

Artificial intelligence in the context of die filling on rotary tablet presses

Studies- and master thesis

In the industrial production of tablets, die filling is an extremely critical step that is not yet fully understood. The influence of material properties and process parameters on the filling result has been investigated previously. The goal of this work is to develop an AI-based predictive model that describes the influence of powder properties, machine configurations, and process parameters on filling quality. The aim is to maximize model accuracy while reducing the relevant influencing factors to an economically viable minimum.

In addition, the work will focus on interpretable AI approaches to better understand how material properties, process settings, and filling-wheel geometries influence filling performance. The developed models should not only predict the filling quality, but also support knowledge-based recommendations for suitable machine configurations.

Methods:

- Structuring and preprocessing of existing experimental metadata
- Correlation analysis and feature selection, including powder properties, process parameters, and filling-wheel geometry
- Development and comparison of interpretable AI models, e.g. Random Forest, ANN, and symbolic regression



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