Representing e-values using convex duality

Martin Larsson[1]

[1]   Department of Mathematical Sciences, Carnegie Mellon University

Abstract:
An e-value is a nonnegative sample statistic whose expected value is at most one when computed under a given possibly composite null hypothesis. E-values can be used, for example, to construct valid statistical tests. In addition to validity, one is interested in power against appropriate alternative hypotheses, and this involves searching among all possible e-values for one with suitable optimality properties. The goal of this talk is to show, for certain types of null hypotheses, how all possible e-values can be explicitly parameterized using ideas from convex duality. I will also present a sequential version of this result, which characterizes all possible so-called test (super-) martingales. These results are intended to guide the design of sequential testing and inference procedures where an alternative hypothesis may not be specified a priori but is gradually learned as new data arrives.

Keywords:
e-values; convex duality; martingales