THESIS FOR THE DEGREE OF LICENTIATE OF ENGINEERING

Modelling the Offset Lithographic Printing Process

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Abstract

A concept for data management and adaptive modelling of the offset lithographic printing process is proposed. Artificial neural networks built from historical process data are used to model the offset printing process aiming to develop tools for online ink flow control.

Inherent in the historical data are outliers owing to sensor faults, measurement errors and impurity of the materials used. It is fundamental to identify outliers in process data in order to avoid using these data points for updating the model. In this work, a hybrid the process-model-network-based technique for outlier detection is proposed. Several diagnostic measures are aggregated via a neural network to categorize the data points into the *outlier* or *inlier* classes. Experimentally it was demonstrated that a fuzzy expert can be configured to label data for training the categorization neural network.

A SOM based model combination strategy, allowing to create adaptive—data dependent—committees, is proposed to build models used for printing press initialization. Both, the number of models included into a committee and aggregation weights are specific for each input data point analyzed.

The printing process is constantly changing due to wear, seasonal changes, duration of print jobs etc. Consequently, models trained on historical data become out of date with time and need to be updated. Therefore, a data mining and adaptive modelling approach has been proposed. The experimental investigations performed have shown that the tools developed can follow the process changes and make appropriate adaptations of the data set and the process models. A low process modelling error has been obtained by employing data dependent committees.