6.19.4.4 end

`skdiscovery.table.filters.HTanFilter.end`

6.19.4.5 end_time_limit

`skdiscovery.table.filters.HTanFilter.end_time_limit`

6.19.4.6 labels

`skdiscovery.table.filters.HTanFilter.labels`

6.19.4.7 offset

`skdiscovery.table.filters.HTanFilter.offset`

6.19.4.8 slope

`skdiscovery.table.filters.HTanFilter.slope`

6.19.4.9 start

`skdiscovery.table.filters.HTanFilter.start`

6.19.4.10 start_time_limit

`skdiscovery.table.filters.HTanFilter.start_time_limit`

6.19.4.11 t0

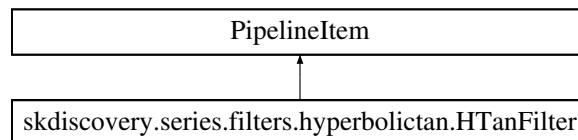
`skdiscovery.table.filters.HTanFilter.t0`

The documentation for this class was generated from the following file:

- [table/filters/hyperbolictan.py](#)

6.20 skdiscovery.series.filters.HTanFilter Class Reference

Inheritance diagram for `skdiscovery.series.filters.HTanFilter`:



Public Member Functions

- `def __init__(self, str_description, t0, amplitude=5, timescale=1., offset=0, slope=0, labels=None, column_names=None, start_time_limit=None, end_time_limit=None, start=None, end=None)`
- `def process(self, obj_data)`

Public Attributes

- `a`
- `t0`
- `c`
- `slope`
- `offset`
- `labels`
- `column_names`
- `start_time_limit`
- `end_time_limit`
- `start`
- `end`

6.20.1 Constructor & Destructor Documentation

6.20.1.1 `__init__()`

```
def skdiscovery.series.filters.HTanFilter.__init__ (
    self,
    str_description,
    t0,
    amplitude = 5,
    timescale = 1.,
    offset = 0,
    slope = 0,
    labels = None,
    column_names = None,
    start_time_limit = None,
    end_time_limit = None,
    start = None,
    end = None )
```

Fit and remove hyperbolic tangent function from data.

Parameters

<i>str_description</i>	String description of data
<i>t0</i>	Initial time offset of arctangent
<i>amplitude</i>	Initial amplitude of arctangent
<i>timescale</i>	Timescale of fit
<i>offset</i>	Initial Y offset of arctangent
<i>slope</i>	Slope of the data
<i>labels</i>	Labels to apply arctangent function to
<i>column_names</i>	Column names to apply arctanget function to
<i>start_time_limit</i>	Starting time bound for fit to arctan (default: no bound)
<i>end_time_limit</i>	Ending time bound for fit to arctan (default: no bound)
<i>start</i>	Index of the first data point to fit (default: index of first data point)
<i>end</i>	Index of the last data point to fit (default: index of last data point)

6.20.2 Member Function Documentation

6.20.2.1 `process()`

```
def skdiscovery.series.filters.HTanFilter.process (
    self,
    obj_data )
```

Apply Arctangent filter to data param.

`obj_data`: Input data. Changes are made in place.

6.20.3 Member Data Documentation

6.20.3.1 a

`skdiscovery.series.filters.HTanFilter.a`

6.20.3.2 c

`skdiscovery.series.filters.HTanFilter.c`

6.20.3.3 column_names

`skdiscovery.series.filters.HTanFilter.column_names`

6.20.3.4 end

`skdiscovery.series.filters.HTanFilter.end`

6.20.3.5 end_time_limit

`skdiscovery.series.filters.HTanFilter.end_time_limit`

6.20.3.6 labels

`skdiscovery.series.filters.HTanFilter.labels`

6.20.3.7 offset

`skdiscovery.series.filters.HTanFilter.offset`

6.20.3.8 slope

`skdiscovery.series.filters.HTanFilter.slope`

6.20.3.9 start

`skdiscovery.series.filters.HTanFilter.start`

6.20.3.10 start_time_limit

```
skdiscovery.series.filters.HTanFilter.start_time_limit
```

6.20.3.11 t0

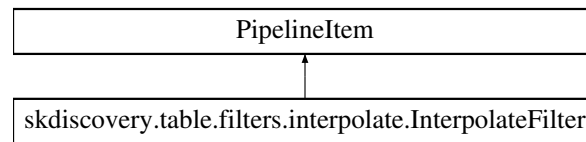
```
skdiscovery.series.filters.HTanFilter.t0
```

The documentation for this class was generated from the following file:

- [series/filters/hyperbolictan.py](#)

6.21 skdiscovery.table.filters.InterpolateFilter Class Reference

Inheritance diagram for skdiscovery.table.filters.InterpolateFilter:



Public Member Functions

- def [process](#) (self, obj_data)

6.21.1 Detailed Description

Interpolate missing values on table data.

6.21.2 Member Function Documentation

6.21.2.1 process()

```
def skdiscovery.table.filters.InterpolateFilter.process (
    self,
    obj_data )
```

Interpolate missing data in obj_data DataWrapper.

Parameters

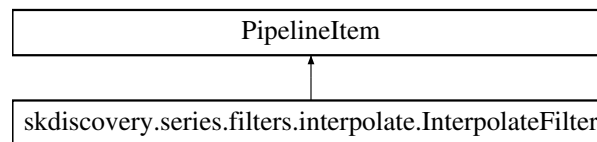
<i>obj_data</i>	Input DataWrapper, will be modified in place
-----------------	--

The documentation for this class was generated from the following file:

- [table/filters/interpolate.py](#)

6.22 skdiscovery.series.filters.InterpolateFilter Class Reference

Inheritance diagram for skdiscovery.series.filters.InterpolateFilter:



Public Member Functions

- def [process](#) (self, *obj_data*)

6.22.1 Detailed Description

Interpolate missing values on series data.

6.22.2 Member Function Documentation

6.22.2.1 process()

```
def skdiscovery.series.filters.InterpolateFilter.process (
    self,
    obj_data )
```

Interpolate missing data in *obj_data* DataWrapper.

Parameters

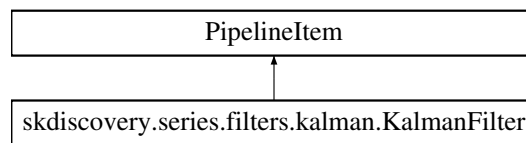
<i>obj_data</i>	Input DataWrapper, will be modified in place
-----------------	--

The documentation for this class was generated from the following file:

- [series/filters/interpolate.py](#)

6.23 skdiscovery.series.filters.KalmanFilter Class Reference

Inheritance diagram for skdiscovery.series.filters.KalmanFilter:



Public Member Functions

- `def __init__(self, str_description, ap_paramList, uncertainty_clip=5)`
- `def process(self, obj_data)`

Public Attributes

- [uncertainty_clip](#)
- [ap_paramNames](#)

6.23.1 Detailed Description

Runs a Kalman Smoother on series data.

For more information see: Ji, K. H. 2011, PhD thesis, MIT.

6.23.2 Constructor & Destructor Documentation

6.23.2.1 __init__()

```

def skdiscovery.series.filters.KalmanFilter.__init__(
    self,
    str_description,
    ap_paramList,
    uncertainty_clip = 5 )
  
```

Initialize [KalmanFilter](#).

Parameters

<i>str_description</i>	String describing filter
<i>ap_paramList[ap_tau]</i>	the correlation time
<i>ap_paramList[ap_sigmaSq]</i>	the data noise
<i>ap_paramList[ap_R]</i>	the process noise
<i>uncertainty_clip</i>	Clip data with uncertainties greater than <code>uncertainty_clip * median uncertainty</code>

6.23.3 Member Function Documentation

6.23.3.1 process()

```
def skdiscovery.series.filters.KalmanFilter.process (
    self,
    obj_data )
```

Apply kalman smoother to data set.

Parameters

<i>obj_data</i>	Input DataWrapper. Changes are made in place.
-----------------	---

6.23.4 Member Data Documentation

6.23.4.1 ap_paramNames

```
skdiscovery.series.filters.KalmanFilter.ap_paramNames
```

6.23.4.2 uncertainty_clip

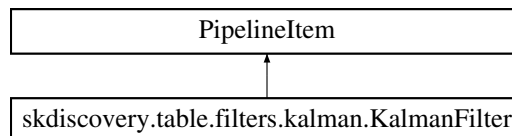
```
skdiscovery.series.filters.KalmanFilter.uncertainty_clip
```

The documentation for this class was generated from the following file:

- series/filters/[kalman.py](#)

6.24 skdiscovery.table.filters.KalmanFilter Class Reference

Inheritance diagram for skdiscovery.table.filters.KalmanFilter:



Public Member Functions

- def `__init__` (self, str_description, ap_paramList, [uncertainty_clip](#)=5, [column_names](#)=None, [error_column_name](#)=None, pool_num=0, [fillna](#)=True)
- def [process](#) (self, obj_data)

Public Attributes

- [uncertainty_clip](#)
- [ap_paramNames](#)
- [column_names](#)
- [error_column_names](#)
- [fillna](#)

6.24.1 Detailed Description

Runs a Kalman Smoother on table data.

For more information see: Ji, K. H. 2011, PhD thesis, MIT.

6.24.2 Constructor & Destructor Documentation

6.24.2.1 `__init__()`

```
def skdiscovery.table.filters.KalmanFilter.__init__ (
    self,
    str_description,
    ap_paramList,
    uncertainty_clip = 5,
    column_names = None,
    error_column_names = None,
    pool_num = 0,
    fillna = True )
```

Initialize [KalmanFilter](#).

Parameters

<i>str_description</i>	String describing filter
<i>ap_paramList[ap_tau]</i>	the correlation time
<i>ap_paramList[ap_sigmaSq]</i>	the data noise
<i>ap_paramList[ap_R]</i>	the process noise
<i>uncertainty_clip</i>	Clip data with uncertainties greater than <code>uncertainty_clip * median uncertainty</code>
<i>column_names</i>	List of column names to smooth (using <code>None</code> will apply to all columns)
<i>error_column_names</i>	List of error column names to smooth (using <code>None</code> will use default error columns)
<i>fillna</i>	Fill in missing values

6.24.3 Member Function Documentation

6.24.3.1 process()

```
def skdiscovery.table.filters.KalmanFilter.process (
    self,
    obj_data )
```

Apply kalman smoother to data set.

Parameters

<i>obj_data</i>	Input data. Changes are made in place.
-----------------	--

6.24.4 Member Data Documentation

6.24.4.1 ap_paramNames

```
skdiscovery.table.filters.KalmanFilter.ap_paramNames
```

6.24.4.2 column_names

```
skdiscovery.table.filters.KalmanFilter.column_names
```

6.24.4.3 error_column_names

```
skdiscovery.table.filters.KalmanFilter.error_column_names
```

6.24.4.4 fillna

```
skdiscovery.table.filters.KalmanFilter.fillna
```

6.24.4.5 uncertainty_clip

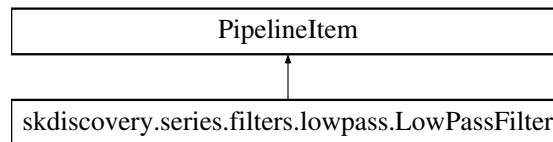
```
skdiscovery.table.filters.KalmanFilter.uncertainty_clip
```

The documentation for this class was generated from the following file:

- [table/filters/kalman.py](#)

6.25 skdiscovery.series.filters.LowPassFilter Class Reference

Inheritance diagram for skdiscovery.series.filters.LowPassFilter:



Public Member Functions

- `def __init__ (self, str_description, ap_paramList)`
- `def process (self, obj_data)`

Public Attributes

- `ap_paramNames`

6.25.1 Detailed Description

A FIR Remez (Parks-McLellan) designed low pass filter for series data.

6.25.2 Constructor & Destructor Documentation

6.25.2.1 __init__()

```

def skdiscovery.series.filters.LowPassFilter.__init__ (
    self,
    str_description,
    ap_paramList )
  
```

Initialize `LowPassFilter`.

