

## Change Point Detection

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### Abstract

In this talk, I give a brief summary of change point detection in general hidden Markov models, including an epidemic model for the COVID-19 outbreak. Then present a theoretical result, in which the pre-change distribution  $f^{\theta_0}$  is given, while the post-distribution  $f^\theta$  after change is unknown. The problem is to raise an alarm as soon as possible after the distribution changes from  $f^{\theta_0}$  to  $f^\theta$ , under a restriction on the false alarms. I investigate theoretical properties of a weighted Shiriyayev-Roberts-Pollak (SRP) change point detection rule, to show that it is second-order asymptotically optimal. To illustrate the method, I apply the results to linear state space models with simulation studies.