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AI powered surface inspection for billets - next generation quality control

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Rising demands on the surface quality and the necessity for 100% inspected billets are requested by the customers. Surface defects on billets, like longitudinal or transversal cracks, can –if not removed e.g. by grinding - lead to increased reject rates, or in the worst case to a complete production stop, in the further rolling process route.
The surface inspection at voestalpine Stahl Donawitz was based on an image classification algorithm which was trained to detect specific defects on the billets. Although most of the surface defects could be detected and classified, this algorithm showed a high false positive rate, so the operators at the rolling mill had to check each detected pseudo defect, which was a time consuming and error prone procedure. The new project aims to replace the old image classification algorithm with a new AI-based object detection model by using the same camera setup. This AI based supervised deep learning model uses the technique of a sliding window and a convolutional neuronal network, more specific a residual network (ResNet34), to increase both the accuracy and the precision of the predictions of each image patch. In addition, a customized graphical user interface (GUI) was developed to increase workers' confidence in the new system, significantly reducing the need for manual follow-up checks. To improve the detection accuracy as well as the precision the standard camera was replaced with a multi spectral camera. This opens up new perspectives by using the blue spectrum of the light which leads to an increased depth perception and a steep increase in the detection rate.

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Session Classification: SURFACE QUALITY PREDICTION IN CC AT THE CROSSROADS: FROM PHENOMENOLOGICAL MODELS TO DATA DRIVEN MODELS AND HYBRID APPROACHES

Track Classification: Surface quality prediction in cc at the crossroads: From phenomenological models to data driven models and hybrid approaches