Robustness of AIC Based Criterion for Selecting the Number of Clusters

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Abstract A method to detect outliers in multivariate data based on clustering and robust estimators was introduced in Santos-Pereira and Pires (2002). In order to evaluate the performance of the method, we conducted a simulation study with several distributional situations, three clustering methods (K-means, pam and mcclus) and three pairs of location-scatter estimators. One of the difficulties encountered in the implementation of the method, was the choice of the number of clusters, k, as well as the clustering method and the location-scatter estimators. At that time we suggested to apply several values of k (e.g. from 1 to a maximum possible k which depends on the number of observations and on the number of variables) and select k minimizing

$$AIC = -2 \sum_{i=1}^{n} \log \hat{f}(x_i) + 2k \left( p + \frac{p(p+1)}{2} \right),$$

with

$$\hat{f}(x) = \sum_{j=1}^{k} \frac{n_j}{n_T} f_N(x; \hat{\mu}_j, \hat{\Sigma}_j),$$

and $n_T = \sum_{j=1}^{k} n_j$.

(see Sakamoto et al. (1988) and Ronchetti (1997)).

In this communication we discuss the robustness of this AIC based criterion for choosing the number of clusters k, by using some distributional situations described in Santos-Pereira and Pires (2002) with and without outliers.

Keywords: AIC, outliers, robust estimators

References

