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Goodness-of-fit tests and robust regime selection procedure for general hidden Markov models

This work presents powerful goodness-of-fit procedures for general Markov regime-switching models with covariates when the outcomes are continuous, discrete, or zero-inflated. The EM algorithm is used for the estimation method and a randomized Rosenblatt's transform is applied to obtain formal goodness-of-fit tests. The latter then served for selecting the number of regimes. Numerical experiments are used to assess the finite sample performance of the proposed methodologies and to compare with other criteria for the selection of models, including Bayesian methods. Finally, the proposed methodologies are implemented in an R package available on CRAN.