Parameters

<i>str_description</i>	String describing filter
<i>ap_paramList[ntaps]</i>	Number of filter taps
<i>ap_paramList[fpasf_per]</i>	Frequency passband ratio/percentage
<i>ap_paramList[fstopf_per]</i>	Frequency stopband ratio/percentage
<i>ap_paramList[wghts]</i>	Band importance weights
<i>ap_paramList[imiter]</i>	Maximum number of iterations for generating the filter

6.25.3 Member Function Documentation

6.25.3.1 process()

```
def skdiscovery.series.filters.LowPassFilter.process (
    self,
    obj_data )
```

Apply lowpass filter to data set, with changes applied in place.

Parameters

<i>obj_data</i>	Input data with data
-----------------	----------------------

6.25.4 Member Data Documentation

6.25.4.1 ap_paramNames

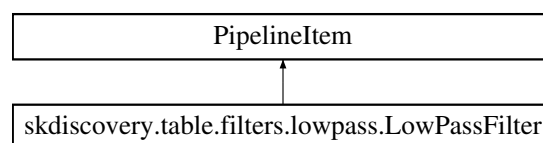
```
skdiscovery.series.filters.LowPassFilter.ap_paramNames
```

The documentation for this class was generated from the following file:

- [series/filters/lowpass.py](#)

6.26 skdiscovery.table.filters.LowPassFilter Class Reference

Inheritance diagram for skdiscovery.table.filters.LowPassFilter:



Public Member Functions

- `def __init__ (self, str_description, ap_paramList)`
- `def process (self, obj_data)`

Public Attributes

- [ap_paramNames](#)

6.26.1 Detailed Description

A remez low pass filter for table data.

6.26.2 Constructor & Destructor Documentation

6.26.2.1 `__init__()`

```
def skdiscovery.table.filters.LowPassFilter.__init__ (
    self,
    str_description,
    ap_paramList )
```

Initialize [LowPassFilter](#).

Parameters

<i>str_description</i>	String describing filter
<i>ap_paramList[ntaps]</i>	number of filter taps
<i>ap_paramList[fpassf_per]</i>	frequency passband ratio/percentage
<i>ap_paramList[fstopf_per]</i>	frequency stopband ratio/percentage
<i>ap_paramList[wghts]</i>	band importance weights
<i>ap_paramList[miter]</i>	maximum number of iterations for generating the filter

6.26.3 Member Function Documentation

6.26.3.1 `process()`

```
def skdiscovery.table.filters.LowPassFilter.process (
    self,
    obj_data )
```

Apply lowpass filter to data set.

Parameters

<i>obj_data</i>	Input data. Changes are made in place.
-----------------	--

6.26.4 Member Data Documentation

6.26.4.1 `ap_paramNames`

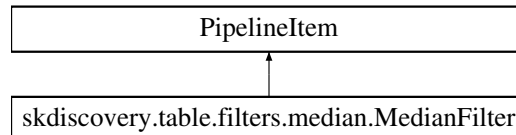
```
skdiscovery.table.filters.LowPassFilter.ap_paramNames
```

The documentation for this class was generated from the following file:

- [table/filters/lowpass.py](#)

6.27 skdiscovery.table.filters.MedianFilter Class Reference

Inheritance diagram for skdiscovery.table.filters.MedianFilter:



Public Member Functions

- `def __init__(self, str_description, ap_paramList, interpolate=True, subtract=False, regular_period=True, min_periods=1)`
- `def process(self, obj_data)`

Public Attributes

- [interpolate](#)
- [subtract](#)
- [ap_paramNames](#)
- [regular_period](#)
- [min_periods](#)

6.27.1 Detailed Description

A Median filter for table data.

6.27.2 Constructor & Destructor Documentation

6.27.2.1 __init__()

```

def skdiscovery.table.filters.MedianFilter.__init__(
    self,
    str_description,
    ap_paramList,
    interpolate = True,
    subtract = False,
    regular_period = True,
    min_periods = 1 )

```

Initialize [MedianFilter](#).

Parameters

<i>str_description</i>	String describing filter
<i>ap_paramList[ap_window]</i>	median filter window width
<i>interpolate</i>	Interpolate data points before filtering
<i>subtract</i>	Subtract filtered result from original

6.27.3 Member Function Documentation**6.27.3.1 process()**

```
def skdiscovery.table.filters.MedianFilter.process (
    self,
    obj_data )
```

Apply median filter to data set.

Parameters

<i>obj_data</i>	Input panda's data series. Changes are made in place.
-----------------	---

6.27.4 Member Data Documentation**6.27.4.1 ap_paramNames**

```
skdiscovery.table.filters.MedianFilter.ap_paramNames
```

6.27.4.2 interpolate

```
skdiscovery.table.filters.MedianFilter.interpolate
```

6.27.4.3 min_periods

```
skdiscovery.table.filters.MedianFilter.min_periods
```

6.27.4.4 regular_period

```
skdiscovery.table.filters.MedianFilter.regular_period
```

6.27.4.5 subtract

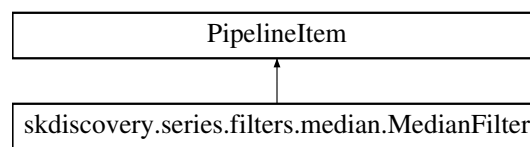
```
skdiscovery.table.filters.MedianFilter.subtract
```

The documentation for this class was generated from the following file:

- [table/filters/median.py](#)

6.28 skdiscovery.series.filters.MedianFilter Class Reference

Inheritance diagram for skdiscovery.series.filters.MedianFilter:



Public Member Functions

- `def __init__(self, str_description, ap_paramList, interpolate=True, subtract=False)`
- `def process(self, obj_data)`

Public Attributes

- [interpolate](#)
- [subtract](#)
- [ap_paramNames](#)

6.28.1 Detailed Description

A Median filter for series data.

6.28.2 Constructor & Destructor Documentation

6.28.2.1 __init__()

```
def skdiscovery.series.filters.MedianFilter.__init__ (
    self,
    str_description,
    ap_paramList,
    interpolate = True,
    subtract = False )
```

Initialize [MedianFilter](#).

Parameters

<i>str_description</i>	String describing filter
<i>ap_paramList[ap_window]</i>	median filter window width
<i>interpolate</i>	Flag to interpolate data points before filtering
<i>subtract</i>	Flag to subtract filtered result from original

6.28.3 Member Function Documentation**6.28.3.1 process()**

```
def skdiscovery.series.filters.MedianFilter.process (
    self,
    obj_data )
```

Apply median filter to data set.

Parameters

<i>obj_data</i>	Input DataWrapper. Changes are made in place.
-----------------	---

6.28.4 Member Data Documentation**6.28.4.1 ap_paramNames**

```
skdiscovery.series.filters.MedianFilter.ap_paramNames
```

6.28.4.2 interpolate

```
skdiscovery.series.filters.MedianFilter.interpolate
```

6.28.4.3 subtract

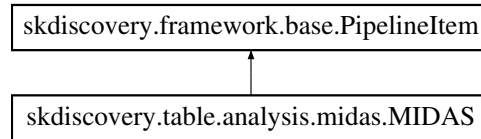
```
skdiscovery.series.filters.MedianFilter.subtract
```

The documentation for this class was generated from the following file:

- series/filters/[median.py](#)

6.29 skdiscovery.table.analysis.midas.MIDAS Class Reference

Inheritance diagram for skdiscovery.table.analysis.midas.MIDAS:



Public Member Functions

- def `__init__` (self, `str_description`, `column_names`=None)
- def `process` (self, `obj_data`)
- def `perturbParams` (self)
- def `resetParams` (self)
- def `__str__` (self)
- def `getMetadata` (self)

Public Attributes

- `column_names`
- `str_description`
- `ap_paramList`
- `ap_paramNames`

6.29.1 Constructor & Destructor Documentation

6.29.1.1 `__init__()`

```
def skdiscovery.table.analysis.midas.MIDAS.__init__ (
    self,
    str_description,
    column_names = None )
```

Initiatlize the `MIDAS` filtering item.

Parameters

<code>obj_data</code>	Data wrapper
-----------------------	--------------

6.29.2 Member Function Documentation

6.29.2.1 `__str__()`

```
def skdiscovery.framework.PipelineItem.__str__ (
    self ) [inherited]
```

String representation of object.

Returns

String listing all current parameters

6.29.2.2 `getMetadata()`

```
def skdiscovery.framework.PipelineItem.getMetadata (
    self ) [inherited]
```

Retrieve metadata about filter.

Returns

String containing the item description and current parameters for filter.

6.29.2.3 `perturbParams()`

```
def skdiscovery.framework.PipelineItem.perturbParams (
    self ) [inherited]
```

choose other random value for all parameters

6.29.2.4 `process()`

```
def skdiscovery.table.analysis.midas.MIDAS.process (
    self,
    obj_data )
```

6.29.2.5 `resetParams()`

```
def skdiscovery.framework.PipelineItem.resetParams (
    self ) [inherited]
```

set all parameters to initial value

6.29.3 Member Data Documentation

6.29.3.1 ap_paramList

skdiscovery.framework.PipelineItem.ap_paramList [inherited]

6.29.3.2 ap_paramNames

skdiscovery.framework.PipelineItem.ap_paramNames [inherited]

6.29.3.3 column_names

skdiscovery.table.analysis.midas.MIDAS.column_names

6.29.3.4 str_description

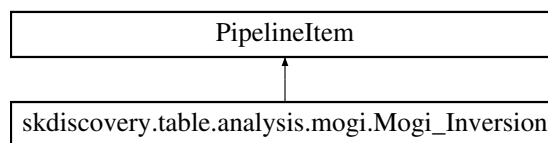
skdiscovery.framework.PipelineItem.str_description [inherited]

The documentation for this class was generated from the following file:

- [table/analysis/midas.py](#)

6.30 skdiscovery.table.analysis.Mogi_Inversion Class Reference

Inheritance diagram for skdiscovery.table.analysis.Mogi_Inversion:



Public Member Functions

- def `__init__` (self, str_description, ap_paramList, [pca_name](#), [column_names](#)=['dN', dE, dU)
- def [FitPCA](#) (self, hPCA_Proj)
- def [FitTimeSeries](#) (self, pd_series, ct)
- def [process](#) (self, obj_data)

Public Attributes

- [pca_name](#)
- [column_names](#)
- [ap_paramNames](#)

6.30.1 Detailed Description

Perform a mogi source inversion on a set of gps table data.

The source is assumed to be a mogi source (point source), but other source models can be selected. Assumes directions are named ('dN', 'dE', 'dU').

6.30.2 Constructor & Destructor Documentation

6.30.2.1 __init__()

```
def skdiscovery.table.analysis.Mogi_Inversion.__init__ (
    self,
    str_description,
    ap_paramList,
    pca_name,
    column_names = ['dN',
    dE,
    dU ]
```

Initialize Mogi analysis item.

Parameters

<i>str_description</i>	Description of item
<i>ap_paramList[source_type]</i>	Type of magma chamber source model to use (default-mogi,finites_sphere,closed_pipe,constant_open_pipe,rising_open_pipe,sill)
<i>pca_name</i>	Name of pca result
<i>column_names</i>	The data direction column names

6.30.3 Member Function Documentation

6.30.3.1 FitPCA()

```
def skdiscovery.table.analysis.Mogi_Inversion.FitPCA (
    self,
    hPCA_Proj )
```

Determine the timing of the inflation event from the first component of the pca projection.

fits $A * \arctan((t - t_0) / c) + B$ to the first pca projection, in order to estimate source amplitude parameters

Parameters

<i>hPCA_Proj</i>	The sklearn PCA
------------------	-----------------

Returns

ct: the t0, c, and B parameters from the fit
 pA[0]: the fitted amplitude parameter

6.30.3.2 FitTimeSeries()

```
def skdiscovery.table.analysis.Mogi_Inversion.FitTimeSeries (
    self,
    pd_series,
    ct )
```

6.30.3.3 process()

```
def skdiscovery.table.analysis.Mogi_Inversion.process (
    self,
    obj_data )
```

Finds the magma source (default-mogi) from PBO GPS data.

