Title

Cody Buntain, Christopher Natoli, Miroslav Živković

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Title

- item

Building the test statistic

$$\text{test statistic} = \frac{\sum_{t=1}^{h} \boldsymbol{e}_t}{}$$

Building the test statistic

$$\text{test statistic} = \frac{\sum_{t=1}^{h} \boldsymbol{e}_t{}^{\top} \qquad \boldsymbol{e}_t}{}$$

Building the test statistic

$$\text{test statistic} = \frac{\sum_{t=1}^{h} \boldsymbol{e}_t{}^{\top} (\hat{\Sigma})^{-1} \boldsymbol{e}_t}{h}$$

$$\hat{\Sigma} := \frac{1}{n-1} \sum_{t=1}^{n} \boldsymbol{e}_t \boldsymbol{e}_t^{\top}$$

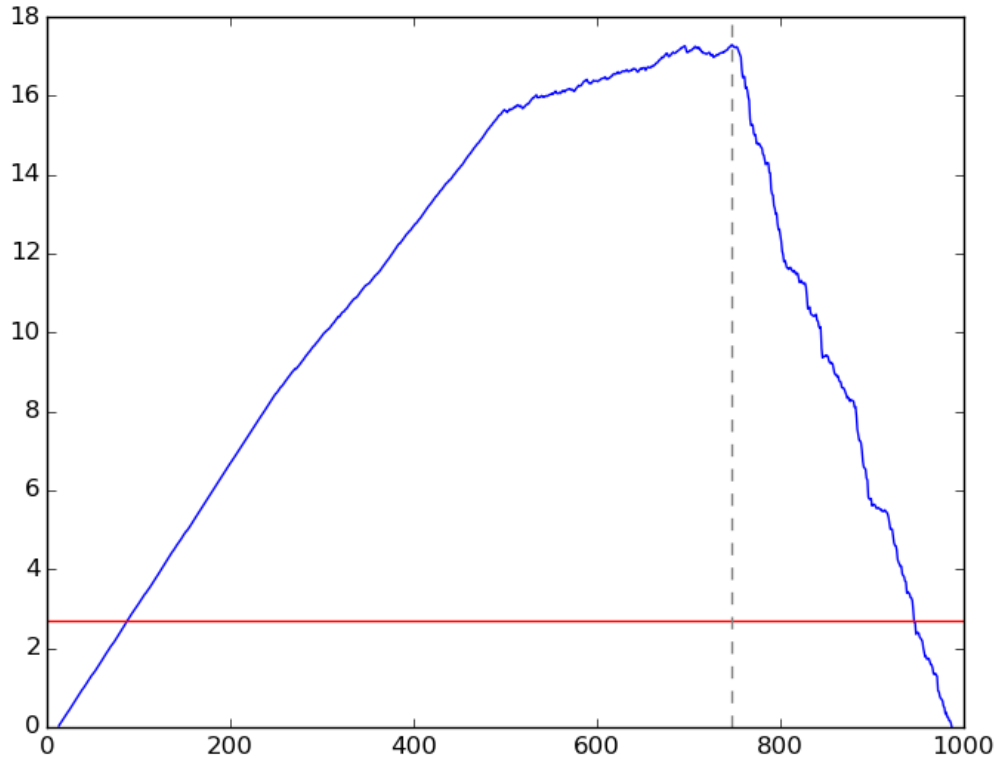
Building the test statistic

$$\text{test statistic} = \frac{\sum_{t=1}^{h} \boldsymbol{e}_t{}^{\top}(\hat{\Sigma})^{-1}\boldsymbol{e}_t}{h} - \frac{\sum_{t=1}^{n} \boldsymbol{e}_t^{\top}(\hat{\Sigma})^{-1}\boldsymbol{e}_t}{n}$$

Building the test statistic

$$\text{test statistic} = \frac{h}{\sqrt{2kn}}\left(\frac{\sum_{t=1}^{h} \boldsymbol{e}_t{}^{\top}(\hat{\Sigma})^{-1}\boldsymbol{e}_t}{h} - \frac{\sum_{t=1}^{n} \boldsymbol{e}_t^{\top}(\hat{\Sigma})^{-1}\boldsymbol{e}_t}{n}\right)$$

Finding a single changepoint



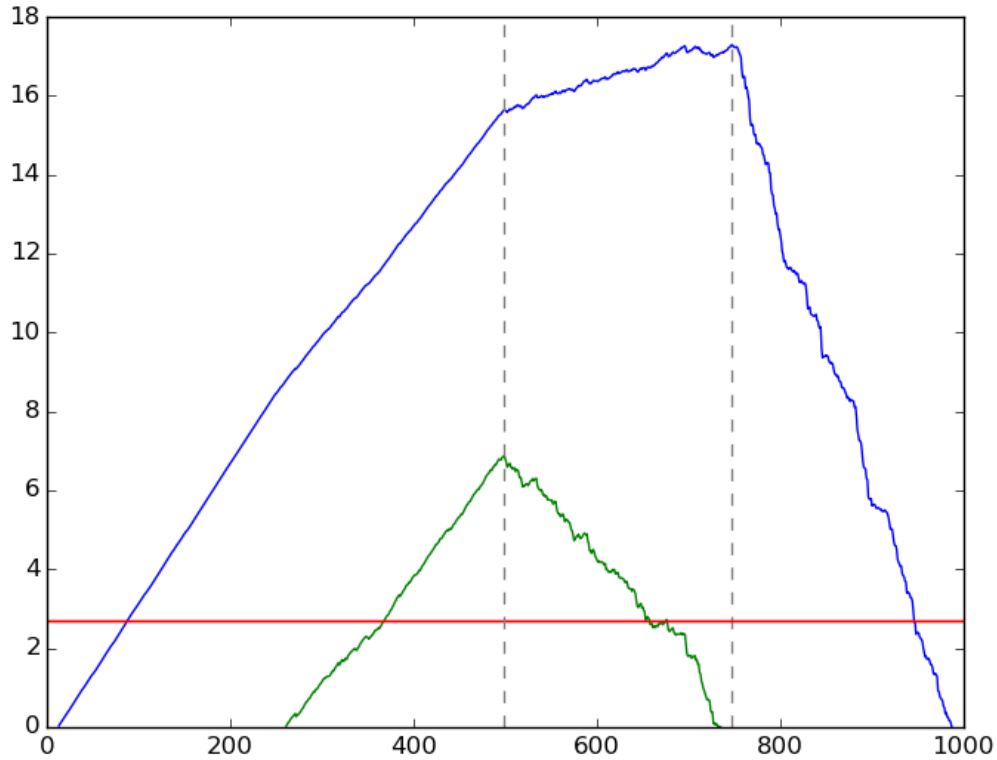
Cusum statistic for a time series with three changepoints.

Finding a single changepoint

$$\max(\text{test statistic}) = \max\left(\frac{h}{\sqrt{2kn}}\left(\frac{\sum_{t=1}^{h} \boldsymbol{e}_t^\top (\hat{\Sigma})^{-1} \boldsymbol{e}_t}{h} - \frac{\sum_{t=1}^{n} \boldsymbol{e}_t^\top (\hat{\Sigma})^{-1} \boldsymbol{e}_t}{n}\right)\right)$$
$$\xrightarrow{D} \sup\{\text{Brownian bridge}\},$$

which is a known distribution!

Finding more changepoints



Cusum statistic for a time series with three changepoints.

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