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Testing Homogeneity in Normal Scale Mixture Models

Normal scale mixture models are a special type of the mixture models and have many applications. We propose the retooled EM-test for testing homogeneity in them. Two approaches are carried out. In one way, the estimation of the common mean is initialized by the sample mean. In the other way, to initialize, we maximize the penalized log-likelihood function. We show that the EM-test statistics asymptotically follow the simple distribution $\frac{1}{2}\chi_0^2 + \frac{1}{2}\chi_1^2$. Simulation studies show that the EM-test has accurate type I errors, and the second approach enjoys higher power than the first. Two real data examples are analyzed.