Research License Plate Recognition

## Introduction

For the parking app, once a visitor enters the parking lot they should receive a text. In order to know who the text needs to be sent to, their license plate will be used. With the footage received from a camera on-site the license plate should be detected.

## How are license plates recognised?

After our application receives an image, firstly a plate must be located. This can be done by searching for a yellow area and checking the dimensions of a license plate. After, a form of character recognition must be used to turn the image into a string we can use.

## What are the ways of doing this?

Because it is not reliable or practical to have a person on-site reading the license plates, and because we have a camera at our disposal, it is more practical to make use of Artificial intelligence or the subset of it known as machine learning.

## Artificial Intelligence

### What technologies are used?

#### JavaANPR (Automatic Number Plate Recognition)

Github Repository: <https://github.com/oskopek/javaanpr>

Full Documentation: <http://javaanpr.sourceforge.net/anpr.pdf>

* Pros: Does all of the heavy lifting, and has a how-to file making it easy to use.
* Cons: There is no documentation on what types of license plates it will work on so the application will have to be tested and modified if it doesn't work on Dutch plates.

#### Google Ocr Tesseract (Optical Character Recognition)

Github Repository: <https://github.com/tesseract-ocr/tesseract>

Example: <https://stackabuse.com/tesseract-simple-java-optical-character-recognition>

* Pros: Easy to use, free.
* Cons: Only supports TIFF files therefore PNG, JPEG or PDF files have to be converted first.

## Why is Artificial Intelligence a good option?

Artificial Intelligence takes less time to create, and is great for repetitive jobs such as this one. (Kumar, 2019)

## Machine Learning

### What Technologies are used?

#### Wpod-net (License plate segmentation)

ECCV 2018 Paper: <https://www.ecva.net/papers/eccv_2018/papers_ECCV/papers/Sergio_Silva_License_Plate_Detection_ECCV_2018_paper.pdf>

* Pros: Pre-trained, which could save lots of time collecting data and letting the machine learn.
* Cons: Badly documented, only a few good papers online that mention wpod-net

#### OpenCV (Character segmentation and recognition)

Full documentation and tutorials: <https://docs.opencv.org/master/>

* Pros: Supports Java, free.
* Cons: None

## Why is Machine learning a good choice?

Machine learning doesn’t require human intervention, can continuously improve and easily identifies patterns. (Data flair, 2021) However, it does take extensive time and data. (Williams, 2021)

## Conclusion

Between artificial intelligence and machine learning, both could work for our project, but because artificial intelligence takes significantly less time and data it is better for our project.

**Bibliography**

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