2nd International Symposium on
Information Geometry and its Applications
December 12-16, 2005, Tokyo

AN INFORMATION GEOMETRIC APPROACH TO UNDERSTANDING INFERENCE ON A DISCRETE SAMPLE SPACE

PAUL VOS

This talk will focus on the binomial distribution, but the ideas apply to other discrete sample spaces. A variety of "improved" confidence intervals have been suggested to replace the Clopper-Pearson interval for the binomial distribution which many consider to be too conservative (its coverage is greater than the nominal level). These alternative intervals have reasonable properties in terms of coverage and expected length. However, there are difficulties with using these alternative intervals especially when we consider applications where the sample size may increase by one or a few observations. One reason for these difficulties is that coverage and expected length, by themselves, are an inadequate description of the inference problem. Information geometries provide an elegant characterization of important statistical concepts by mapping the data to a point in a smooth manifold. To understand the problems encountered with these binomial intervals, I will use the dual geometries but the data will be mapped to a subset of the manifold. The resulting description of this binomial inference problem will be used to describe existing confidence intervals and suggest new intervals.