Estimating and designing for mixtures of distributions

Jesús López–Fidalgo, Raúl Martín–Martín, and Maria Rodríguez–Hernández

University of Castile-La Mancha, Spain

Abstract

Maximum Likelihood Estimates (MLE) for a model with mixture of distributions is usually an unaffordable task from a computational point of view, even for simple cases when the number of distributions is known. The EM algorithm is frequently used in this context to approximate the MLE. Louis (1982) in a celebrated paper provides the information matrix for the EM ("pure") estimates. The EM algorithm provides approximate MLE, thus the information matrix to be used must be the Fisher information matrix for the marginal log-likelihood of the observations. Pure EM estimates are computed and compared to the MLE. Some comparisons of the two information matrices are also performed. Finally, optimal designs are computed for a mixture of normal distributions with modeled means throughout an explanatory variable.

References

Louis, T.A. (1982). Finding the observed information matrix when using the the EM algorithm. *J. R. Stat. Soc. Ser. B 44(2)*, 226–233.