Assumes time series columns are named ('dN', 'dE', 'dU'). Predicts the location of the magma source using `scipy.optimize.curve_fit`

The result is added to the data wrapper as a list, with the four elements describing the location of the magma source:
 res[0] = latitude res[1] = longitude res[2] = source depth (km) res[3] = volume change (meters³)

Parameters

<i>obj_data</i>	
-----------------	--

6.30.4 Member Data Documentation

6.30.4.1 ap_paramNames

```
skdiscovery.table.analysis.Mogi_Inversion.ap_paramNames
```

6.30.4.2 column_names

```
skdiscovery.table.analysis.Mogi_Inversion.column_names
```

6.30.4.3 `pca_name`

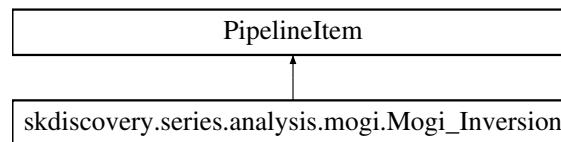
`skdiscovery.table.analysis.Mogi_Inversion.pca_name`

The documentation for this class was generated from the following file:

- [table/analysis/mogi.py](#)

6.31 `skdiscovery.series.analysis.Mogi_Inversion` Class Reference

Inheritance diagram for `skdiscovery.series.analysis.Mogi_Inversion`:



Public Member Functions

- `def __init__(self, str_description, ap_paramList)`
- `def FitPCA(self, hPCA_Proj)`
- `def FitTimeSeries(self, pd_series, ct)`
- `def process(self, obj_data)`

Public Attributes

- `ap_paramNames`

6.31.1 Detailed Description

Perform a Mogi source inversion on a set of gps series data.

The source is assumed to be a Mogi source (point source), but other source models can be selected. Assumes directions are named ('dN', 'dE', 'dU').

6.31.2 Constructor & Destructor Documentation

6.31.2.1 `__init__()`

```
def skdiscovery.series.analysis.Mogi_Inversion.__init__(
    self,
    str_description,
    ap_paramList )
```

Initialize Mogi analysis item.

Parameters

<i>str_description</i>	Description of the item
<i>ap_paramList[h_pca_name]</i>	Name of the pca computed by General_Component_Analysis. Gets start and end date from the PCA fit.
<i>ap_paramList[source_type]</i>	Type of magma chamber source model to use (mogi [default],finite_sphere,closed_pipe,constant_open_pipe,rising_open_pipe,sill)

6.31.3 Member Function Documentation

6.31.3.1 FitPCA()

```
def skdiscovery.series.analysis.Mogi_Inversion.FitPCA (
    self,
    hPCA_Proj )
```

6.31.3.2 FitTimeSeries()

```
def skdiscovery.series.analysis.Mogi_Inversion.FitTimeSeries (
    self,
    pd_series,
    ct )
```

6.31.3.3 process()

```
def skdiscovery.series.analysis.Mogi_Inversion.process (
    self,
    obj_data )
```

Finds the magma source (default-mogi) from PBO GPS data.

Assumes time series columns are named ('dN', 'dE', 'dU'). Predictes location of the magma source using scipy.optimize.curve_fit

The location of the magma source is stored in the data wrapper as a list res[0] = latitude res[1] = longitude res[2] = source depth (km) res[3] = volume change (meters³) res[4] = extra parameters (depends on mogi fit type)

Parameters

<i>obj_data</i>	Data object containing the results from the PCA stage
-----------------	---

6.31.4 Member Data Documentation

6.31.4.1 `ap_paramNames`

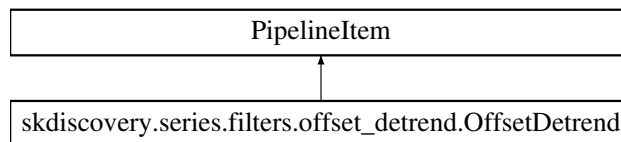
`skdiscovery.series.analysis.Mogi_Inversion.ap_paramNames`

The documentation for this class was generated from the following file:

- [series/analysis/mogi.py](#)

6.32 `skdiscovery.series.filters.OffsetDetrend` Class Reference

Inheritance diagram for `skdiscovery.series.filters.OffsetDetrend`:



Public Member Functions

- `def __init__` (self, str_description, ap_paramList=[], [labels](#)=None, [column_names](#)=None, [time_point](#)=None, [time_interval](#)=None)
- `def process` (self, obj_data)

Public Attributes

- [labels](#)
- [column_names](#)
- [time_point](#)
- [time_interval](#)
- [ap_paramNames](#)

6.32.1 Detailed Description

Trend filter that fits a stepwise function to linearly detrended series data.

On detrended data this filter fits a stepwise function (number of steps provided by the user) to correct the linear fit by accounting for discontinuous offsets, such as due to a change in the antenna or from an earthquake. The final linear fit handles each portion of the offset independently. If the number of discontinuities is not provided as an autoparam, the filter assumes a single discontinuity.

6.32.2 Constructor & Destructor Documentation

6.32.2.1 `__init__()`

```
def skdiscovery.series.filters.OffsetDetrend.__init__ (
    self,
    str_description,
    ap_paramList = [],
    labels = None,
    column_names = None,
    time_point = None,
    time_interval = None )
```

Initialize [OffsetDetrend](#) filter.

Parameters

<i>str_description</i>	String describing filter
<i>ap_paramList[step_count]</i>	Number of steps to remove from data (Default: 1)
<i>labels</i>	List of labels used to select data to be removed (using None will apply to all labels)
<i>column_names</i>	List of column names to select data to be removed (using None will apply to all columns)
<i>time_point</i>	Time of offset
<i>time_interval</i>	Interval within which the offset occurs

6.32.3 Member Function Documentation

6.32.3.1 `process()`

```
def skdiscovery.series.filters.OffsetDetrend.process (
    self,
    obj_data )
```

Apply offset estimation and detrending filter to data set.

Parameters

<i>obj_data</i>	Input data. Changes are made in place.
-----------------	--

6.32.4 Member Data Documentation

6.32.4.1 `ap_paramNames`

```
skdiscovery.series.filters.OffsetDetrend.ap_paramNames
```

6.32.4.2 column_names

`skdiscovery.series.filters.OffsetDetrend.column_names`

6.32.4.3 labels

`skdiscovery.series.filters.OffsetDetrend.labels`

6.32.4.4 time_interval

`skdiscovery.series.filters.OffsetDetrend.time_interval`

6.32.4.5 time_point

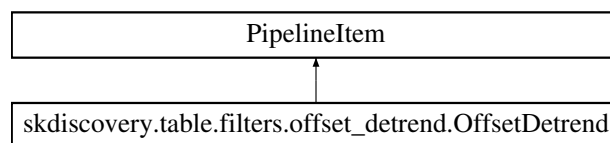
`skdiscovery.series.filters.OffsetDetrend.time_point`

The documentation for this class was generated from the following file:

- [series/filters/offset_detrend.py](#)

6.33 skdiscovery.table.filters.OffsetDetrend Class Reference

Inheritance diagram for `skdiscovery.table.filters.OffsetDetrend`:



Public Member Functions

- `def __init__(self, str_description, column_names, ap_paramList=[], labels=None, time_point=None, time_interval=None)`
- `def process(self, obj_data)`

Public Attributes

- [labels](#)
- [column_names](#)
- [time_point](#)
- [time_interval](#)
- [ap_paramNames](#)

6.33.1 Detailed Description

Trend filter that fits a stepwise function to linearly detrended table data.

On detrended data this filter fits a stepwise function (number of steps provided by the user) to correct the linear fit by accounting for discontinuous offsets, such as due to a change in the antenna or from an earthquake. The final linear fit handles each portion of the offset independently. If the number of discontinuities is not provided as an autoparam, the filter assumes a single discontinuity.

6.33.2 Constructor & Destructor Documentation

6.33.2.1 `__init__()`

```
def skdiscovery.table.filters.OffsetDetrend.__init__ (
    self,
    str_description,
    column_names,
    ap_paramList = [],
    labels = None,
    time_point = None,
    time_interval = None )
```

Initialize [OffsetDetrend](#) filter for use on table data.

Parameters

<i>str_description</i>	String describing filter
<i>column_names</i>	List of column names to select data to be removed (using None will apply to all columns)
<i>ap_paramList[step_count]</i>	Number of steps to remove from data (Default: 1)
<i>labels</i>	List of labels used to select data to be removed (using None will apply to all labels)
<i>time_point</i>	Time of offset
<i>time_interval</i>	Interval within which the offset occurs

6.33.3 Member Function Documentation

6.33.3.1 `process()`

```
def skdiscovery.table.filters.OffsetDetrend.process (
    self,
    obj_data )
```

Apply offset estimation and detrending filter to data set.

Parameters

<i>obj_data</i>	Input data. Changes are made in place.
-----------------	--

6.33.4 Member Data Documentation

6.33.4.1 ap_paramNames

`skdiscovery.table.filters.OffsetDetrend.ap_paramNames`

6.33.4.2 column_names

`skdiscovery.table.filters.OffsetDetrend.column_names`

6.33.4.3 labels

`skdiscovery.table.filters.OffsetDetrend.labels`

6.33.4.4 time_interval

`skdiscovery.table.filters.OffsetDetrend.time_interval`

6.33.4.5 time_point

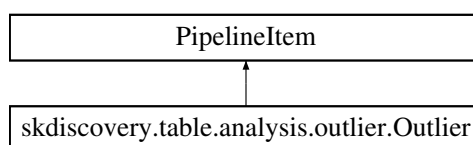
`skdiscovery.table.filters.OffsetDetrend.time_point`

The documentation for this class was generated from the following file:

- [table/filters/offset_detrend.py](#)

6.34 skdiscovery.table.analysis.outlier.Outlier Class Reference

Inheritance diagram for `skdiscovery.table.analysis.outlier.Outlier`:



Public Member Functions

- `def __init__(self, str_description, columns=None, name_prefix='MAD_Scale_')`
- `def process(self, obj_data)`

Public Attributes

- [columns](#)
- [name_prefix](#)

6.34.1 Constructor & Destructor Documentation

6.34.1.1 `__init__()`

```
def skdiscovery.table.analysis.outlier.Outlier.__init__ (
    self,
    str_description,
    columns = None,
    name_prefix = 'MAD_Scale_' )
```

Initialize [Outlier](#) Item.

Parameters

<i>str_description</i>	Name of Item
<i>columns</i>	List of of column names
<i>new_column_name</i>	Name of newly created column

6.34.2 Member Function Documentation

6.34.2.1 `process()`

```
def skdiscovery.table.analysis.outlier.Outlier.process (
    self,
    obj_data )
```

Process the data object to add a column with the outlier scores.

Parameters

<i>obj_data</i>	Input table data wrapper
-----------------	--------------------------

6.34.3 Member Data Documentation

6.34.3.1 `columns`

```
skdiscovery.table.analysis.outlier.Outlier.columns
```

6.34.3.2 name_prefix

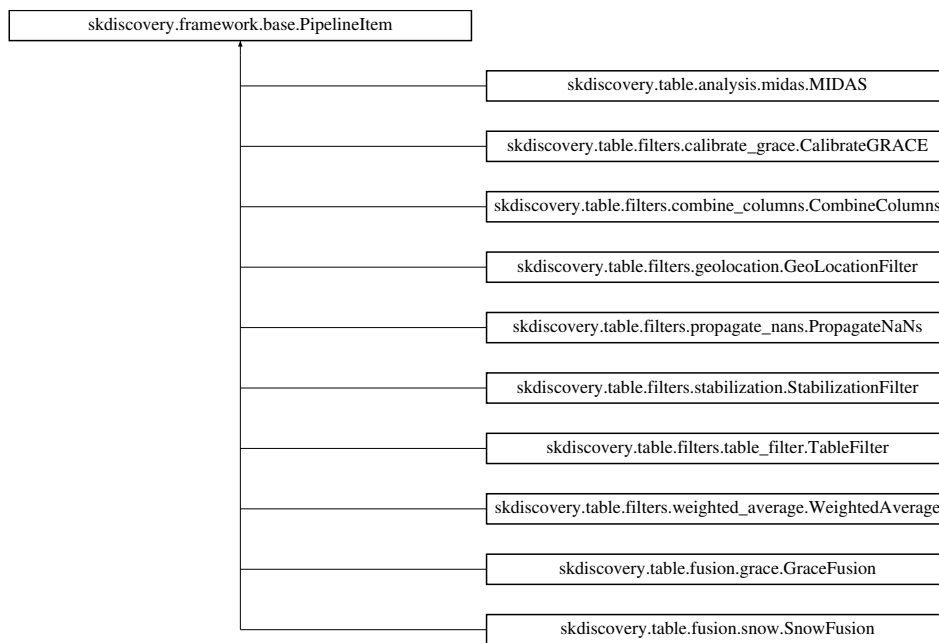
`skdiscovery.table.analysis.outlier.Outlier.name_prefix`

The documentation for this class was generated from the following file:

- [table/analysis/outlier.py](#)

6.35 skdiscovery.framework.PipelineItem Class Reference

Inheritance diagram for `skdiscovery.framework.PipelineItem`:



Public Member Functions

- `def __init__(self, str_description, ap_paramList=[])`
- `def perturbParams (self)`
- `def resetParams (self)`
- `def process (self, obj_data)`
- `def __str__ (self)`
- `def getMetadata (self)`

Public Attributes

- `str_description`
- `ap_paramList`
- `ap_paramNames`

6.35.1 Detailed Description

The general class used to create pipeline items.

