Project Description for Hardware and QA

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Introduction

Automate Quality Assurance(QA) processes for Otovo. The QA of installed solar panels is currently being conducted manually by project managers by inspection of pictures of the installation. The goal of this project is to reduce the amount of time needed of project managers by automating the inspection of these pictures. The success criteria is a working prototype which potentially could be implemented in Otovo's production. The project consists of detection and identification of serial numbers on the household's electricity meter and compare them with the expected values in Otovo's database. A confidence score will be provided depicting whether or not manual interference is necessary.

The task of extracting the serial number from an image can be divided into two problems. First we need to detect the location of the numbers and second we need to recognize the numbers. The detection problem is an instance of scene text recognition (STR)[1] and the latter is an Optical Character Recognition (OCR) problem. One well performing framework for solving the STR problem is CRAFT[1]. And a popular OCR engine is Tesseract [6]. However most current tools solve both the STR and OCR task at once such as the PaddleOCR [3]. Inspired by the mentioned models we seek to investigate the following:

Research questions

1. How well can current STR-and OCR models solve the task of detecting and identifying serial numbers?

2. How can we measure how confident the model is in its prediction?

3. How well can we explain the reason for a low confidence score for the different presented models and can such an explanation aid further automation of the inspection process?

Challenges

- The images in the dataset are of varying nature. Some contain no serial number at all and others several different numbers, which needs to be handled carefully. One solution might be locating the electricity meter and create a region of interest inspired by this video. [5]

- OCR can often be improved by utilizing linguistic information [4]. However a serial number carries no such information. If we want to use inference to predict blurry numbers, we might instead turn towards concepts presented in [2], where features such as character height might carry useful information.

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[1]STR is the process of identifying the location of text in images and creating a bounding box

References

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[3] Yuning Du et al. *PP-OCR: A Practical Ultra Lightweight OCR System*. Tech. rep. 2021. URL: `https://github.com/PaddlePaddle/PaddleOCR.`.

[4] Shancheng Fang et al. *Read Like Humans: Autonomous, Bidirectional and Iterative Language Modeling for Scene Text Recognition*. Tech. rep. URL: `https://github.com/FangShancheng/ABINet.`.

[5] Nicholas Renotte. *Tensorflow Object Detection in 5 Hours with Python — Full Course with 3 Projects*. Apr. 2021.

[6] Ray Smith. *An Overview of the Tesseract OCR Engine*. Tech. rep. URL: `http://code.google.com/p/tesseract-ocr.`.