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Evaluation of Prediction Techniques in Time Series Data

BSc Thesis:

Work overview:

Prediction in time series is a longstanding problem. Several prediction techniques have been proposed in the literature, each showing superior results in some use cases. However, little is known about their relative performance, as existing comparisons are limited to either a small subset of relevant algorithms or to very few datasets or often both. Drawing general conclusion about the performance of prediction techniques remains a challenge.

The aim of this thesis is to study state-of-the-art prediction techniques, propose improvements to some of them, and empirically evaluate their performance. The output of the thesis will be a common test-bed for comparing prediction algorithms using a reusable code framework, a large selection of representative time series, and mechanisms to automate the benchmarking.

Work tasks:

1. Familiarize yourself with prediction in Time Series [1,2,3].
2. Study the prediction techniques provided separately by the supervisor.
3. Implement a benchmark to empirically evaluate the performance of prediction techniques. Identify the relative strengths and weaknesses of each of the produced predictions.
4. Evaluate the accuracy, efficiency, and the parameterization of these prediction techniques under a variety of scenarios.
5. (Optional) Implement the most effective prediction technique(s) in the revival tool: `revival.exascale.info`
6. Write a thesis that describes the evaluation results.
7. Presentation of 20 minutes.

Literature:

1. Yuyang Wang, Christos Faloutsos, Valentin Flunkert, Jan Gasthaus and Tim Januschowski: *Forecasting Big Time Series: Theory and Practice*, Web conference 2020.
2. Christos Faloutsos, Jan Gasthaus, Tim Januschowski, Yuyang Wang: *Forecasting Big Time Series: Old and New*, VLDB'2018 Tutorial.
3. Nicholas I. Sapankevych and Ravi Sankar: *Time Series Prediction Using Support Vector Machines: A Survey*, IEEE Computational Intelligence Magazine, 2009.

Starting date of thesis: 15/05/2021

Ending date of thesis:

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