ABSTRACT

Steel is very important in the industrial world, therefore the quality of steel must be in the best condition. This thesis is made for checking the quality of steel surfaces using multistage deep learning to classify defects and localization of defects that exist on the steel surface from six classes of defects, namely Crazing (Cr), Inclusion (In), Pitted Surface (PS), Rolled-inscale (Rs), and Scratches (Sc).

First, collecting data obtained from Northeastern University (NEU) with a size of 200×200 pixels. There are 1800 total data with each 300 data per classes. Pre-processing the image data with resize to 1333×800 pixels. Next, classify images using the multi-stage deep learning method with the Faster RCNN, Cascade RCNN and DetectoRS with addition backbone ResNet and ResneXt which will then be trained and tested so that the results will be analyzed based on predetermined parameters.

The simulation and analysis results in this Final Thesis can inspect six classes defect of steel surface. Model DetectoRS with Cascade RCNN ResNeXt utilized is capable of producing good results. Parameters mean Average Precision (mAP) achieve 81.3% and FpS 3.6 task per second.

Keywords: Deep learning; defect inspection; steel surface; multi stage; multi-scale