TEFT Summer Internship

Kystverket - Team-ML

Object Detection Guide

Martin Valderhaug Larsen
Elias Lerheim Birkeland
Simon Lervåg Breivik

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Abstract

The main goal of this project was to do image analysis with artificial intelligence and machine learning to classify building facade colors. The motivation was a more realistic representation of Kystverkets' digital twin application. We utilized the YOLO algorithm and Google Maps API to detect buildings and classify their color from image data. This is currently a work in progress, and the guide will provide an overview of our current methodology, results, issues, and potential solutions. In addition to the building project, we have trained a YOLO object detection model to identify excavators on ships. This was a much simpler problem than the building facade colors and will be used as an example of how Kystverket can use object detection in general. Two separate GitHub repositories will be provided. Building-colors contains the building color detection model. Python-image-detection contains the excavator demo and tutorials on how to use the YOLO object detection models in general

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1 Introduction

1.1 About TEFT-lab

We have spent the summer at the TEFT-lab. Here, students have cooperated with different companies to solve various problems. The time period was six weeks, split up by three weeks of summer vacation in the middle. NTNU provided us with two supervisors. We had both midterm and final presentations of our work.

1.2 The Team

Name	Field of study	Role
Martin Valderhaug Larsen	Informatics	Intern
Elias Lerheim Birkeland	Industrial Economics and Technology Management	Intern
Simon Lervåg Breivik	Cybernetics and Robotics	Intern
Odd Sveinung Hareide	Kystverket	Employer
Rituka Jaiswal	NTNU	Supervisor
Hans Georg Schaatun	NTNU	Supervisor

Table 1: The people working on the project

1.3 Project overview45 (lag ny figur her!)

The general structure of our solution is presented in Figure 1

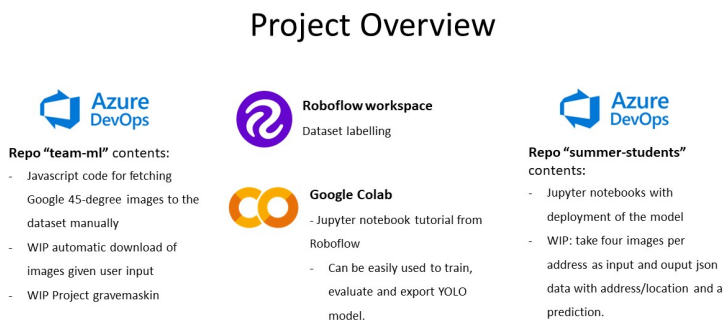

Figure 1: Overview of project

2 Methods

2.1 Choosing an approach

2.2 Creating a model

We used a machine learning approach in the summer project, which can be roughly divided into these steps:

1. **Dataset creation**
2. **Model training**
3. **Deployment**

Labeling Dataset For labeling our datasets we have used Roboflow. Roboflow provides a user friendly way of annotating images and allows teams to annotate simultaneously. To get started have a look at this blog post (until "Export your dataset").

Training

2.3 Using a model

3 Building Color Detection

3.1 Data source

- Alternatives and advantages/disadvantages.
- Assuming that it is possible to automate. First, collect manually to see if classification works.

3.2 Obstacles

Only loose ideas here:

- Trees
- Bad quality, difficult to automate
- Angled images only in certain places
- Legal side of things
- Rooftops: This is considered a much simpler problem.

4 Object Detection For Ships

4.1 Excavator

4.2 Side Ports

Bibliography

Appendix

A Manuals