Causality Inference in a nonstationary and nonhomogenous framework

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The project deploys statistical and computational techniques to develop a novel approach to causality inference in multivariate time series of economical data on equity and credit risks. The methods build on recent research of project participants, [1]. They improve on classical approaches to causality analysis such as Granger causality (see [2]) by accommodating general forms of nonstationarity and non-homogenity resulting from unresolved and latent scale effects.
Emerging causality framework results in and is implemented through a clustering of time series based on a minimization of the averaged clustering functional, which describes the mean distance between observation data and its representation in terms of given number of abstract Bayesian causality models of a certain predefined class. We are using finite element framework to the problem of time series analysis and propose a numerical scheme for time series clustering [3].
One of the most challenging components of the emerging HPC implementation is a Quadratic Programming (QP) problem with the combination of linear equality and bound inequality constraints. In our contribution, we compare tree different QP algorithms to solve this problem - Augmented Lagrangian method combined with active-set strategy [4], Interior-point methods [5], and the modification of Spectral Projected Gradient method for QP [6], [7]. We demonstrate and compare the efficiency of the methods solving practical benchmark problems.

References

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