

Department of Decision Sciences

Statistics Seminar

A flexible stationary model for time series

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Abstract

Stationary processes have been used as statistical models for time series. Stationarity is desirable to guarantee some statistical properties of estimators. However, the need to define a stationary model limits their endurance; being unable to capture a prolonged changing of the dynamics which can arise in many real life phenomena. Alternative models have therefore been proposed, usually resulting in a compromise, sacrificing the ability to estimate quantities of interest, in favour of greater modelling flexibility. We propose a family of discrete time Markov processes with nonparametric stationary and transition densities, which retain the desirable statistical properties for inference, while achieving necessary modelling flexibility.

Bayesian consistency for this type of models remains, to this day, somewhat of an open problem. This is due to the lack of suitable metrics with which to work; standard metrics seem inadequate, even for simple autoregressive models. Current results derive from generalizations of the i.i.d. case and additionally require some non-trivial model assumptions. We find a suitable metric and derive sufficient conditions for posterior consistency which can be applied in general settings. This allows us to prove consistency for the time series model we propose.