Explanation of models

Revision 0, 8/6/2015

Table 1: Revision history

Revision	Date	Changes/Additions	Author
0	8/6/15	Initial document	Marc Delvaux

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1 Model 9

This model is the transition function described in this [math stack exchange post](). This is a C∞ function with an upper bound on the absolute value of the first derivative.

The basic function decays from 1 between 1 and 2, the implementation in model 9 starts at the average of the time series and decays to 0 between the change point and the last sample in the time series.

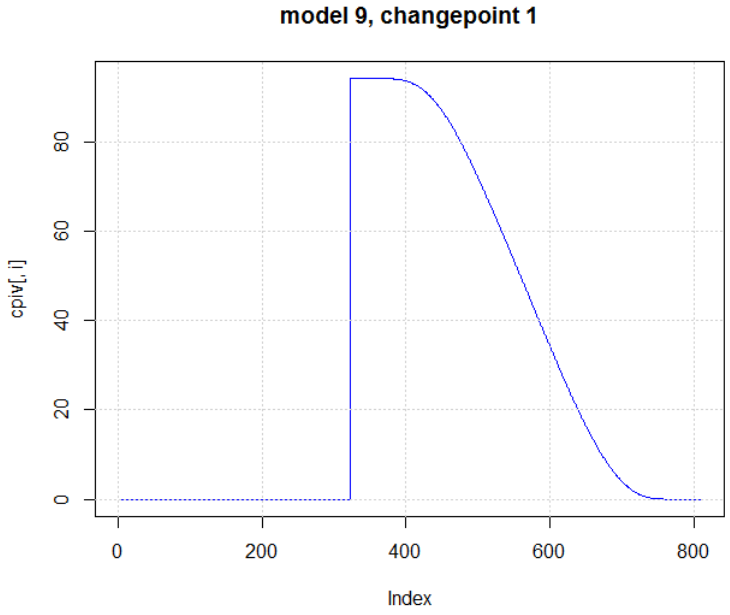

Figure 1: Model 9 general form.

2 Model 10

This model is the absolute value of a cosine with an exponentially decreasing amplitude. The parameters are:

- The start phase (expressed in samples), fixed at 0
- The start amplitude, set to twice the average of the time series
- The decay factor, set based on the number of samples to have reasonable decay
- The period, set to have 6 periods across all samples

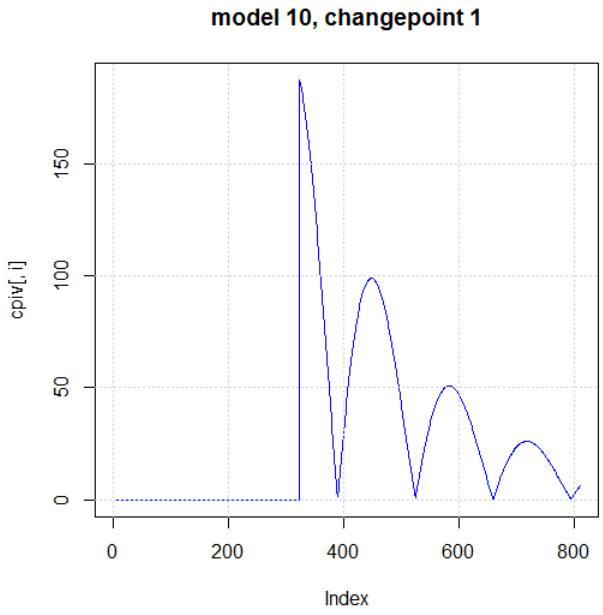

Figure 2: Model 10 general form.

3 Model 11

This model simply uses well known window functions used in DSP to calculate FFT. The specific one her is the Bartlett window function, scaled by the average of the time series. Other window functions defined in signal could be used. The window function is scaled to cover the full time series.

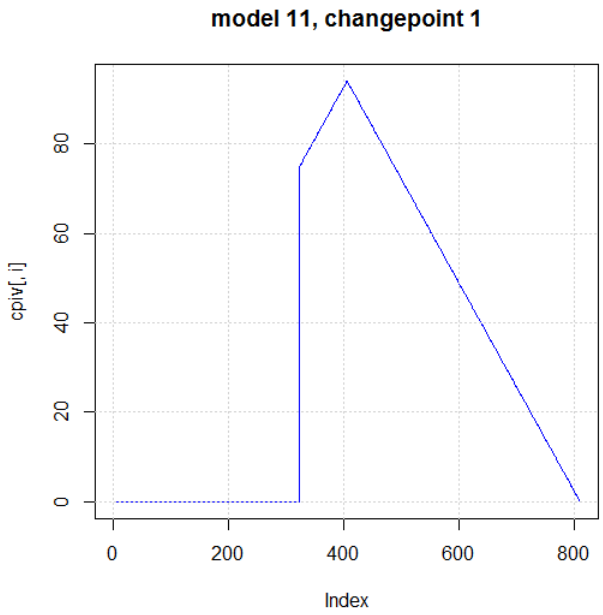

Figure 3: Model 11 general form.

4 Model 12

Model 12 is similar to model 11 but uses the flat top window. This window has negative values in general, but here we take its absolute value.

