

## Asymptotic distribution and local power of the log-likelihood ratio test for mixtures: bounded and unbounded cases

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We consider the log-likelihood ratio test (LRT) for testing the number of components in a mixture of populations in a parametric family. We provide the asymptotic distribution of the LRT statistic under the null hypothesis as well as under contiguous alternatives when the parameter set is bounded. Moreover, for the simple contamination model we prove, under general assumptions, that the asymptotic local power under contiguous hypotheses may be arbitrarily close to the asymptotic level when the set of parameters is large enough. In the particular problem of normal distributions, we prove that, when the unknown mean is not a priori bounded, the asymptotic local power under contiguous hypotheses is equal to the asymptotic level.

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