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PHD THESIS PRESENTATION

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Nonparametric Inference on Nonstationary Time Series

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ABSTRACT

Nonparametric methods are model-free approaches that can be useful in assessing parametric and semiparametric models. The problem of testing parametric assumptions has been widely studied in the literature, but mainly for independent data. However, the later assumption can be easily violated in time series analysis where dependence is the rule rather than the exception. In this thesis, we consider the situation with locally stationary processes, a special class of nonstationary processes. We start with the problem of testing whether the mean trend of a locally stationary process falls into a certain parametric form. A central limit theorem for the integrated squared error is derived, and a simulation-assisted hypothesis testing procedure is proposed to improve the finite-sample performance. We demonstrate by simulation that ignoring the underlying dependence can lead to erroneous conclusions. The method is applied to assess the trend pattern of lifetime-maximum wind speeds of tropical cyclones and the central England temperature series. Its extension to high dimensional time series data and time-varying coefficient models are also considered.