

Improving efficiency of supervised Fabric Anomaly Detection Models

Introduction

Image-based quality control is concerned with detecting anomalies in products and poses a crucial yet challenging part of the production process. It still heavily relies on manual inspection due to complexity and variety of manufactured products and defects combined with the rarity of defect occurrence.

Data driven approaches employing Machine Learning have greatly improved anomaly detection performance, and are more and more realized in industry. To improve their economic feasibility however, it is important to further increase efficiency of Machine Learning models to employ them on less powerful accelerators, facilitating e.g. edge computing scenarios.

Thesis Aim

This thesis aims at improving efficiency of supervised Anomaly Detection algorithms for fabric inspection. In a first step, published algorithms in fields of model pruning, quantization, knowledge distillation and Neural Architecture Search will be identified and adapted to the use-case and benchmarked. Next, own extensions/approaches will be developed based on insights gained from benchmarking. The thesis will employ an in-house fabric defect dataset.

Requirements

- Interest in Digital Image Processing
- Knowledge about Machine Learning theory
- Programming experience

Additional, desirable skills are:

- Experience in Python and relevant Frameworks (Scikit-Learn, Pytorch, Pytorch-lightning)
- Knowledge in model pruning, quantization, knowledge distillation and Neural Architecture Search or Anomaly Detection

Our Offer

During the course of the work, you will acquire competences in the field of Machine Learning, supervised Anomaly Detection and various techniques capable of improving model efficiency. Additionally, the thesis offers the possibility of actively planning/detailing its contents, which is also desired. We aim to publish results in a relevant, peer reviewed conference, and experience in that regard may also be gained.

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We also offer you a pleasant working environment with an institute shop for snacks and drinks, a fully automatic coffee machine and an espresso machine.

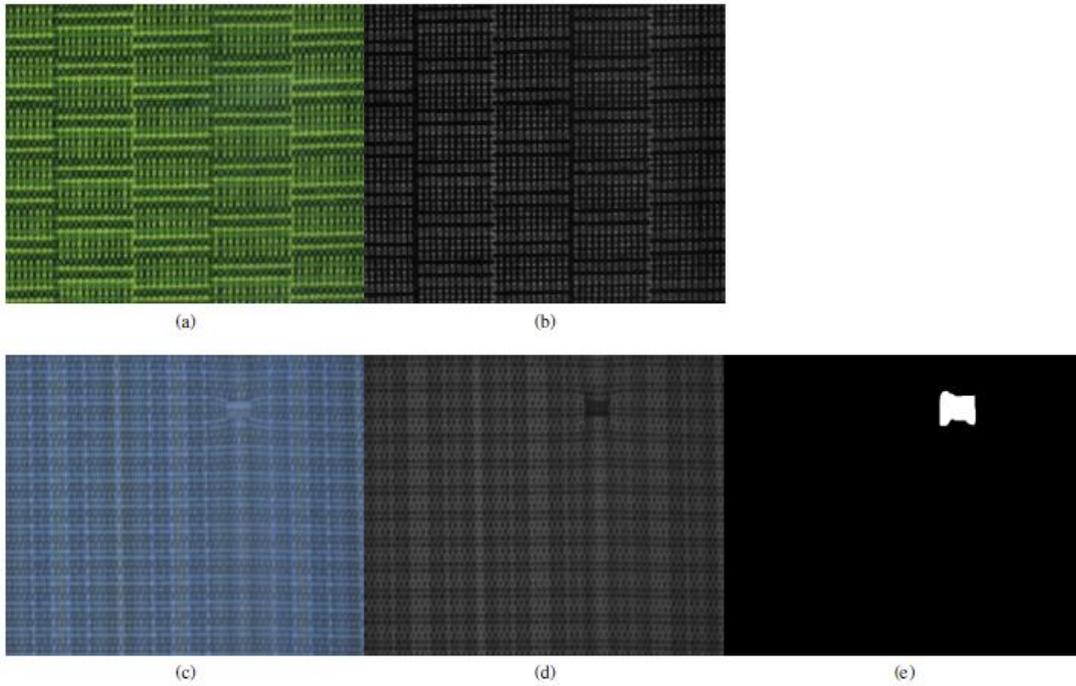


Fig. 1. Representative defect-free (a-b, fabric 4) and defective (c-e, fabric 1) sample images. (a), (c) are front-light images, (b), (d) back-light images and (e) the ground-truth segmentation mask.