Domain Adaptation for Object Detection in Style Transferred Datasets (BA/SA/MA)

Industry Application

Automation and Information Systems
Engineering and Design
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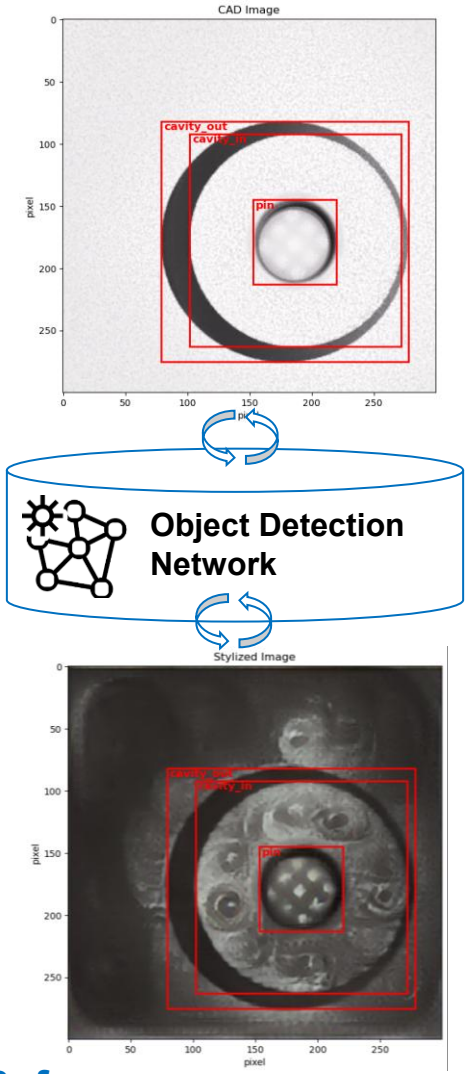
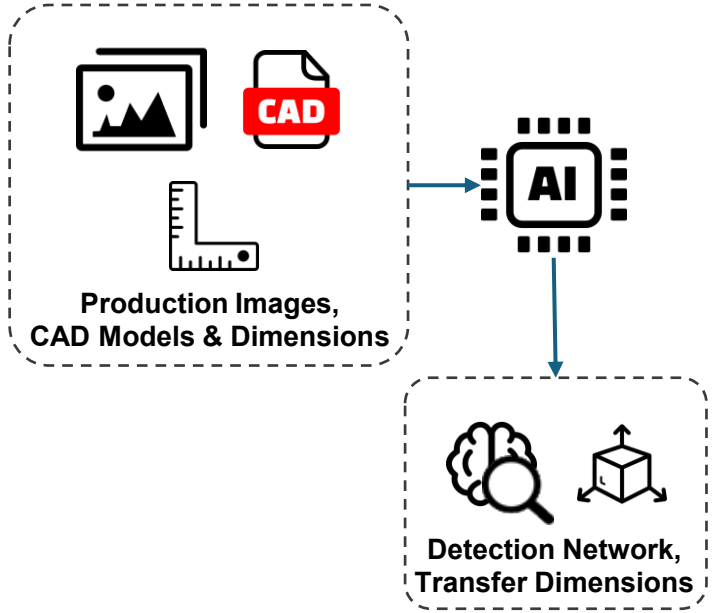


At the chair of Automation and Information Systems (AIS), we use synthetic datasets created from CAD models and past production images to support object detection in industrial settings. However, domain shifts like size and placement differences prevent CAD-derived dimensions from being used directly for training. To overcome this, we explore unsupervised domain adaptation (UDA) techniques that allow deep learning models to adapt to the target domain without requiring labeled images. By incorporating UDA into the training pipeline, networks can effectively learn from unlabeled, style-transferred images, bridging the gap between synthetic and real-world data. This cutting-edge approach has already shown promising results in sectors like automotive and medical imaging. Now, we're bringing it to industrial object detection.



Thesis Goal: Develop a UDA pipeline for integration into existing YOLO object detection networks. The pipeline should enable unsupervised transfer of domain knowledge from labeled source images to unlabeled target images. To achieve this, novel approaches such as teacher-student architectures will be explored, implemented, and evaluated for an industrial use case.

Prerequisites

- Programming experience in Python
- First experiences with PyTorch or TensorFlow are beneficial
- Motivation to deep-dive into object detection networks such as YOLO

Reference

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