6.35.2 Constructor & Destructor Documentation

6.35.2.1 `__init__()`

```
def skdiscovery.framework.PipelineItem.__init__ (
    self,
    str_description,
    ap_paramList = [] )
```

Initialize an object.

Parameters

<i>str_description</i>	String description of filter
<i>ap_paramList</i>	List of AutoParam parameters.

6.35.3 Member Function Documentation

6.35.3.1 `__str__()`

```
def skdiscovery.framework.PipelineItem.__str__ (
    self )
```

String represntation of object.

Returns

String listing all currenter parameters

6.35.3.2 `getMetadata()`

```
def skdiscovery.framework.PipelineItem.getMetadata (
    self )
```

Retrieve metadata about filter.

Returns

String containing the item description and current parameters for filter.

6.35.3.3 perturbParams()

```
def skdiscovery.framework.PipelineItem.perturbParams (
    self )
```

choose other random value for all parameters

6.35.3.4 process()

```
def skdiscovery.framework.PipelineItem.process (
    self,
    obj_data )
```

The actual filter processing.

Empty in this generic filter.

```
@param obj_data: Data wrapper that will be processed
```

6.35.3.5 resetParams()

```
def skdiscovery.framework.PipelineItem.resetParams (
    self )
```

set all parameters to initial value

6.35.4 Member Data Documentation

6.35.4.1 ap_paramList

```
skdiscovery.framework.PipelineItem.ap_paramList
```

6.35.4.2 ap_paramNames

```
skdiscovery.framework.PipelineItem.ap_paramNames
```

6.35.4.3 str_description

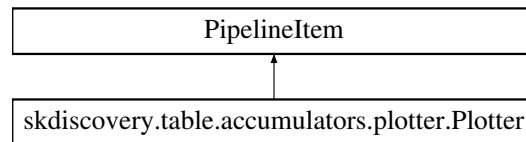
```
skdiscovery.framework.PipelineItem.str_description
```

The documentation for this class was generated from the following file:

- framework/[base.py](#)

6.36 skdiscovery.table.accumulators.Plotter Class Reference

Inheritance diagram for skdiscovery.table.accumulators.Plotter:



Public Member Functions

- `def __init__ (self, str_description, column_names=None, error_column_names=None, num_columns=3, width=13, height=4, columns_together=False, annotate_column=None, annotate_data=None, xlim=None, ylim=None, kwargs)`
- `def process (self, obj_data)`

Public Attributes

- `xlim`
- `ylim`
- `kwargs`
- `num_columns`
- `height`
- `width`
- `column_names`
- `annotate_column`
- `annotate_data`
- `error_column_names`
- `columns_together`

6.36.1 Detailed Description

Make a plot of table data.

6.36.2 Constructor & Destructor Documentation

6.36.2.1 __init__()

```
def skdiscovery.table.accumulators.Plotter.__init__ (  
    self,  
    str_description,  
    column_names = None,  
    error_column_names = None,  
    num_columns = 3,
```

```

width = 13,
height = 4,
columns_together = False,
annotate_column = None,
annotate_data = None,
xlim = None,
ylim = None,
kwargs )

```

Initialize [Plotter](#).

Parameters

<i>str_description</i>	String describing accumulator
<i>column_names</i>	Columns to be plot
<i>error_column_names</i>	Columns containing uncertainties to be plot, no errorbars if None
<i>num_columns</i>	Number of columns to use when plotting data
<i>width</i>	Total width of all columns combined
<i>height</i>	Height of single row of plots
<i>columns_together</i>	If true, plot the columns on the same graph
<i>annotate_column</i>	Column of annotation data to use for annotation
<i>annotate_data</i>	Annotation data
<i>**kwargs</i>	Any additional keyword arguments are passed on to matplotlib

6.36.3 Member Function Documentation

6.36.3.1 process()

```

def skdiscovery.table.accumulators.Plotter.process (
    self,
    obj_data )

```

Plot each column in obj_

Parameters

<i>obj_data</i>	Data Wrapper
-----------------	--------------

6.36.4 Member Data Documentation

6.36.4.1 annotate_column

```
skdiscovery.table.accumulators.Plotter.annotate_column
```

6.36.4.2 annotate_data

`skdiscovery.table.accumulators.Plotter.annotate_data`

6.36.4.3 column_names

`skdiscovery.table.accumulators.Plotter.column_names`

6.36.4.4 columns_together

`skdiscovery.table.accumulators.Plotter.columns_together`

6.36.4.5 error_column_names

`skdiscovery.table.accumulators.Plotter.error_column_names`

6.36.4.6 height

`skdiscovery.table.accumulators.Plotter.height`

6.36.4.7 kwargs

`skdiscovery.table.accumulators.Plotter.kwargs`

6.36.4.8 num_columns

`skdiscovery.table.accumulators.Plotter.num_columns`

6.36.4.9 width

`skdiscovery.table.accumulators.Plotter.width`

6.36.4.10 xlim

`skdiscovery.table.accumulators.Plotter.xlim`

6.36.4.11 ylim

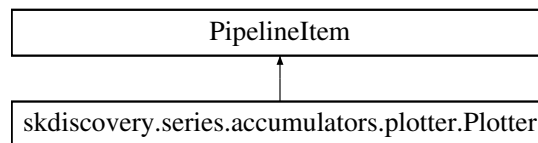
`skdiscovery.table.accumulators.Plotter.ylim`

The documentation for this class was generated from the following file:

- [table/accumulators/plotter.py](#)

6.37 skdiscovery.series.accumulators.Plotter Class Reference

Inheritance diagram for `skdiscovery.series.accumulators.Plotter`:



Public Member Functions

- `def __init__(self, str_description, num_columns=3, errorbars=False, width=13, height=4, kwargs)`
- `def process(self, obj_data)`

Public Attributes

- `kwargs`
- `num_columns`
- `errorbars`
- `height`
- `width`

6.37.1 Detailed Description

Make a plot of series data.

6.37.2 Constructor & Destructor Documentation

6.37.2.1 __init__()

```
def skdiscovery.series.accumulators.Plotter.__init__(  
    self,  
    str_description,  
    num_columns = 3,  
    errorbars = False,  
    width = 13,  
    height = 4,  
    kwargs )
```

Initialize `Plotter`.

Parameters

<i>str_description</i>	String describing accumulator
<i>num_columns</i>	Number of columns to use when plotting data
<i>errorbars</i>	Flag indicating if errorbars should be used
<i>width</i>	Total width of all columns combined
<i>height</i>	Height of single row of plots
<i>**kwargs</i>	Any additional keyword arguments are passed on to matplotlib

6.37.3 Member Function Documentation

6.37.3.1 process()

```
def skdiscovery.series.accumulators.Plotter.process (
    self,
    obj_data )
```

Plot each column in obj_

Parameters

<i>obj_data</i>	Data Wrapper
-----------------	--------------

6.37.4 Member Data Documentation

6.37.4.1 errorbars

```
skdiscovery.series.accumulators.Plotter.errorbars
```

6.37.4.2 height

```
skdiscovery.series.accumulators.Plotter.height
```

6.37.4.3 kwargs

```
skdiscovery.series.accumulators.Plotter.kwargs
```

6.37.4.4 num_columns

```
skdiscovery.series.accumulators.Plotter.num_columns
```

6.37.4.5 width

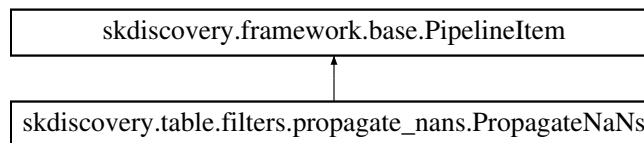
`skdiscovery.series.accumulators.Plotter.width`

The documentation for this class was generated from the following file:

- [series/accumulators/plotter.py](#)

6.38 skdiscovery.table.filters.propagate_nans.PropagateNaNs Class Reference

Inheritance diagram for `skdiscovery.table.filters.propagate_nans.PropagateNaNs`:



Public Member Functions

- `def __init__(self, str_description, nan_column, target_columns)`
- `def process(self, obj_data)`
- `def perturbParams(self)`
- `def resetParams(self)`
- `def __str__(self)`
- `def getMetadata(self)`

Public Attributes

- `nan_column`
- `target_columns`
- `str_description`
- `ap_paramList`
- `ap_paramNames`

6.38.1 Detailed Description

Propagates NaN's from one column to other columns.

6.38.2 Constructor & Destructor Documentation

6.38.2.1 __init__()

```

def skdiscovery.table.filters.propagate_nans.PropagateNaNs.__init__(
    self,
    str_description,
    nan_column,
    target_columns )
  
```

Initialize `PropagateNaNs` Filter.

Parameters

<i>str_description</i>	String describing filter
<i>nan_column</i>	Column used to select which rows should be NaN's
<i>target_columns</i>	Rows in these column will be set to NaN's based on nan_column

6.38.3 Member Function Documentation

6.38.3.1 __str__()

```
def skdiscovery.framework.PipelineItem.__str__ (
    self ) [inherited]
```

String represntation of object.

Returns

String listing all current parameters

6.38.3.2 getMetadata()

```
def skdiscovery.framework.PipelineItem.getMetadata (
    self ) [inherited]
```

Retrieve metadata about filter.

Returns

String containing the item description and current parameters for filter.

6.38.3.3 perturbParams()

```
def skdiscovery.framework.PipelineItem.perturbParams (
    self ) [inherited]
```

choose other random value for all parameters

6.38.3.4 process()

```
def skdiscovery.table.filters.propagate_nans.PropagateNaNs.process (
    self,
    obj_data )
```

[PropagateNaNs](#) on table data wrapper.

Parameters

<i>obj_data</i>	Input table data wrapper
-----------------	--------------------------

6.38.3.5 resetParams()

```
def skdiscovery.framework.PipelineItem.resetParams (
    self ) [inherited]
```

set all parameters to initial value

6.38.4 Member Data Documentation

6.38.4.1 ap_paramList

```
skdiscovery.framework.PipelineItem.ap_paramList [inherited]
```

6.38.4.2 ap_paramNames

```
skdiscovery.framework.PipelineItem.ap_paramNames [inherited]
```

6.38.4.3 nan_column

```
skdiscovery.table.filters.propagate_nans.PropagateNaNs.nan_column
```

6.38.4.4 str_description

```
skdiscovery.framework.PipelineItem.str_description [inherited]
```

6.38.4.5 target_columns

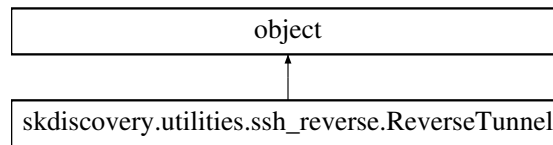
```
skdiscovery.table.filters.propagate_nans.PropagateNaNs.target_columns
```

The documentation for this class was generated from the following file:

- [table/filters/propagate_nans.py](#)

6.39 skdiscovery.utilities.ssh_reverse.ReverseTunnel Class Reference

Inheritance diagram for skdiscovery.utilities.ssh_reverse.ReverseTunnel:



Public Member Functions

- `def __init__(self, server_address, username, key_filename, server_port, remote_host, remote_port, check=30, verbose=False)`
- `def create_reverse_tunnel(self)`
- `def __del__(self)`

Public Attributes

- `server_address`
- `username`
- `key_filename`
- `server_port`
- `remote_host`
- `remote_port`
- `check`
- `verbose`
- `ssh`
- `event`
- `child_threads`

6.39.1 Detailed Description

Create a reverse ssh tunnel.

