Title

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Abstract

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1 Introduction

From the discipline of psychology to ecology and from the field of bioinformatics to economy: the Hidden Markov models (HMMs) provides a convenient framework for analyzing time series behavior. (Rabiner, 1989) (Visser, 2011) (Zucchini, MacDonald Langrock, 2016). One analyzing time series data with the HMM does not have to rely on averaging cross-sectional data, but can rather model and study a process in its entirety (Visser, 2011). The HMM is flexible, stemming amongst other things from the fact that the observed sequence is not required to adhere to a single distribution: the sequence is rather allowed to be of multimodal nature (Zucchini et al., 2016) (Visser, 2011). Consequently, a time series adhering to many different distributions simultaneously can be modelled with the HMM, rendering the framework particularly flexible, and hereby suitable, for a wide range of applications within a wide range of different disciplines. These distinctive disciplines include for instance the field of speech recognition, in which the HMM is utilized as signaling model (Rabiner, 1989), the field of bioinformatics in which the HMM is utilized to analyze genome sequences (Eddy, 1998), the field of econometrics and finance in which the HMM is utilized to predict the volatility of stock markets (Mamon Elliot, 2007), the field of ecology in which the HMM is utilized to model wildlife movement patterns (Langrock et al., 2012) and the field of behavioral neurosciences in which the HMM is utilized to model the behavior of mice (Aarts et al., 2015).

Despite the scientific potency of the HMM, still insufficient knowledge is available regarding the circumstances under which the model is able to perform properly, that is: able to derive accurate estimates. The present research will endeavor to explore the ability of the model to derive accurate estimates, given variations in (1) the length of a time series and (2) the degree to which there is a clear distinction between states. The latter will be endeavored by means of a simulation study, in which control can be exerted over the specification of the latter two variables. Ultimately, the aim is to define guidelines that contribute to model furnishing choices given variations of the aforementioned variables. More specifically, the aim is to define guidelines with respect to the required length of a time series and the required degree of heterogeneity, in order to be able to derive accurate estimates with the Hidden Markov model.

2 Methodology

2.1 Simulation design

2.2 Simulation Study Setup

3 Results

4 Conclusion & Discussion

4.1 Discussion & Future Research

References