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## A p-Value for a True Change when a Cusum Stops

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When a Cusum signals an alarm, often it is not initially clear whether the alarm is true or false. We argue that in principle the observations leading to a signal may provide information on whether or not an alarm is true. The intuition behind this is that the evolution of a false alarm has a well-defined stochastic behavior, so if observations preceding the alarm were to exhibit a behavior that is significantly different, there would be reason to reject the hypothesis that the alarm is false. The upshot would be a p-value for the alarm being true.

In this talk, we will exhibit the stochastic behavior of observations that precede a false alarm and present a method for inference regarding the nature of an alarm. The method is applied to detecting a change in a context of a normal distribution involving a possible increase of a mean.

Time permitting, we will show that the comprehension of the evolution of a false alarm leads to asymptotic independence of Cusums defined on separate dependent streams, leading to a handle on the overall false alarm rate.

### Keywords

false alarm, normal distribution, Covid

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