6.39.2 Constructor & Destructor Documentation

6.39.2.1 __init__()

```
def skdiscovery.utilities.ssh_reverse.ReverseTunnel.__init__(  
    self,  
    server_address,  
    username,  
    key_filename,  
    server_port,  
    remote_host,  
    remote_port,  
    check = 30,  
    verbose = False )
```

Initialize `ReverseTunnel` object.

Parameters

<i>server_address</i>	Local server address
<i>username</i>	Valid username on remote host
<i>key_filename</i>	Filename of ssh key associated with remote host
<i>server_port</i>	Local port
<i>remote_host</i>	Address of remote host
<i>remote_port</i>	Remote port
<i>check</i>	Amount of time to wait in seconds when opening up a channel
<i>verbose</i>	Print status information

6.39.2.2 __del__()

```
def skdiscovery.utilities.ssh_reverse.ReverseTunnel.__del__ (
    self )
```

Deconstructor.

6.39.3 Member Function Documentation**6.39.3.1 create_reverse_tunnel()**

```
def skdiscovery.utilities.ssh_reverse.ReverseTunnel.create_reverse_tunnel (
    self )
```

Create the reverse tunnel.

6.39.4 Member Data Documentation**6.39.4.1 check**

```
skdiscovery.utilities.ssh_reverse.ReverseTunnel.check
```

6.39.4.2 child_threads

```
skdiscovery.utilities.ssh_reverse.ReverseTunnel.child_threads
```

6.39.4.3 event

```
skdiscovery.utilities.ssh_reverse.ReverseTunnel.event
```

6.39.4.4 key_filename

`skdiscovery.utilities.ssh_reverse.ReverseTunnel.key_filename`

6.39.4.5 remote_host

`skdiscovery.utilities.ssh_reverse.ReverseTunnel.remote_host`

6.39.4.6 remote_port

`skdiscovery.utilities.ssh_reverse.ReverseTunnel.remote_port`

6.39.4.7 server_address

`skdiscovery.utilities.ssh_reverse.ReverseTunnel.server_address`

6.39.4.8 server_port

`skdiscovery.utilities.ssh_reverse.ReverseTunnel.server_port`

6.39.4.9 ssh

`skdiscovery.utilities.ssh_reverse.ReverseTunnel.ssh`

6.39.4.10 username

`skdiscovery.utilities.ssh_reverse.ReverseTunnel.username`

6.39.4.11 verbose

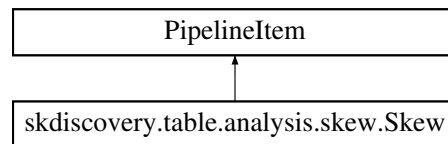
`skdiscovery.utilities.ssh_reverse.ReverseTunnel.verbose`

The documentation for this class was generated from the following file:

- [utilities/ssh_reverse.py](#)

6.40 skdiscovery.table.analysis.skew.Skew Class Reference

Inheritance diagram for skdiscovery.table.analysis.skew.Skew:



Public Member Functions

- def [process](#) (self, obj_data)

6.40.1 Detailed Description

Calculates the skew of table data.

6.40.2 Member Function Documentation

6.40.2.1 process()

```
def skdiscovery.table.analysis.skew.Skew.process (  
    self,  
    obj_data )
```

Apply [Skew](#) analysis with results added to the data wrapper.

Parameters

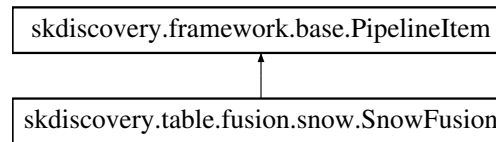
<i>obj_data</i>	Data wrapper
-----------------	--------------

The documentation for this class was generated from the following file:

- [table/analysis/skew.py](#)

6.41 skdiscovery.table.fusion.SnowFusion Class Reference

Inheritance diagram for skdiscovery.table.fusion.SnowFusion:



Public Member Functions

- def `__init__` (self, `str_description`, `metadata`, `column_data_name`='Snow')
- def `process` (self, `obj_data`)
- def `perturbParams` (self)
- def `resetParams` (self)
- def `__str__` (self)
- def `getMetadata` (self)

Public Attributes

- `metadata`
- `column_data_name`
- `str_description`
- `ap_paramList`
- `ap_paramNames`

6.41.1 Detailed Description

Adds snow time series data to table based on geographic coordinates.

Works on table data (original data from <http://nsidc.org/data/g02156>)

6.41.2 Constructor & Destructor Documentation

6.41.2.1 `__init__`()

```

def skdiscovery.table.fusion.SnowFusion.__init__ (
    self,
    str_description,
    metadata,
    column_data_name = 'Snow' )

```

Initialize Snow Fusion item.

Parameters

<i>str_description</i>	String describing item
<i>metadata</i>	Metadata that contains lat,lon coordinates based on data labels
<i>column data name</i>	Name of column for Snow data

6.41.3 Member Function Documentation

6.41.3.1 `__str__()`

```
def skdiscovery.framework.PipelineItem.__str__ (
    self ) [inherited]
```

String representation of object.

Returns

String listing all current parameters

6.41.3.2 `getMetadata()`

```
def skdiscovery.framework.PipelineItem.getMetadata (
    self ) [inherited]
```

Retrieve metadata about filter.

Returns

String containing the item description and current parameters for filter.

6.41.3.3 `perturbParams()`

```
def skdiscovery.framework.PipelineItem.perturbParams (
    self ) [inherited]
```

choose other random value for all parameters

6.41.3.4 `process()`

```
def skdiscovery.table.fusion.SnowFusion.process (
    self,
    obj_data )
```

Adds column for snow (g02156) data.

Parameters

<i>obj_data</i>	Input DataWrapper, will be modified in place
-----------------	--

6.41.3.5 resetParams()

```
def skdiscovery.framework.PipelineItem.resetParams (
    self ) [inherited]
```

set all parameters to initial value

6.41.4 Member Data Documentation

6.41.4.1 ap_paramList

```
skdiscovery.framework.PipelineItem.ap_paramList [inherited]
```

6.41.4.2 ap_paramNames

```
skdiscovery.framework.PipelineItem.ap_paramNames [inherited]
```

6.41.4.3 column_data_name

```
skdiscovery.table.fusion.SnowFusion.column_data_name
```

6.41.4.4 metadata

```
skdiscovery.table.fusion.SnowFusion.metadata
```

6.41.4.5 str_description

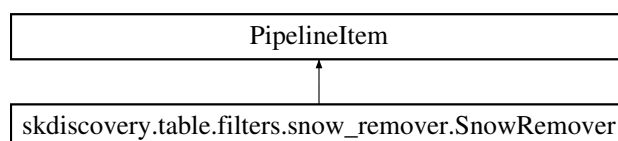
```
skdiscovery.framework.PipelineItem.str_description [inherited]
```

The documentation for this class was generated from the following file:

- [table/fusion/snow.py](#)

6.42 skdiscovery.table.filters.SnowRemover Class Reference

Inheritance diagram for skdiscovery.table.filters.SnowRemover:



Public Member Functions

- def `__init__` (self, str_description, ap_paramList=[AutoParam(1.5)], column_name='dN', snow_column='Snow')
- def `process` (self, obj_data)

Public Attributes

- `column_name`
- `snow_column`

6.42.1 Detailed Description

Removes data with snow errors.

6.42.2 Constructor & Destructor Documentation

6.42.2.1 `__init__()`

```
def skdiscovery.table.filters.SnowRemover.__init__ (
    self,
    str_description,
    ap_paramList = [AutoParam(1.5)],
    column_name = 'dN',
    snow_column = 'Snow' )
```

Initialize snow remover for use on table data.

Parameters

<i>str_description</i>	String describing filter
<i>ap_paramList[sigma_clip]</i>	remove station if the stddev of snowdays is sigma_clip times greater than non-snow days, default 1.5
<i>column_name</i>	Name of column to check
<i>snow_column</i>	Name of snow column to determine snowdays/non snow days

6.42.3 Member Function Documentation

6.42.3.1 `process()`

```
def skdiscovery.table.filters.SnowRemover.process (
    self,
    obj_data )
```

Removes table data with large snow errors.

Parameters

<code>obj_data</code>	Input DataWrapper, will be modified in place
-----------------------	--

6.42.4 Member Data Documentation

6.42.4.1 column_name

```
skdiscovery.table.filters.SnowRemover.column_name
```

6.42.4.2 snow_column

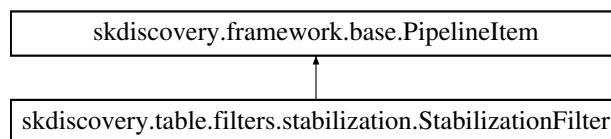
```
skdiscovery.table.filters.SnowRemover.snow_column
```

The documentation for this class was generated from the following file:

- [table/filters/snow_remover.py](#)

6.43 skdiscovery.table.filters.stabilization.StabilizationFilter Class Reference

Inheritance diagram for skdiscovery.table.filters.stabilization.StabilizationFilter:



Public Member Functions

- def [process](#) (self, obj_data)
- def [perturbParams](#) (self)
- def [resetParams](#) (self)
- def [__str__](#) (self)
- def [getMetadata](#) (self)

Public Attributes

- [str_description](#)
- [ap_paramList](#)
- [ap_paramNames](#)

6.43.1 Detailed Description

This filter transforms GPS stations in a region to a local reference frame.

6.43.2 Member Function Documentation

6.43.2.1 __str__()

```
def skdiscovery.framework.PipelineItem.__str__ (
    self ) [inherited]
```

String representation of object.

Returns

String listing all current parameters

6.43.2.2 getMetadata()

```
def skdiscovery.framework.PipelineItem.getMetadata (
    self ) [inherited]
```

Retrieve metadata about filter.

Returns

String containing the item description and current parameters for filter.

6.43.2.3 perturbParams()

```
def skdiscovery.framework.PipelineItem.perturbParams (
    self ) [inherited]
```

choose other random value for all parameters

6.43.2.4 process()

```
def skdiscovery.table.filters.stabilization.StabilizationFilter.process (
    self,
    obj_data )
```

Apply stabilization filter to data set.

Parameters

<i>obj_data</i>	Table data wrapper.
-----------------	---------------------

6.43.2.5 resetParams()

```
def skdiscovery.framework.PipelineItem.resetParams (
    self ) [inherited]
```

set all parameters to initial value

6.43.3 Member Data Documentation

6.43.3.1 ap_paramList

```
skdiscovery.framework.PipelineItem.ap_paramList [inherited]
```

6.43.3.2 ap_paramNames

```
skdiscovery.framework.PipelineItem.ap_paramNames [inherited]
```

6.43.3.3 str_description

```
skdiscovery.framework.PipelineItem.str_description [inherited]
```

The documentation for this class was generated from the following file:

- [table/filters/stabilization.py](#)

6.44 skdiscovery.framework.StageContainer Class Reference

Public Member Functions

- def `__init__` (self, [obj_content](#), obj_runmethod=None, obj_perturbmethod=None, obj_reset=None)
- def [run](#) (self, obj_data_container)
- def [perturb](#) (self)
- def [reset](#) (self)
- def [getMetadata](#) (self)
- def [getObjects](#) (self)
- def [getMetadataType](#) (self)
- def [getMetadataNestedTypes](#) (self)
- def [getMetadataNestedGraph](#) (self)

Public Attributes

- [obj_content](#)
- [runmethod](#)
- [perturbmethod](#)
- [resetmethod](#)

6.44.1 Detailed Description

Container to hold a stage for the DiscoveryPipeline.

6.44.2 Constructor & Destructor Documentation

6.44.2.1 `__init__()`

```
def skdiscovery.framework.StageContainer.__init__ (
    self,
    obj_content,
    obj_runmethod = None,
    obj_perturbmethod = None,
    obj_reset = None )
```

Get the object and its run method into this container.

Parameters

<i>obj_content</i>	filter, analysis, or accumulator
<i>obj_runmethod</i>	Run method of the obj_content (default process)
<i>obj_perturbmethod</i>	Perturb method of the obj_content (default peturbParams)
<i>obj_reset</i>	Reset method of the obj_content (default resetParams)

6.44.3 Member Function Documentation

6.44.3.1 `getMetadata()`

```
def skdiscovery.framework.StageContainer.getMetadata (
    self )
```

Retrieves the obj_content metadata.

Returns

obj_content metadata

6.44.3.2 getMetadataNestedGraph()

```
def skdiscovery.framework.StageContainer.getMetadataNestedGraph (
    self )
```

Get the nested graph for the container.

