CrossMark

Empirical identifiability in finite mixture models

Daeyoung Kim · Bruce G. Lindsay

Abstract Although the parameters in a finite mixture model are unidentifiable, there is a form of local identifiability guaranteeing the existence of the identifiable parameter regions. To verify its existence, practitioners use the Fisher information on the estimated parameters. However, there exist model/data situations where local identifiability based on Fisher information does not correspond to that based on the likelihood. In this paper, we propose a method to empirically measure degree of local identifiability on the estimated parameters, *empirical identifiability*, based on one's ability to construct an identifiable likelihood set. From a detailed topological study of the likelihood region, we show that for any given data set and mixture model, there typically exists limited range of confidence levels where the likelihood region has a natural partition into identifiable subsets. At confidence levels that are too high, there is no natural way to use the likelihood to resolve the identifiability problem.