

Neural Networks in System Identification and Forecasting Principles, Techniques, Applications

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Neural Networks offer a way to model complex (nonlinear, high dimensional) dynamical systems based on time series. Unfortunately, complex tasks are often only incompletely described by the measured data alone. The talk will give an insight on how prior knowledge about large classes of dynamical systems can be included in the identification of the system. Surprisingly this additional knowledge can be integrated with the data analysis ability mostly in form of a specific network architecture. The talk will cover sections on:

- Introduction to neural networks,
- Learning as an optimization task,
- The observer - observation dilemma,
- Types of basis functions,
- Basic recurrent neural networks,
- The modeling of open systems,
- Modeling partly observable systems by error correction neural networks,
- Variance - invariance separation by neural networks,
- Connectivity and memory in large neural networks.