Returns

String: Stage container subgraph

6.44.3.3 getMetadataNestedTypes()

```
def skdiscovery.framework.StageContainer.getMetadataNestedTypes (
    self )
```

Get the metadata along with container type.

Returns

string of container and metadata

6.44.3.4 getMetadataType()

```
def skdiscovery.framework.StageContainer.getMetadataType (
    self )
```

Get metadata type.

Returns

String: container type

6.44.3.5 getObjects()

```
def skdiscovery.framework.StageContainer.getObjects (
    self )
```

Return the obj_content in a list.

Returns

Contained object in a list

6.44.3.6 perturb()

```
def skdiscovery.framework.StageContainer.perturb (
    self )
```

Execute the obj_content perturb method.

6.44.3.7 reset()

```
def skdiscovery.framework.StageContainer.reset (
    self )
```

Execute the obj_content reset method.

6.44.3.8 run()

```
def skdiscovery.framework.StageContainer.run (
    self,
    obj_data_container )
```

Execute the obj_content run method.

Parameters

<i>obj_data_container</i>	Data container to be passed to the held obj_content's run method
---------------------------	--

6.44.4 Member Data Documentation

6.44.4.1 obj_content

```
skdiscovery.framework.StageContainer.obj_content
```

6.44.4.2 perturbmethod

```
skdiscovery.framework.StageContainer.perturbmethod
```

6.44.4.3 resetmethod

```
skdiscovery.framework.StageContainer.resetmethod
```

6.44.4.4 runmethod

```
skdiscovery.framework.StageContainer.runmethod
```

The documentation for this class was generated from the following file:

- framework/[stagecontainers.py](#)

6.45 skdiscovery.framework.StageContainerAlternative Class Reference

Public Member Functions

- def [__init__](#) (self, [list_stagecontainers](#))
- def [run](#) (self, obj_data_container)
- def [perturb](#) (self)
- def [getMetadata](#) (self)
- def [getObjects](#) (self)
- def [reset](#) (self)
- def [getMetadataType](#) (self)
- def [getMetadataNestedTypes](#) (self)
- def [getMetadataNestedGraph](#) (self)

Public Attributes

- [list_stagecontainers](#)
- [currentContainer](#)

Static Public Attributes

- list [currentContainer](#) = []

6.45.1 Detailed Description

Stage Container that holds a list of stage containers and randomly chooses one to use.

6.45.2 Constructor & Destructor Documentation

6.45.2.1 __init__()

```
def skdiscovery.framework.StageContainerAlternative.__init__ (
    self,
    list_stagecontainers )
```

Initialize the [StageContainerAlternative](#).

Parameters

<i>list_stagecontainers</i>	List of stage containers
-----------------------------	--------------------------

6.45.3 Member Function Documentation**6.45.3.1 getMetadata()**

```
def skdiscovery.framework.StageContainerAlternative.getMetadata (  
    self )
```

Return metadata from the current container.

Returns

metadata from the currently selected container

6.45.3.2 getMetadataNestedGraph()

```
def skdiscovery.framework.StageContainerAlternative.getMetadataNestedGraph (  
    self )
```

Get the nested graph for the container.

Returns

String: Container subgraph

6.45.3.3 getMetadataNestedTypes()

```
def skdiscovery.framework.StageContainerAlternative.getMetadataNestedTypes (  
    self )
```

Get the metadata along with container type.

Returns

string of container and metadata

6.45.3.4 getMetadataType()

```
def skdiscovery.framework.StageContainerAlternative.getMetadataType (
    self )
```

Get metadata type.

Returns

String: container type

6.45.3.5 getObjects()

```
def skdiscovery.framework.StageContainerAlternative.getObjects (
    self )
```

retrieve the current container as a list

Returns

Current container being used as a list

6.45.3.6 perturb()

```
def skdiscovery.framework.StageContainerAlternative.perturb (
    self )
```

choose one of the containers as an alternative and perturb its parameters

6.45.3.7 reset()

```
def skdiscovery.framework.StageContainerAlternative.reset (
    self )
```

6.45.3.8 run()

```
def skdiscovery.framework.StageContainerAlternative.run (
    self,
    obj_data_container )
```

Run the currently selected stage container.

Parameters

<i>obj_datacontainer</i>	Data container to be passed to the current stagecontainer
--------------------------	---

6.45.4 Member Data Documentation

6.45.4.1 currentContainer [1/2]

```
list skdiscovery.framework.StageContainerAlternative.currentContainer = [] [static]
```

6.45.4.2 currentContainer [2/2]

```
skdiscovery.framework.StageContainerAlternative.currentContainer
```

6.45.4.3 list_stagecontainers

```
skdiscovery.framework.StageContainerAlternative.list_stagecontainers
```

The documentation for this class was generated from the following file:

- framework/[stagecontainers.py](#)

6.46 skdiscovery.framework.StageContainerIncrementalAdd Class Reference

Public Member Functions

- def [__init__](#) (self, list_stagecontainers)
- def [reset](#) (self)
- def [run](#) (self, obj_data_container)
- def [perturb](#) (self)
- def [getMetadata](#) (self)
- def [getObjects](#) (self)
- def [getMetadataType](#) (self)
- def [getMetadataNestedTypes](#) (self)
- def [getMetadataNestedGraph](#) (self)

Public Attributes

- [length](#)
- [list_AllStagecontainers](#)
- [list_currentContainers](#)
- [currentindex](#)

Static Public Attributes

- int `length` = 0
- int `currentindex` = 0
- list `list_currentContainers` = []

6.46.1 Detailed Description

In each perturb call, it incrementally adds one of the filters specified in the constructor.

6.46.2 Constructor & Destructor Documentation

6.46.2.1 `__init__()`

```
def skdiscovery.framework.StageContainerIncrementalAdd.__init__ (
    self,
    list_stagecontainers )
```

Initialize the container.

Parameters

<i>list_stagecontainers</i>	List of stage containers.
-----------------------------	---------------------------

6.46.3 Member Function Documentation

6.46.3.1 `getMetadata()`

```
def skdiscovery.framework.StageContainerIncrementalAdd.getMetadata (
    self )
```

Return the metadata from the currently used stage containers.

Returns

List of metadata from current containers

6.46.3.2 `getMetadataNestedGraph()`

```
def skdiscovery.framework.StageContainerIncrementalAdd.getMetadataNestedGraph (
    self )
```

Get the nested graph for the container.

Returns

String: Container subgraph

6.46.3.3 getMetadataNestedTypes()

```
def skdiscovery.framework.StageContainerIncrementalAdd.getMetadataNestedTypes (
    self )
```

Get the metadata along with container type.

Returns

string of container and metadata

6.46.3.4 getMetadataType()

```
def skdiscovery.framework.StageContainerIncrementalAdd.getMetadataType (
    self )
```

Get metadata type.

Returns

String: container type

6.46.3.5 getObjects()

```
def skdiscovery.framework.StageContainerIncrementalAdd.getObjects (
    self )
```

Retrieve objects in the current list of stage containers.

Returns

List of current obj_content from the current list of stage containers

6.46.3.6 perturb()

```
def skdiscovery.framework.StageContainerIncrementalAdd.perturb (
    self )
```

Add another stage container to the current list of stage containers.

6.46.3.7 reset()

```
def skdiscovery.framework.StageContainerIncrementalAdd.reset (
    self )
```

Reset the container so that it will only run the first stage container again.

6.46.3.8 run()

```
def skdiscovery.framework.StageContainerIncrementalAdd.run (
    self,
    obj_data_container )
```

Run the current list of stage containers.

6.46.4 Member Data Documentation

6.46.4.1 currentindex [1/2]

```
int skdiscovery.framework.StageContainerIncrementalAdd.currentindex = 0 [static]
```

6.46.4.2 currentindex [2/2]

```
skdiscovery.framework.StageContainerIncrementalAdd.currentindex
```

6.46.4.3 length [1/2]

```
int skdiscovery.framework.StageContainerIncrementalAdd.length = 0 [static]
```

6.46.4.4 length [2/2]

```
skdiscovery.framework.StageContainerIncrementalAdd.length
```

6.46.4.5 list_AllStagecontainers

```
skdiscovery.framework.StageContainerIncrementalAdd.list_AllStagecontainers
```

6.46.4.6 list_currentContainers [1/2]

```
list skdiscovery.framework.StageContainerIncrementalAdd.list_currentContainers = [] [static]
```

6.46.4.7 list_currentContainers [2/2]

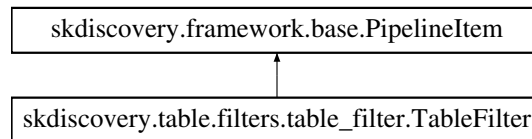
```
skdiscovery.framework.StageContainerIncrementalAdd.list_currentContainers
```

The documentation for this class was generated from the following file:

- framework/[stagecontainers.py](#)

6.47 skdiscovery.table.filters.table_filter.TableFilter Class Reference

Inheritance diagram for skdiscovery.table.filters.table_filter.TableFilter:



Public Member Functions

- `def __init__(self, str_description, ap_paramList)`
- `def process(self, obj_data)`
- `def perturbParams(self)`
- `def resetParams(self)`
- `def __str__(self)`
- `def getMetadata(self)`

Public Attributes

- `str_description`
- `ap_paramList`
- `ap_paramNames`

6.47.1 Detailed Description

This class removes tables based on their label.

6.47.2 Constructor & Destructor Documentation

6.47.2.1 __init__()

```
def skdiscovery.table.filters.table_filter.TableFilter.__init__(
    self,
    str_description,
    ap_paramList )
```

Initialize Table Filter.

Parameters

<code>str_description</code>	String describing this filter
<code>ap_paramList[ap_label_list]</code>	AutoList of table labels to remove

6.47.3 Member Function Documentation

6.47.3.1 __str__()

```
def skdiscovery.framework.PipelineItem.__str__ (
    self ) [inherited]
```

String representation of object.

Returns

String listing all current parameters

6.47.3.2 getMetadata()

```
def skdiscovery.framework.PipelineItem.getMetadata (
    self ) [inherited]
```

Retrieve metadata about filter.

Returns

String containing the item description and current parameters for filter.

6.47.3.3 perturbParams()

```
def skdiscovery.framework.PipelineItem.perturbParams (
    self ) [inherited]
```

choose other random value for all parameters

6.47.3.4 process()

```
def skdiscovery.table.filters.table_filter.TableFilter.process (
    self,
    obj_data )
```

Apply geolocation filter to data set.

Parameters

<i>obj_data</i>	Table data wrapper
-----------------	--------------------

6.47.3.5 resetParams()

```
def skdiscovery.framework.PipelineItem.resetParams (
    self ) [inherited]
```

set all parameters to initial value

6.47.4 Member Data Documentation

6.47.4.1 ap_paramList

```
skdiscovery.framework.PipelineItem.ap_paramList [inherited]
```

6.47.4.2 ap_paramNames

```
skdiscovery.framework.PipelineItem.ap_paramNames [inherited]
```

6.47.4.3 str_description

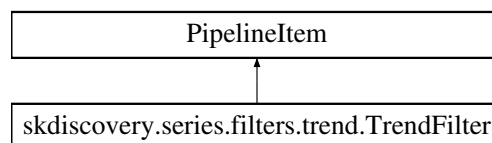
```
skdiscovery.framework.PipelineItem.str_description [inherited]
```

The documentation for this class was generated from the following file:

- [table/filters/table_filter.py](#)

6.48 skdiscovery.series.filters.TrendFilter Class Reference

Inheritance diagram for skdiscovery.series.filters.TrendFilter:



Public Member Functions

- def [__init__](#) (self, str_description, ap_paramList)
- def [process](#) (self, obj_data)

Public Attributes

- [ap_paramNames](#)

6.48.1 Detailed Description

Trend Filter that removes linear and sinusoidal (annual, semi-annual) trends on series data.

6.48.2 Constructor & Destructor Documentation

6.48.2.1 `__init__()`

```
def skdiscovery.series.filters.TrendFilter.__init__ (
    self,
    str_description,
    ap_paramList )
```

Initialize Trend Filter.

Parameters

<i>str_description</i>	String describing filter
<i>ap_paramList</i> [<i>list_trendTypes</i>]	List of trend types. List can contain any mix of "linear", "annual", or "semiannual". The default is to remove the linear, annual, and semiannual trends

6.48.3 Member Function Documentation

6.48.3.1 `process()`

```
def skdiscovery.series.filters.TrendFilter.process (
    self,
    obj_data )
```

Apply trend filter to data set.

