Wales
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Learning to See for Robotic Manipulation with Limited Labeled Training Data

Summary

A lightweight object recognition model for a resource constraint embedded device can essentially aid automation in several applications, especially in the manufacturing industry.

The proposed architecture for training the deep learning model eliminates the requirement for a large labelled dataset and employs self-supervision for robust performance in the real world.
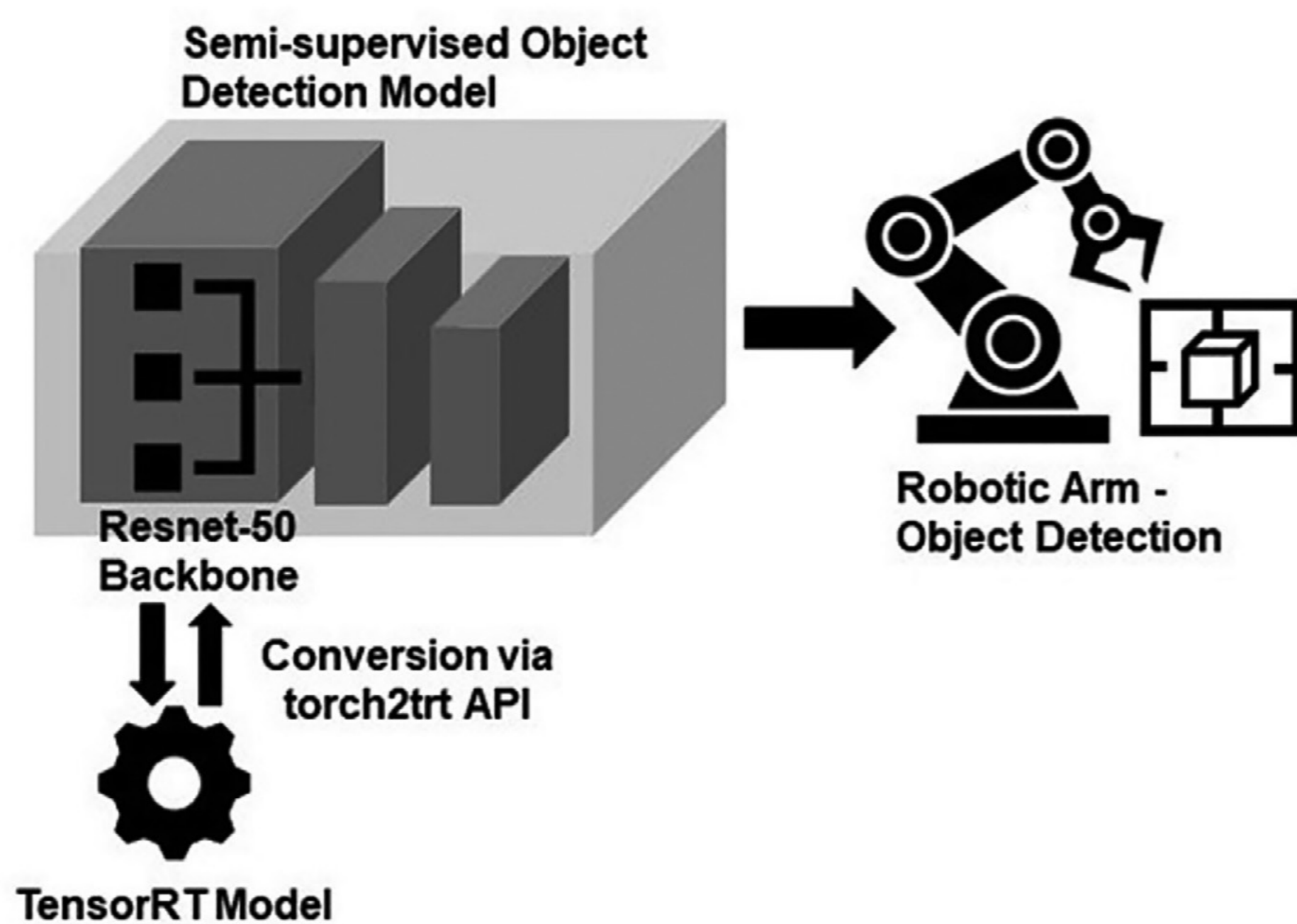
The project is based on a semi-supervised object detection model [1] using Faster-R-CNN via ResNet-50 backbone, optimized by NVIDIA TensorRT. This enables high accuracy and precision while making inferences in real-time.

The end goal is to pilot the object detection model on a KINOVA Gen 3 robotic arm.

Benefits

Deploying a deep object detector trained on a self-supervised framework that can address the scarcity of labeled data in the real-world, on a resource-constrained device has many benefits:

- Facilitation in the field of robotics, process optimization, and vision control.
- Potential application for IoT smart assisted living, where elderly needs can be met without human assistance
- The smart manufacturing industry can be greatly benefitted, especially in production and supply chains, from integrated AI-enabled tools to boost performance and efficiency.

[1] C. Chen and J. Han, "Semi-supervised Object Detection via Virtual Category Learning", European Conference on Computer Vision (ECCV), 2022, under review.

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