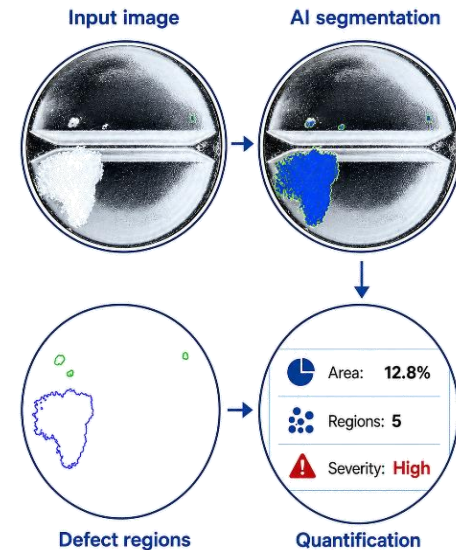


Master thesis

Sticking and picking are common challenges in tablet manufacturing that can compromise product quality, reduce production efficiency, and increase manufacturing costs. Sticking refers to the adhesion of formulation material to the punch surface during tablet compression, whereas picking is a localized type of sticking that mainly affects embossed areas, including imprints and score lines. Image processing offers a promising approach for detecting and quantifying these defects, but its application in this area remains limited. Modern AI-based computer vision methods, including convolutional neural networks, transformer-based segmentation models, and foundation models, offer new possibilities for robust and automated defect detection. Developing a reliable image-based analysis method could enable earlier detection and allow corrective action before defects significantly affect production.

Goals and tasks:

- Image segmentation using established models, with alternative methods for challenging cases such as concave and scored punch designs (focusing on discrimination of reflexes)
- Identification and evaluation of additional image-derived parameters and quantitative metrics
- Training, evaluation, and comparison of different deep-learning architectures for image segmentation, including CNN-based, transformer-based, and foundation-model approaches
- Implementation and enhancement of the institute's existing image-processing tool, followed by the design and development of a dedicated application



Somayeh Hosseinhashemi

s.hosseinhashemi@tu-braunschweig.de

Hasti Ghanadimaragheh

hasti.ghanadimaragheh@tu-braunschweig.de

