Bachelor/Master thesis

Improvement of the performance of deep learning algorithms for the classification of the metallurgical features in microstructural images

Institut für Metallkunde und Materialphysik

RWTH Aachen University

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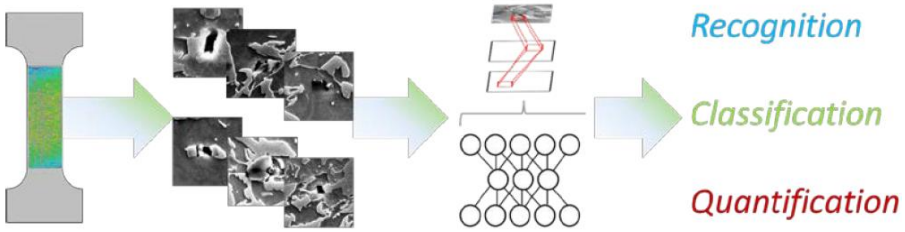
Motivation:



Development of new materials design strategies needs detail and accurate information about the statistics of microstructural features such as damage sites, slip traces, etc. which appear in electron/light microscope images and for this purpose large datasets are studied. Machine learning facilitates us with a proper ability in this regard. A machine-learning environment has been already developed in IMM, within which, specific metallographic features are being classified after being automatically detected in microstructures, then the statistic of each feature and its role in the properties of the material is being studied.

The final aim for this project is to improve the classification performance of the network after training the interested candidates with the fundamentals of the current framework. As the result, the manipulation of input data quality (pre-processing) and reevaluation of the classification results (post-processing) is expected.

Tasks:

- Correct the loaded metallurgical images as input data for the machine by different clustering algorithms.
- Reevaluate and correct the classification of metallurgical features as the output of the machine using some data visualization tools.

What we offer:

- Obtain a knowledge in correlating machine learning and materials scientific applications.
- Work with a young enthusiastic team of materials engineers.

The ideal candidate will:

- Have a high motivation for implementing data-driven based techniques in materials science applications.
- Have some programing skills (Matlab/Python).
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