Parameters

<i>obj_data</i>	Input data. Changes are made in place.
-----------------	--

6.48.4 Member Data Documentation

6.48.4.1 `ap_paramNames`

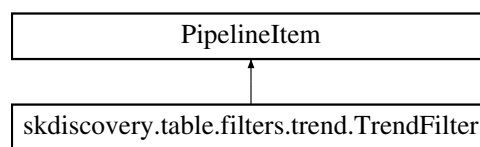
`skdiscovery.series.filters.TrendFilter.ap_paramNames`

The documentation for this class was generated from the following file:

- `series/filters/trend.py`

6.49 `skdiscovery.table.filters.TrendFilter` Class Reference

Inheritance diagram for `skdiscovery.table.filters.TrendFilter`:



Public Member Functions

- `def __init__(self, str_description, ap_paramList, columns=None)`
- `def process(self, obj_data)`

Public Attributes

- `columns`
- `ap_paramNames`

6.49.1 Detailed Description

Trend Filter that removes linear and sinusoidal (annual, semi-annual) trends on series data.

Works on table data

6.49.2 Constructor & Destructor Documentation

6.49.2.1 `__init__()`

```

def skdiscovery.table.filters.TrendFilter.__init__ (
    self,
    str_description,
    ap_paramList,
    columns = None )
  
```

Initialize Trend Filter.

Parameters

<i>str_description</i>	String describing filter [list_trendTypes]: List of trend types. List can contain "linear", "annual", or "semiannual"
------------------------	---

6.49.3 Member Function Documentation

6.49.3.1 process()

```
def skdiscovery.table.filters.TrendFilter.process (
    self,
    obj_data )
```

Apply trend filter to data set.

Parameters

<i>obj_data</i>	Input data. Changes are made in place.
-----------------	--

6.49.4 Member Data Documentation

6.49.4.1 ap_paramNames

```
skdiscovery.table.filters.TrendFilter.ap_paramNames
```

6.49.4.2 columns

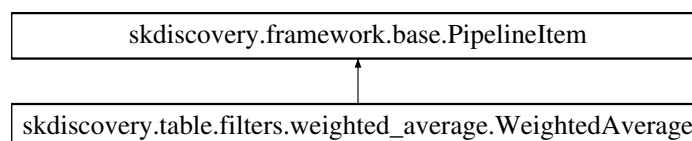
```
skdiscovery.table.filters.TrendFilter.columns
```

The documentation for this class was generated from the following file:

- [table/filters/trend.py](#)

6.50 skdiscovery.table.filters.weighted_average.WeightedAverage Class Reference

Inheritance diagram for skdiscovery.table.filters.weighted_average.WeightedAverage:



Public Member Functions

- `def __init__ (self, str_description, ap_paramList, column_names, std_dev_column_names=None)`
- `def process (self, obj_data)`
- `def perturbParams (self)`
- `def resetParams (self)`
- `def __str__ (self)`
- `def getMetadata (self)`

Public Attributes

- `column_names`
- `std_dev_column_names`
- `str_description`
- `ap_paramList`
- `ap_paramNames`

6.50.1 Detailed Description

This filter performs a rolling weighted average using standard deviations as weight.

6.50.2 Constructor & Destructor Documentation

6.50.2.1 __init__()

```
def skdiscovery.table.filters.weighted_average.WeightedAverage.__init__ (
    self,
    str_description,
    ap_paramList,
    column_names,
    std_dev_column_names = None )
```

Initializes a [WeightedAverage](#) object.

Parameters

<i>str_description</i>	String describing filter
<i>ap_paramList[window]</i>	Window to use for computing rolling weighted average
<i>column_names</i>	Names of columns to apply the weighted average
<i>std_dev_column_names</i>	Names of columns of the standard deviations. If none a regular mean is computed.

6.50.3 Member Function Documentation

6.50.3.1 `__str__()`

```
def skdiscovery.framework.PipelineItem.__str__ (
    self ) [inherited]
```

String representation of object.

Returns

String listing all current parameters

6.50.3.2 `getMetadata()`

```
def skdiscovery.framework.PipelineItem.getMetadata (
    self ) [inherited]
```

Retrieve metadata about filter.

Returns

String containing the item description and current parameters for filter.

6.50.3.3 `perturbParams()`

```
def skdiscovery.framework.PipelineItem.perturbParams (
    self ) [inherited]
```

choose other random value for all parameters

6.50.3.4 `process()`

```
def skdiscovery.table.filters.weighted_average.WeightedAverage.process (
    self,
    obj_data )
```

6.50.3.5 `resetParams()`

```
def skdiscovery.framework.PipelineItem.resetParams (
    self ) [inherited]
```

set all parameters to initial value

6.50.4 Member Data Documentation

6.50.4.1 `ap_paramList`

`skdiscovery.framework.PipelineItem.ap_paramList` [inherited]

6.50.4.2 `ap_paramNames`

`skdiscovery.framework.PipelineItem.ap_paramNames` [inherited]

6.50.4.3 `column_names`

`skdiscovery.table.filters.weighted_average.WeightedAverage.column_names`

6.50.4.4 `std_dev_column_names`

`skdiscovery.table.filters.weighted_average.WeightedAverage.std_dev_column_names`

6.50.4.5 `str_description`

`skdiscovery.framework.PipelineItem.str_description` [inherited]

The documentation for this class was generated from the following file:

- [table/filters/weighted_average.py](#)

Chapter 7

File Documentation

7.1 framework/base.py File Reference

Classes

- class [skdiscovery.framework.PipelineItem](#)

Namespaces

- [skdiscovery.framework.base](#)

7.2 framework/discoverypipeline.py File Reference

Classes

- class [skdiscovery.DiscoveryPipeline](#)

Namespaces

- [skdiscovery.framework.discoverypipeline](#)

7.3 framework/stagecontainers.py File Reference

Classes

- class [skdiscovery.framework.StageContainer](#)
- class [skdiscovery.framework.StageContainerAlternative](#)
- class [skdiscovery.framework.StageContainerIncrementalAdd](#)

Namespaces

- [skdiscovery.framework.stagecontainers](#)

7.4 generic/accumulators/data.py File Reference

Classes

- class [skdiscovery.generic.accumulators.DataAccumulator](#)

Namespaces

- [skdiscovery.generic.accumulators.data](#)

7.5 generic/accumulators/gpshplotter.py File Reference

Classes

- class [skdiscovery.generic.accumulators.GPSHPlotter](#)

Namespaces

- [skdiscovery.generic.accumulators.gpshplotter](#)

7.6 generic/accumulators/hcluster.py File Reference

Classes

- class [skdiscovery.generic.accumulators.HCluster](#)

Namespaces

- [skdiscovery.generic.accumulators.hcluster](#)

7.7 series/accumulators/plotter.py File Reference

Classes

- class [skdiscovery.series.accumulators.Plotter](#)

Namespaces

- [skdiscovery.series.accumulators.plotter](#)

7.8 table/accumulators/plotter.py File Reference

Classes

- class [skdiscovery.table.accumulators.Plotter](#)

Namespaces

- [skdiscovery.table.accumulators.plotter](#)

7.9 series/analysis/correlate.py File Reference

Classes

- class [skdiscovery.series.analysis.Correlate](#)

Namespaces

- [skdiscovery.series.analysis.correlate](#)

7.10 table/analysis/correlate.py File Reference

Classes

- class [skdiscovery.table.analysis.Correlate](#)

Namespaces

- [skdiscovery.table.analysis.correlate](#)

7.11 series/analysis/gca.py File Reference

Classes

- class [skdiscovery.series.analysis.General_Component_Analysis](#)

Namespaces

- [skdiscovery.series.analysis.gca](#)

7.12 table/analysis/gca.py File Reference

Classes

- class [skdiscovery.table.analysis.General_Component_Analysis](#)

Namespaces

- [skdiscovery.table.analysis.gca](#)

7.13 series/analysis/mogi.py File Reference

Classes

- class [skdiscovery.series.analysis.Mogi_Inversion](#)

Namespaces

- [skdiscovery.series.analysis.mogi](#)

Functions

- def [skdiscovery.series.analysis.MogiVectors](#) (mogi_res, station_lat_list, station_lon_list, flag3D=False)

7.14 table/analysis/mogi.py File Reference

Classes

- class [skdiscovery.table.analysis.Mogi_Inversion](#)

Namespaces

- [skdiscovery.table.analysis.mogi](#)

Functions

- def [skdiscovery.table.analysis.MogiVectors](#) (mogi_res, station_lat_list, station_lon_list, flag3D=False)

7.15 series/filters/dataremover.py File Reference

Classes

- class [skdiscovery.series.filters.DataRemover](#)

Namespaces

- [skdiscovery.series.filters.dataremover](#)

7.16 table/filters/dataremover.py File Reference

Classes

- class [skdiscovery.table.filters.DataRemover](#)

Namespaces

- [skdiscovery.table.filters.dataremover](#)

7.17 series/filters/hyperbolictan.py File Reference

Classes

- class [skdiscovery.series.filters.HTanFilter](#)

Namespaces

- [skdiscovery.series.filters.hyperbolictan](#)

7.18 table/filters/hyperbolictan.py File Reference

Classes

- class [skdiscovery.table.filters.HTanFilter](#)

Namespaces

- [skdiscovery.table.filters.hyperbolictan](#)

7.19 series/filters/interpolate.py File Reference

Classes

- class [skdiscovery.series.filters.InterpolateFilter](#)

Namespaces

- [skdiscovery.series.filters.interpolate](#)

7.20 table/filters/interpolate.py File Reference

Classes

- class [skdiscovery.table.filters.InterpolateFilter](#)

Namespaces

- [skdiscovery.table.filters.interpolate](#)

7.21 series/filters/kalman.py File Reference

Classes

- class [skdiscovery.series.filters.KalmanFilter](#)

Namespaces

- [skdiscovery.series.filters.kalman](#)

7.22 table/filters/kalman.py File Reference

Classes

- class [skdiscovery.table.filters.KalmanFilter](#)

Namespaces

- [skdiscovery.table.filters.kalman](#)

7.23 series/filters/lowpass.py File Reference

Classes

- class [skdiscovery.series.filters.LowPassFilter](#)

Namespaces

- [skdiscovery.series.filters.lowpass](#)

7.24 table/filters/lowpass.py File Reference

Classes

- class [skdiscovery.table.filters.LowPassFilter](#)

Namespaces

- [skdiscovery.table.filters.lowpass](#)

7.25 series/filters/median.py File Reference

Classes

- class [skdiscovery.series.filters.MedianFilter](#)

Namespaces

- [skdiscovery.series.filters.median](#)

7.26 table/filters/median.py File Reference

Classes

- class [skdiscovery.table.filters.MedianFilter](#)

Namespaces

- [skdiscovery.table.filters.median](#)

7.27 series/filters/offset_detrend.py File Reference

Classes

- class [skdiscovery.series.filters.OffsetDetrend](#)

Namespaces

- [skdiscovery.series.filters.offset_detrend](#)

7.28 table/filters/offset_detrend.py File Reference

Classes

- class [skdiscovery.table.filters.OffsetDetrend](#)

Namespaces

- [skdiscovery.table.filters.offset_detrend](#)

7.29 series/filters/trend.py File Reference

Classes

- class [skdiscovery.series.filters.TrendFilter](#)

Namespaces

- [skdiscovery.series.filters.trend](#)

7.30 table/filters/trend.py File Reference

Classes

- class [skdiscovery.table.filters.TrendFilter](#)

Namespaces

- [skdiscovery.table.filters.trend](#)

7.31 table/analysis/dbscan.py File Reference

Classes

- class [skdiscovery.table.analysis.dbscan.DBScan](#)

Namespaces

- [skdiscovery.table.analysis.dbscan](#)

7.32 table/analysis/midas.py File Reference

Classes

- class [skdiscovery.table.analysis.midas.MIDAS](#)

Namespaces

- [skdiscovery.table.analysis.midas](#)

7.33 table/analysis/outlier.py File Reference

Classes

- class [skdiscovery.table.analysis.outlier.Outlier](#)

Namespaces

- [skdiscovery.table.analysis.outlier](#)

