FORECASTING OF PROCESSES IN COMPLEX SYSTEMS FOR REAL-WORLD PROBLEMS

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tutorial

Abstract: This tutorial is based on modification of the professor nomination lecture presented two years ago in front of the Scientific Council of the Czech Technical University in Prague [16].

It is devoted to the techniques for the models developing suitable for processes forecasting in complex systems. Because of the high sensitivity of the processes to the initial conditions and, consequently, due to our limited possibilities to forecast the processes for the long-term horizon, the attention is focused on the techniques leading to practical applications of the short term prediction models. The aim of this tutorial paper is to bring attention to possible difficulties which designers of the predicting models and their users meet and which have to be solved during the prediction model developing, validation, testing, and applications. The presented overview is not complete, it only reflects the author's experience with developing of the prediction models for practical tasks solving in banking, meteorology, air pollution and energy sector.

The paper is completed by an example of the global solar radiation prediction which forms an important input for the electrical energy production forecast from renewable sources. The global solar radiation forecasting is based on numerical weather prediction models. The time-lagged ensemble technique for uncertainty quantification is demonstrated on a simple example.

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