

A COMPUTATIONAL BAYESIAN APPROACH TO CONTINUOUS-TIME-AUTO-REGRESSIVE-MOVING- AVERAGE (CARMA) MODELS

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Bayesian methods are based on combining a problem, a model, prior information, and data using Bayes rule. This paper addresses the implementation of a Bayesian approach to stationary continuous-time-auto-regressive-moving-average (CARMA) models. The interpretation of the parameters of a CARMA models is somewhat non-intuitive. The interpretation of the spectral function is much clearer. For a Bayesian an expression of a prior belief in the frequency domain, i.e., stating a preference on the shape of the spectral function, is therefore more natural than formulating a prior on the time-domain parameters. Stating a prior on a function space is non-trivial. In this paper the fact that the CARMA models have a rational spectrum is used to construct a measure of the distance between spectral curves. It is therefore possible to form a prior stating some desired properties of the spectral curve. A computational way of calculating the measure is given. Some examples of implementation of the procedure are illustrated. A computer program in R is shown.

Keywords: Continuous-time models, Bayesian methods, Kalman-filter, Laplace approximation.