

Goodness-of-fit Test for Directional Data

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Abstract

In this paper, we study the problem of testing the hypothesis on whether the density f of a random variable on a sphere belongs to a given parametric class of densities. We propose two test statistics based on the L^2 and L^1 distances between a non-parametric density estimator adapted to circular data and a smoothed version of the specified density. The asymptotic distribution of the L^2 test statistic is provided under the null hypothesis and contiguous alternatives. We also consider a bootstrap method to approximate the distribution of both test statistics. Through a simulation study, we explore the moderate sample performance of the proposed tests under the null hypothesis and under different alternatives. Finally, the procedure is illustrated by analysing a real data set based on wind direction measurements.