

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

R. Langrock

Centre for Research into Ecological and Environmental Modelling
School of Mathematics and Statistics
University of St Andrews
St Andrews, Scotland, UK
roland.langrock@st-and.ac.uk

Keywords: latent-state model; maximum likelihood; state-space model; Viterbi algorithm

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.