

Fast estimation of multiple-regime threshold autoregressive model

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Threshold autoregressive (TAR) models have been widely used in many areas including financial data analysis. When the number of thresholds is large, the estimation of the thresholds is often computationally infeasible. In this work we employ the Minimum Description Length (MDL) Principle to develop a criterion function to estimate the number of thresholds and the corresponding order and parameter values of the AR model in each regime. A genetic algorithm is implemented to efficiently solve this optimization problem. This can be interpreted as the “space” version of the AutoPARM of Davis, Lee and Rodriguez-Yam (2006). We further extend the framework of AutoPARM to piecewise TAR model, i.e., we allow for structural breaks in TAR models and estimate the number of change points, the number of thresholds and the corresponding order of AR in each piecewise TAR segments. Applications to US real GNP data is considered to illustrate the estimation procedure.

Key Words: Change-point, Genetic Algorithm, Minimum Description Length (MDL) Principle, Multiple-threshold, nonstationarity