

Scipy.org (<http://scipy.org/>)    Docs (<http://docs.scipy.org/>)

SciPy v0.16.1 Reference Guide (../index.html)    Signal processing (**scipy.signal**) (../signal.html)

index (../genindex.html)    modules (../py-modindex.html)

modules (../scipy-optimize-modindex.html)    next (scipy.signal.deconvolve.html)

previous (scipy.signal.filtfilt.html)

## scipy.signal.savgol\_filter

**scipy.signal.savgol\_filter**(*x, window\_length, polyorder, deriv=0, delta=1.0, axis=-1, mode='interp', cval=0.0*) [source]  
([http://github.com/scipy/scipy/blob/v0.16.1/scipy/signal/\\_savitzky\\_golay.py#L228](http://github.com/scipy/scipy/blob/v0.16.1/scipy/signal/_savitzky_golay.py#L228))

Apply a Savitzky-Golay filter to an array.

This is a 1-d filter. If *x* has dimension greater than 1, *axis* determines the axis along which the filter is applied.

**Parameters:** *x* : *array\_like*

The data to be filtered. If *x* is not a single or double precision floating point array, it will be converted to type `numpy.float64` before filtering.

**window\_length** : *int*

The length of the filter window (i.e. the number of coefficients). *window\_length* must be a positive odd integer.

**polyorder** : *int*

The order of the polynomial used to fit the samples. *polyorder* must be less than *window\_length*.

**deriv** : *int, optional*

The order of the derivative to compute. This must be a nonnegative integer. The default is 0, which means to filter the data without differentiating.

**delta** : *float, optional*

The spacing of the samples to which the filter will be applied. This is only used if *deriv* > 0. Default is 1.0.

**axis** : *int, optional*

The axis of the array *x* along which the filter is to be applied. Default is -1.

**mode** : *str, optional*

Must be 'mirror', 'constant', 'nearest', 'wrap' or 'interp'. This determines the type of extension to use for the padded signal to which the filter is applied. When *mode* is 'constant', the padding value is given by *cval*. See the Notes for more details on 'mirror', 'constant', 'wrap', and 'nearest'. When the 'interp' mode is selected (the default), no extension is used. Instead, a degree *polyorder* polynomial is fit to the last *window\_length* values of the edges, and this polynomial is used to evaluate the last *window\_length* // 2 output values.

**cval** : *scalar, optional*

Value to fill past the edges of the input if *mode* is 'constant'. Default is 0.0.

**Returns:**

*y* : *ndarray, same shape as x*

The filtered data.

**See also:**

`savgol_coeffs` ([scipy.signal.savgol\\_coeffs.html#scipy.signal.savgol\\_coeffs](https://docs.scipy.org/doc/scipy/reference/signal.savgol_coeffs.html))

## Notes

Details on the *mode* options:

**'mirror':**

Repeats the values at the edges in reverse order. The value closest to the edge is not included.

**'nearest':**

The extension contains the nearest input value.

**'constant':**

The extension contains the value given by the *cval*/argument.

**'wrap':**

The extension contains the values from the other end of the array.

For example, if the input is [1, 2, 3, 4, 5, 6, 7, 8], and *window\_length* is 7, the following shows the extended data for the various *mode* options (assuming *cval* is 0):

mode	Ext	Input	Ext
'mirror'	4 3 2	1 2 3 4 5 6 7 8	7 6 5
'nearest'	1 1 1	1 2 3 4 5 6 7 8	8 8 8
'constant'	0 0 0	1 2 3 4 5 6 7 8	0 0 0
'wrap'	6 7 8	1 2 3 4 5 6 7 8	1 2 3

*New in version 0.14.0.*

## Examples

---

```
>>> np.set_printoptions(precision=2) # For compact display.
>>> x = np.array([2, 2, 5, 2, 1, 0, 1, 4, 9])
```

Filter with a window length of 5 and a degree 2 polynomial. Use the defaults for all other parameters.

```
>>> y = savgol_filter(x, 5, 2)
array([ 1.66,  3.17,  3.54,  2.86,  0.66,  0.17,  1.  ,  4.  ,  9.  ])
```

Note that the last five values in *x* are samples of a parabola, so when *mode*='interp' (the default) is used with *polyorder*=2, the last three values are unchanged. Compare that to, for example, *mode*='nearest':

```
>>> savgol_filter(x, 5, 2, mode='nearest')
array([ 1.74,  3.03,  3.54,  2.86,  0.66,  0.17,  1.  ,  4.6 ,  7.97])
```

### Previous topic

[scipy.signal.filtfilt \(scipy.signal.filtfilt.html\)](#)

### Next topic

[scipy.signal.deconvolve \(scipy.signal.deconvolve.html\)](#)