A WEIGHTED MULTIVARIARE SIGN TEST FOR CLUSTER CORRELATED DATA

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We consider the multivariate location problem with cluster correlated data. A family of multivariate weighted sign tests are introduced for which observations from different clusters can receive different weights. Under weak assumptions, the test statistic is asymptotically distributed as a chi-squared random variable as the number of clusters goes to infinity. The asymptotic distribution of the test statistic is also given for a local alternative model under multivariate normality. Optimal weights maximizing Pitman asymptotic efficiency are provided. These weights depend on the cluster sizes and on the intracluster correlation. Several approaches for estimating these weights are presented. Using Pitman asymptotic efficiency, it is shown that appropriate weighting can increase substantially the efficiency compared to a test that gives the same weight to each cluster. A multivariate weighted t-test is also introduced. The finite sample performance of the weighted sign test is explored through a simulation study which shows that the proposed approach is very competitive.