ID de Contribution: **7** Type: **Non spécifié**

Identification of periodic autoregressive models by genetic algorithms

mardi 24 juin 2025 11:15 (1 heure)

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Résumé : Periodic autoregressive (PAR) models extend the classical autoregressive models by allowing the parameters to vary with seasons. Selecting PAR time-series models can be computationally expensive, and the results are not always satisfactory. In this presentation, we propose an automatic procedure for identifying PAR models and multiregime PAR models. We aim at filling the literature gap on multiple changepoint detection by allowing several time segments to be detected, inside of which a different PAR structure is specified, with the resulting model being employed to successfully capture the discontinuities of river flow data. The model estimation is performed by optimization of an objective function based on an information criterion using genetic algorithms. The proposed methodology is evaluated by means of simulation studies and it is then employed in the analysis of several river flows : the Fraser river measured at Hope, British Columbia, the South Saskatchewan, measured at Saskatoon, Canada, and the Colorado, measured at Lees Ferry, Arizona. For these river flows we build changepoint models, discussing the possible events that caused discontinuity, and evaluate their forecasting accuracy. Comparisons with the literature on river flow analysis and on existing methods for changepoint detection confirm the efficiency of our proposal.

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