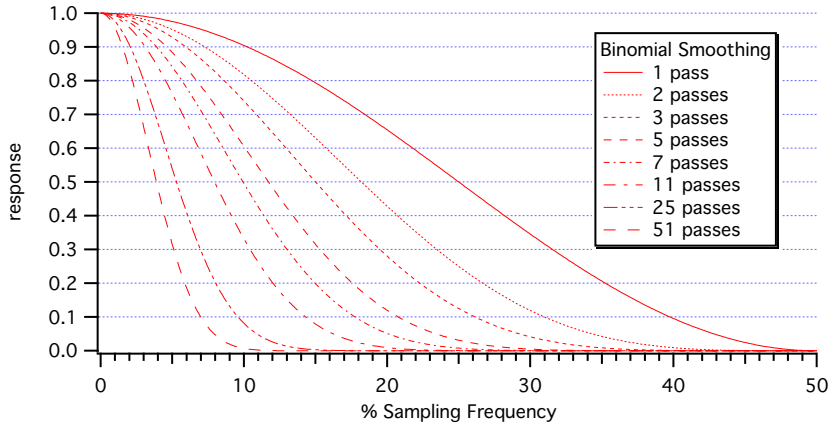
Binomial Smoothing

The Binomial smoothing operation is a Gaussian filter. It convolves your data with normalized coefficients derived from Pascal's triangle at a level equal to the Smoothing parameter. The algorithm is derived from an article by Marchand and Marmet (1983).

This graph shows the frequency response of the binomial smoothing algorithm expressed as a percentage of the sampling frequency. For example, if your data is sampled at 1000 Hz and you use 5 passes, the signal at 200 Hz (20% of the sampling frequency) will be approximately 0.1.



Savitzky-Golay Smoothing

Savitzky-Golay smoothing uses a different set of precomputed coefficients popular in the field of chemistry. It is a type of Least Squares Polynomial smoothing. The amount of smoothing is controlled by two parameters: the polynomial order and the number of points used to compute each smoothed output value. This algorithm was first proposed by A. Savitzky and M.J.E. Golay in 1964. The coefficients were subsequently corrected by others in 1972 and 1978; Igor uses the corrected coefficients.

The maximum Points value is 32767; the minimum is either 5 (2nd order) or 7 (4th order). Note that 2nd and 3rd order coefficients are the same, so we list only the 2nd order choice. Similarly, 4th and 5th order coefficients are identical.

Even though Savitzky-Golay smoothing has been widely used, there are advantages to the binomial smoothing as described by Marchand and Marmet in their article.

The following graphs show the frequency response of the Savitzky-Golay algorithm for 2nd order and 4th order smoothing. The large responses in the higher frequencies show why binomial smoothing is often a better choice.