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Image Ranking to Assist Object Labeling for Training Detection Models

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Abstract : Training a machine learning model for object detection that generalizes well is known to benefit from a training dataset with diverse examples. However, training datasets usually contain many repeats of common examples of a class and lack rarely seen examples. This is due to the process commonly used during human annotation where a person would proceed sequentially through a list of images labeling a sufficiently high total number of examples. Instead, the method presented involves an active process where, after the initial labeling of several images is completed, the next subset of images for labeling is selected by an algorithm. This process of algorithmic image selection and manual labeling continues in an iterative fashion. The algorithm used for the image selection is a deep learning algorithm, based on the U-shaped architecture, which quantifies the presence of unseen data in each image in order to find images that contain the most novel examples. Moreover, the location of the unseen data in each image is highlighted, aiding the labeler in spotting these examples. Experiments performed using semiconductor wafer data show that labeling a subset of the data, curated by this algorithm, resulted in a model with a better performance than a model produced from sequentially labeling the same amount of data. Also, similar performance is achieved compared to a model trained on exhaustive labeling of the whole dataset. Overall, the proposed approach results in a dataset that has a diverse set of examples per class as well as more balanced classes, which proves beneficial when training a deep learning model.

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