

# Estimating variability from capture-recapture data using the SAEM algorithm

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**Abstract:** Hidden Markov models are now well spread in capture-recapture analysis, as an appropriate tool to managed correlation between states for two consecutive dates. However, some individual differences or different kind of autocorrelation may remain unaccounted in such models while being present in the data. Mixed hidden Markov models (MHMM) were proposed by Altmann (2007) by introducing random effects to capture differences in the observation and the state processes. The additional variability included in the model may have some biological meaning and may improve the precision of estimators. However fitting such models remains challenging inside a frequentist framework. We applied the SAEM algorithm used by Delattre et Lavielle (2012) to a MHMM with several individual random effects. In addition, we propose a variant of this algorithm to fit a model with a time random effect. We test the algorithms through 1) capture-recapture simulated data sets and 2) a real case study.

## References

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