Hidden Markov and related models as powerful and versatile devices for modelling ecological time series

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Abstract: The class of hidden Markov models (HMMs) is fairly easily accessible, yet it constitutes an extremely powerful toolbox for conducting statistical inference in surprisingly many ecological scenarios. In this talk, I will briefly review some of the key inferential tools available for HMMs, including maximum likelihood estimation, state decoding and pseudo-residuals for model checking. I will also give a short overview of some extensions of the basic HMM framework that I believe to be particularly relevant in ecology. I will attempt to illustrate the usefulness of these models by sketching various areas of ecological applications, including animal movement, capture-recapture, abundance estimation and population modelling.