License Plate Recognizer
Numerical Calculations for Engineering

International Semester

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April 24, 2019

Due Date: 17 May 2019

Class :   International Semester

Introduction

This document is a report describing a project. The project being reported is part of the course *Numerical Calculations for Engineering*, element of the *International Semester* offered at *Escuela Técnica Superior de Ingeniería y Diseño Industrial*, part of *Universidad Politecnica de Madrid*. This course is presented by *ALBARRACIN SANCHEZ RICARDO* and *CASTANO SOLIS SANDRA*.

The course consists of mutiple lectures and examples all related to Matlab and more imported the link between Matlab and the engineering world. Everything in the subject is teached and showed with real life examples.

The evalution of this course consists of multiple smaller assignments and one large final project. This document describes that final project.

Contents

Listings

1 Problem Introduction

The general information about the project reported in this documented is presented in this section.

1.1 Description

In recent years or decade, a new way of traffic/speed control is introduced. The so called trajectory control. This way of traffic control exists in monitoring traffic at entry and exit points of a given trisect. With monitoring is meant the identification of vehicles. In this case cameras are used with a computer system that recognizes license plates. By comparing times at entry and exit point an average speed can be calculated. In general this method of speed control is better than normal one point control due to the avoidance of the break-and-accelerate syndrome. This system can be used for a lot more than just speed control. By analyzing data, conclusion can be drawn why people change lanes, etc. Maybe it will become possible to predict traffic jams, accidents etc. Both present systems and futuristic extension relay on the basic principle of licenseplate recognition from images. This is a very interesting and also fundamental subject in the modern world.

1.2 Matlab functionality

The recognizing of license plates is no more than an Image processing problem. This is possible with Matlab because in digital terms a photo is a matrix of values and can be analyzed. Matrix manipulation is very straight forward in Matlab, you could say Matlab is build for Matrix manipulation. In this way is this a perfect example as a Matlab project.

1.3 Goals and Objectives

For a project of any size it is very important to clearly define the goals. This gives a clear view off direction, wheter the project consists of research, development or even experiments.

- Creating a script that manipulates the images so the license plate becomes clear.

- Creating a script that returns the licenseplate when (in string format) when a picture is given as input.

- Creating a script capable of recognizing the land code.

- Provided enough test data and results to confirm all stated conclusions.

1.4 Possible Extensions

Further in this report is a larger section devotad to possible extensions, this is only a fortaste.

1.4.1 Moving Images

In real life this system works with cameras so with image processing on frames. An extension can be giving an input of video files instead of just pictures.

1.4.2 CUDA

CUDA is a programming language built on top of C that lets the user control the Graphic processor. Because image processing contains a lot of parallel calculations, it can be interesting to see what the gain is when executing on a GPU.

2 Problem Breakdown

In this section the general problem is brought down to simpilar and smaller sub problems. The goals of this section is not making more objectives but making a clear and good dividence in the project. Important in breaking down a problem is th clear definition off the sub problems. It has to be very clear what every part consists off and most important when a sub problem is solved. Out off this last defintion follows that it has to be possible to test every different sub problem in a convenient way. To summarize: a project consists off different sub problems which all have the following.

- Title

- Clear and simple objective.

- Orientation whitin the whole project.

- Test conditions.

Multiple sub problems can be combined into a project phase.

3 Development proces