

Byron J. T. Morgan (National Centre for Statistical Ecology, University of Kent)

Applications of Hidden Markov Models in Ecology

Abstract

Several standard models in common use in Statistical Ecology can be formulated in terms of hidden Markov Models (Zucchini et al, 2016). In this talk we summarise the essentials of hidden Markov modelling, including the forward algorithm, which provides the unifying structure for likelihood construction, and for efficient likelihood optimisation. Different applications require particular modifications, and this is shown through a range of illustrations, involving batch-marked animals in capture recapture, dynamic stochastic models for seasonal insect data, integrated population modelling, modelling population survey data and multi-species indicators.

References

1. Cowan, L., Besbeas, P. T., Morgan, B.J.T. and Schwarz, C. (2017) Hidden Markov models for extended batch data, *Biometrics*, 73, 1321-1331.
2. Besbeas, P. T. and Morgan, B.J.T. (2018) A general framework for modelling population survey data, in revision.
3. Besbeas, P. T. and Morgan, B.J.T. (2019) Exact inference for integrated population modeling, *Biometrics*, in press.
4. Zucchini, W., MacDonald, I. L. and Longrock, R. (2016) *Hidden Markov Models for Time Series: An Introduction using R*, Second Edition, Chapman Hall, CRC press, Boca Raton.