



Title:

Analysis of domain adaptation techniques in manufacturing machine learning usecases

Tasks:

Manufacturing environments are strongly dynamic with constantly changing environment conditions such as varying materials, product configurations and machine parameters. This makes it difficult to apply machine learning in usecases such as predictive maintenance or quality prediction, as traditional supervised machine learning methods assume that training data and test/online data are sampled from the same distribution. One possible solution can be the usage of domain adaption techniques, which have received growing research interest in the last years. In this thesis, the application of domain adaption techniques to manufacturing machine learning usecases shall be analyzed and evaluated using a provided dataset.

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Start:

As soon as possible

Tasks in the scope of this thesis:

- Literature review on domain adaptation techniques and their usage in industrial machine learning applications
- Literature review on domain shift problems in industrial machine learning applications
- Implementation of a selection of domain adaptation techniques on a given manufacturing dataset
- Performance evaluation and derivation of action recommendations

The final set of tasks will be discussed together with the student.

Sample Literature:

Singh, Jaskaran, et al. "Deep learning-based cross-domain adaptation for gearbox fault diagnosis under variable speed conditions." *Measurement Science and Technology* 31.5 (2020): 055601.

Li, Xiang, and Wei Zhang. "Deep learning-based partial domain adaptation method on intelligent machinery fault diagnostics." *IEEE Transactions on Industrial Electronics* 68.5 (2020): 4351-4361.

Note: It is possible to this thesis in German or English.