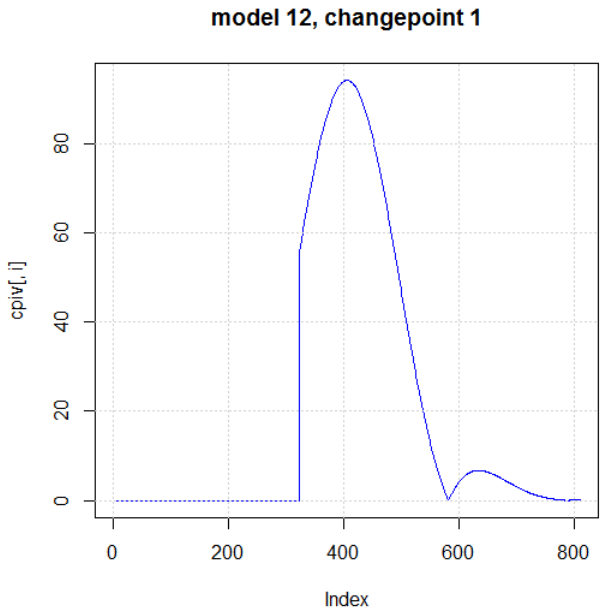

Figure 4: Model 12 general form.

5 Model 13

Model 13 is a negative exponential with a periodic modulation. The modulation is 1 + 0.5 * cosine. The parameters are:

- The start phase (expressed in samples), fixed at 0
- The start amplitude, set to twice the average of the time series
- The decay factor, set based on the number of samples to have reasonable decay
- The period, set to have 6 periods across all samples

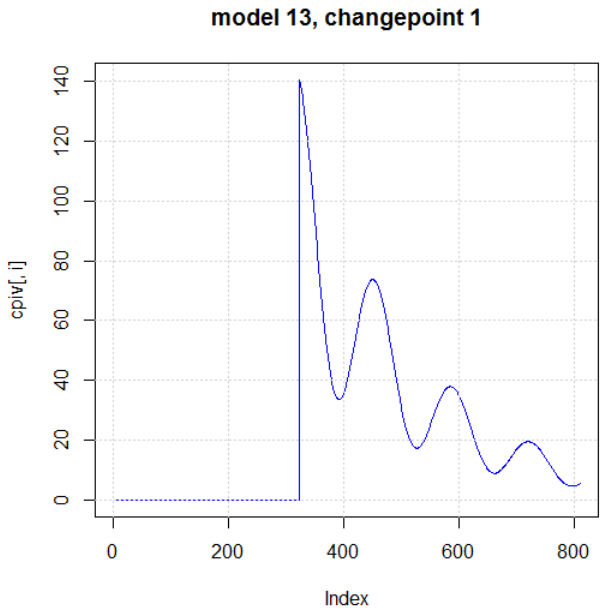

Figure 5: Model 13 general form.

6 Model 14

Model 14 is a sin(x)/x, i.e. the sinc function approach.. The parameters are:

- The period, set to have 1/2 periods across the full sample
- The amplitude, set to the average of the time series

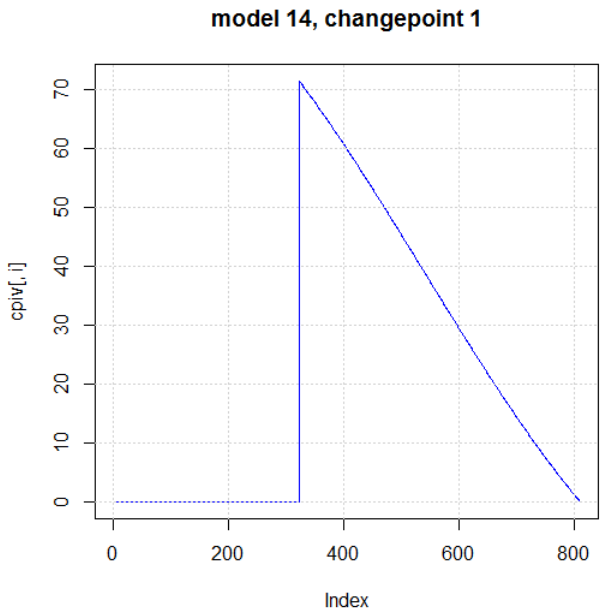

Figure 6: Model 14 general form.

7 Model 15

Model 15 is a variation of model 14, it uses the absolute value of the sinc function. The parameters are:

- The period, set to have 4 periods across the full sample
- The amplitude, set to the average of the time series

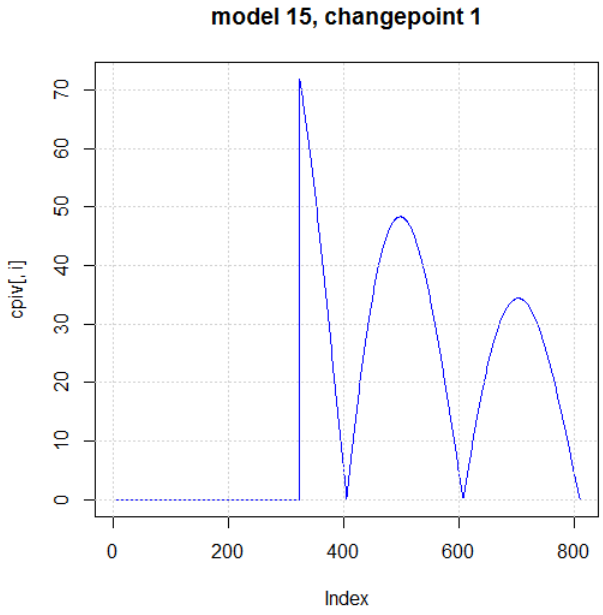

Figure 7: Model 14 general form.