

Title:

**Likelihood Ratio Identities and Their Applications to Sequential Analysis**

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Abstract:

Wald's likelihood ratio identity was pivotal in his development of sequential analysis six decades ago. In particular, the error probabilities of Wald's SPRT, his weight function SPRTs and subsequent invariant SPRTs have simple closed-form approximations because the stopped likelihood ratio statistics in these tests have simple two-point distributions if excess over the boundary is ignored, and Wald's likelihood ratio identity expresses these probabilities as expectations of the stopped likelihood ratio statistics. This paper gives a review of how likelihood ratio identities have been applied to analyze much more complicated sequential testing and change-point detection problems in the past two decades, and uses certain results to address an open problem concerning the asymptotic optimality of sequential generalized likelihood ratio procedures. A brief survey of these procedures is also given.