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Title: Extinction or Explosion in a Galton–Watson Branching Process: Testing or Prediction?

Abstract:  
Testing subcriticality vs. supercriticality in a Galton–Watson branching process is a classical problem in statistical inference for stochastic processes. However, a decision-theoretic analysis shows that this problem is more complex than the literature suggests and that the basis of a standard test procedure is somewhat dubious. Fortunately, this classical testing problem usually is not the one of actual interest, because a supercritical process still may terminate with positive probability. Of more interest is the problem of predicting whether the current realization of the process will terminate or explode. This second problem, which does not seem to have been addressed before, can be formulated as a related but different hypothesis-testing problem for which a relatively simple solution is available, based on the classical Wald sequential probability ratio test. An application is given to the outbreak of pertussis (whooping cough) in Washington State in 2012.

This is joint work with Peter Guttorp.