7.34 table/analysis/skew.py File Reference

Classes

- class [skdiscovery.table.analysis.skew.Skew](#)

Namespaces

- [skdiscovery.table.analysis.skew](#)

7.35 table/filters/antenna_offset.py File Reference

Classes

- class [skdiscovery.table.filters.antenna_offset.AntennaOffset](#)

Namespaces

- [skdiscovery.table.filters.antenna_offset](#)

7.36 table/filters/calibrate_py File Reference

Classes

- class [skdiscovery.table.filters.calibrate_CalibrateGRACE](#)

Namespaces

- [skdiscovery.table.filters.calibrate_grace](#)

7.37 table/filters/combine_columns.py File Reference

Classes

- class [skdiscovery.table.filters.combine_columns.CombineColumns](#)

Namespaces

- [skdiscovery.table.filters.combine_columns](#)

7.38 table/filters/geolocation.py File Reference

Classes

- class [skdiscovery.table.filters.geolocation.GeoLocationFilter](#)

Namespaces

- [skdiscovery.table.filters.geolocation](#)

7.39 table/filters/propagate_nans.py File Reference

Classes

- class [skdiscovery.table.filters.propagate_nans.PropagateNaNs](#)

Namespaces

- [skdiscovery.table.filters.propagate_nans](#)

7.40 table/filters/snow_remover.py File Reference

Classes

- class [skdiscovery.table.filters.SnowRemover](#)

Namespaces

- [skdiscovery.table.filters.snow_remover](#)

7.41 table/filters/stabilization.py File Reference

Classes

- class [skdiscovery.table.filters.stabilization.StabilizationFilter](#)

Namespaces

- [skdiscovery.table.filters.stabilization](#)

7.42 table/filters/table_filter.py File Reference

Classes

- class [skdiscovery.table.filters.table_filter.TableFilter](#)

Namespaces

- [skdiscovery.table.filters.table_filter](#)

7.43 table/filters/weighted_average.py File Reference

Classes

- class [skdiscovery.table.filters.weighted_average.WeightedAverage](#)

Namespaces

- [skdiscovery.table.filters.weighted_average](#)

7.44 table/fusion/grace.py File Reference

Classes

- class [skdiscovery.table.fusion.GraceFusion](#)

Namespaces

- [skdiscovery.table.fusion.grace](#)

7.45 table/fusion/snow.py File Reference

Classes

- class [skdiscovery.table.fusion.SnowFusion](#)

Namespaces

- [skdiscovery.table.fusion.snow](#)

7.46 table/generators/catalog_generator.py File Reference

Classes

- class [skdiscovery.table.generators.catalog_generator.CatalogGenerator](#)

Namespaces

- [skdiscovery.table.generators.catalog_generator](#)

7.47 table/generators/data_generator.py File Reference

Classes

- class [skdiscovery.table.generators.data_generator.DataGenerator](#)

Namespaces

- [skdiscovery.table.generators.data_generator](#)

7.48 utilities/amazon_control.py File Reference

Namespaces

- [skdiscovery.utilities.amazon_control](#)

Functions

- def [skdiscovery.utilities.amazon_control.init](#) (in_aws_access_key, in_aws_secret, in_aws_region, in_aws_security_group, in_aws_key_name, in_pem_file)
- def [skdiscovery.utilities.amazon_control.closeDispyScheduler](#) ()
- def [skdiscovery.utilities.amazon_control.startDispyScheduler](#) ()
- def [skdiscovery.utilities.amazon_control.generateInfo](#) (instance)
- def [skdiscovery.utilities.amazon_control.updateStatus](#) ()
- def [skdiscovery.utilities.amazon_control.setNumInstances](#) (new_total_instances, instance_type, image_id)
- def [skdiscovery.utilities.amazon_control.createTunnels](#) ()
- def [skdiscovery.utilities.amazon_control.startDispyNode](#) ()
- def [skdiscovery.utilities.amazon_control.resetInstances](#) ()
- def [skdiscovery.utilities.amazon_control.reset](#) ()
- def [skdiscovery.utilities.amazon_control.close](#) ()
- def [skdiscovery.utilities.amazon_control.clearAmazonList](#) ()

Variables

- [skdiscovery.utilities.amazon_control.aws_access_key](#) = None
- [skdiscovery.utilities.amazon_control.aws_secret](#) = None
- [skdiscovery.utilities.amazon_control.aws_region](#) = None
- [skdiscovery.utilities.amazon_control.aws_security_group](#) = None
- [skdiscovery.utilities.amazon_control.aws_key_name](#) = None
- [skdiscovery.utilities.amazon_control.pem_file](#) = None
- [skdiscovery.utilities.amazon_control.ec2_res](#) = None
- [skdiscovery.utilities.amazon_control.ec2_client](#) = None
- list [skdiscovery.utilities.amazon_control.amazon_list](#) = []
- [skdiscovery.utilities.amazon_control.scheduler](#) = None
- [skdiscovery.utilities.amazon_control.popen](#) = None

7.49 utilities/amazon_gui.py File Reference

Namespaces

- [skdiscovery.utilities.amazon_gui](#)

Functions

- [def skdiscovery.utilities.amazon_gui.init \(\)](#)
- [def skdiscovery.utilities.amazon_gui.drawGUI \(\)](#)
- [def skdiscovery.utilities.amazon_gui.changeButtonState \(enabled=True\)](#)
- [def skdiscovery.utilities.amazon_gui.checkValidValues \(\)](#)

Variables

- [skdiscovery.utilities.amazon_gui.widget_dict = OrderedDict\(\)](#)
- [list skdiscovery.utilities.amazon_gui.disable_list](#)
- [list skdiscovery.utilities.amazon_gui.key_value_list](#)

7.50 utilities/astro_tools.py File Reference

Namespaces

- [skdiscovery.utilities.astro_tools](#)

Functions

- [def skdiscovery.utilities.astro_tools.z_to_v \(z\)](#)
- [def skdiscovery.utilities.astro_tools.v_to_z \(v\)](#)
- [def skdiscovery.utilities.astro_tools.angular_separation \(ra1, dec1, ra2, dec2\)](#)
- [def skdiscovery.utilities.astro_tools.move_point \(ra, dec, ang_dist, bearing\)](#)
- [def skdiscovery.utilities.astro_tools.abs_mag \(app_mag, z\)](#)
- [def skdiscovery.utilities.astro_tools.app_mag \(abs_mag, z\)](#)
- [def skdiscovery.utilities.astro_tools.nfw \(R, norm_constant, Rs, Rcore\)](#)
- [def skdiscovery.utilities.astro_tools.lf \(x, A, mstar, alpha\)](#)
- [def skdiscovery.utilities.astro_tools.dlf \(x, A, m1, a1, m2, a2\)](#)
- [def skdiscovery.utilities.astro_tools.cdf_dlf \(x, A, m1, a1, m2, a2, start=-26\)](#)
- [def skdiscovery.utilities.astro_tools.inv_cdf_dlf \(p, A, m1, a1, m2, a2, start=-26, end=-15\)](#)

7.51 utilities/config.py File Reference

Namespaces

- [skdiscovery.utilities.config](#)

Functions

- def [skdiscovery.utilities.config.getConfig](#) ()
- def [skdiscovery.utilities.config.writeConfigValue](#) (section, key, value)
- def [skdiscovery.utilities.config.getDispyPassword](#) ()
- def [skdiscovery.utilities.config.getHostName](#) ()

7.52 utilities/kalman_smoother.py File Reference

Namespaces

- [skdiscovery.utilities.kalman_smoother](#)

Functions

- def [skdiscovery.utilities.kalman_smoother.KalmanFilter](#) (in_data, t, sigma_sq, R, Pinit, x0=0, invert=False, clipping=5)
- def [skdiscovery.utilities.kalman_smoother.FitFOGMPParameters](#) (data, Pinit=100, R=1, method='brute', x0=0, clipping=5)
- def [skdiscovery.utilities.kalman_smoother.IterativeGridSearch](#) (f, args, intervals, max_iter=50, tol=0.↵1, bounds=None, prev_minimum=None, verbose=False)
- def [skdiscovery.utilities.kalman_smoother.KalmanSmoother](#) (in_data, Pinit=1e6, Restimate=1, clipping=5, method='simple', t=None, sigma_sq=None, R=1, verbose=False, max_clip_iter=10)
- def [skdiscovery.utilities.kalman_smoother.FOGM](#) (size, t, sigma_sq, R)

7.53 utilities/pbo_tools.py File Reference

Namespaces

- [skdiscovery.utilities.pbo_tools](#)

Functions

- def [skdiscovery.utilities.pbo_tools.mogi](#) (xdata, lat, lon, source_depth, amplitude)
- def [skdiscovery.utilities.pbo_tools.finite_sphere](#) (xdata, lat, lon, source_depth, amplitude, alpha_rad)
- def [skdiscovery.utilities.pbo_tools.closed_pipe](#) (xdata, lat, lon, source_depth, amplitude, pipe_delta)
- def [skdiscovery.utilities.pbo_tools.constant_open_pipe](#) (xdata, lat, lon, source_depth, amplitude, pipe_delta)
- def [skdiscovery.utilities.pbo_tools.rising_open_pipe](#) (xdata, lat, lon, source_depth, amplitude, pipe_delta, open↵_pipe_top)
- def [skdiscovery.utilities.pbo_tools.sill](#) (xdata, lat, lon, source_depth, amplitude)
- def [skdiscovery.utilities.pbo_tools.dirEigenvectors](#) (coord_list, pca_comps, pdir='H')
- def [skdiscovery.utilities.pbo_tools.datetimeToNumber](#) (in_time)

7.54 utilities/random_walks.py File Reference

Namespaces

- [skdiscovery.utilities.random_walks](#)

Functions

- def [skdiscovery.utilities.random_walks.uniform_walk](#) (pos, grid, step_size=None)
- def [skdiscovery.utilities.random_walks.gaussian_walk](#) (pos, grid, step_size=None)
- def [skdiscovery.utilities.random_walks.keep_in_bound](#) (pos, grid)

7.55 utilities/spherical_voronoi.py File Reference

Namespaces

- [skdiscovery.utilities.spherical_voronoi](#)

Functions

- def [skdiscovery.utilities.spherical_voronoi.sphericalToXYZ](#) (lat, lon, radius=1)
- def [skdiscovery.utilities.spherical_voronoi.xyzToSpherical](#) (x, y, z)
- def [skdiscovery.utilities.spherical_voronoi.find_match](#) (region_index, region_list)
- def [skdiscovery.utilities.spherical_voronoi.getVoronoiCollection](#) (data, lat_name, lon_name, bmap=None, v_name=None, full_sphere=False, max_v=.3, min_v=-0.3, cmap=matplotlib.cm.get_cmap('jet'))

7.56 utilities/ssh_reverse.py File Reference

Classes

- class [skdiscovery.utilities.ssh_reverse.ReverseTunnel](#)

Namespaces

- [skdiscovery.utilities.ssh_reverse](#)

Functions

- def [skdiscovery.utilities.ssh_reverse.print_verbose](#) (s, verbose=False)
- def [skdiscovery.utilities.ssh_reverse.handler](#) (chan, host, port, verbose=False)
- def [skdiscovery.utilities.ssh_reverse.reverse_forward_tunnel](#) (server_port, remote_host, remote_port, transport, check=30, verbose=False)

7.57 utilities/trendTools.py File Reference

Namespaces

- [skdiscovery.utilities.trendTools](#)

Functions

- def [skdiscovery.utilities.trendTools.getTrend](#) (xdata)
- def [skdiscovery.utilities.trendTools.sinuFits](#) (xdata, fitN=2, rmve=1)
- def [skdiscovery.utilities.trendTools.interpNaN](#) (data)
- def [skdiscovery.utilities.trendTools.medianFilter](#) (data, window, interpolate=True)

7.58 visualization/multi_ca_plot.py File Reference

Namespaces

- [skdiscovery.visualization.multi_ca_plot](#)

Functions

- def [skdiscovery.visualization.multiCaPlot](#) (pipeline, mogiFlag=False, offset=.15, direction='H', pca_comp=0, scaleFactor=2.5, map_res='i')

7.59 visualization/multi_dist.py File Reference

Namespaces

- [skdiscovery.visualization.multi_dist](#)

Functions

- def [skdiscovery.visualization.calc_distance_map](#) (pipeline, ap_name, ca_name, ca_type, plotFlag=True, hist←
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