WIRTSCHAFTS INFORMATIK

Study- / Masterthesis

TECHNISCHE UNIVERSITÄT DARMSTADT

UNSUPERVISED LEARNING TECHNIQUES FOR PREDICTIVE ANALYTICS IN AN INDUSTRY 4.0 SCENARIO

The push towards new key technologies, i.e. Cloud Computing (CC), Internet of Things (IoT), Data Science technologies etc., in the recent years is followed by a period of big impact on the development of industrial services and systems. Global mega trends lead to a higher product variety, increasingly complex manufacturing systems and higher dynamics and complexity on the market side in the field of production and Industry 4.0. Products and production systems have to move towards Cyber-physical systems for self-control and self-optimization to manage.

Since 1967, WEISS GmbH has specialized in the development and manufacture of components for automation technology. Today, the company with over 400 employees is one of the world's leading manufacturers of automation solutions - from rotary indexing tables and linear transfer systems to handling systems.

In this thesis a heavy-duty rotary table has been instrumentalized with an array of sensors (Position, vibration, temperature, motor current, motor frequency) placed where the symptoms of typical failure modes are assumed to be strongest. This rotary table is subjected to load and operational cycles simulating manufacturing conditions and sensor data are collected by a data acquisition system (from HBM).

GOALS

- Evaluate the informative value of several data analysis tools in the synthesis of a predictive model.
- Compare the behavior of statistical measures of coincidence between two Bayesian models in order to find the best candidate for a “health factor” computation which eliminates the need of direct comparison between a learned model and new data as would happen with the Bayes factor or hypothesis testing.
- Validate the sensitivity of the optimized technique by simulating typical failure modes in a real device.

DELIVERABLE SCIENTIFIC RESULTS

- Increasing the entropy of feature extraction preprocessing algorithms using the innovation process of Kalman filters or General Orthonormal Base Functions
- On the usage of analytical models for physical phenomena in the preprocessing layer of feature extraction algorithms in heavy duty rotary tables
- Condition assessment and comparative evaluation of data clustering of heavy-duty rotary tables

Supervisor / Coach

Begin immediately. If you are interested, please contact:

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