Initial situation

Fineblanking is a highly economical sheet metal cutting process for the mass production of components with very high shearing surface quality. Fineblanked components are widely used in automotive and aerospace industries, for example in the closing mechanism of a seat belt or the powertrain of a car. The die roll is a highly relevant quality deficit on a fineblanked part that reduces the usable surface of the part.

The potential of a fineblanking machine as a cyber-physical system is being researched within the framework of the Internet of Production Cluster of Excellence. For this purpose, various sensor systems for online recording of process forces, peripheral forces and signals from a material sensor have been installed. This multi sensor approach to analyzing cyber-physical systems under industrial conditions is new and innovative. With those various sensor sources data driven models can be trained and used to predict output variables like certain quality features.

The aim of the master thesis is to use a sensor fusion approach with a convolutional neural network to predict the die roll as a quality feature in fineblanking.

The questions to be dealt with in this context cover different areas of data and signal processing. The sensors provide cyclical signals with a high sampling rate, so basic methods for processing digital signals are part of this work. Furthermore, convolutional neural networks and their parameters and hyperparameters (architecture, pooling, dropout etc.) are the tools of choice for this thesis. If you are an engineer wanting to break into Machine Learning and Data Science, then this is your chance to work on state of the art techniques to advance your knowledge and your career.

Prerequisites:
- Motivation and commitment
- Independent working method
- Interest in data analytical women’s attitudes and machine learning in an industrial context
- Basic Python knowledge

What we offer:
- Familiarization with data science and machine learning in an industrial context
- Independent time management
- Familiarization with Keras