ASSESSING SIGNIFICANCE IN FINITE MIXTURE MODELS

by

Ranjan Maitra
Department of Statistics
Iowa State University
E-mail: maitray@iastate.edu

and

Volodymyr Melnykov
Department of Statistics
North Dakota State University
E-mail: volodymyr.melnykov@ndsu.edu

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ABSTRACT

A new method is proposed to quantify significance in finite mixture models. The basis for this new methodology is an approach that calculates the $p$-value for testing a simpler model against a more complicated one in a way that is able to obviate the failure of regularity conditions for likelihood ratio tests. The developed testing procedure allows for pairwise comparison of any two mixture models with failure to reject the null hypothesis implying insignificant likelihood improvement under the more complex model. This leads to a comprehensive tool called a quantitation map which displays significance and quantitatively summarizes all model comparisons. This map can be used, among other applications, to decide on the best among a set of candidate mixture models. The performance of the procedure is illustrated on some classification datasets and a comprehensive simulation study. The methodology is also applied to a study of voting preferences of senators in the 109th US Congress.