

Assignment 1

(Due Date: 20 March 2020 at 11:00pm)

1. Automatically locate the number plate in the following image. (Available in numberplates2020.zip from Blackboard). You may try a 2D cross-correlation with a template matching the plate border, but you will probably need to ‘chamfer’ the template by convolving with a Gaussian or some other blurring function. You’ll also need a good edge detector such as the Canny Edge detector. Test your method on the other example car images from numberplates2020.zip and show the results.

In your report discuss methods used, problems encountered, performance, and possible solutions. Comment on the problems encountered in plate extraction and the difficulties in designing a general plate extractor.



(10 Marks)

2. You are provided with a video of a pantograph which provides the electrical power to a train (Eric2020.mp4). The electrical cable slides across the carbon brush of the pantograph in a zig zag manner. Your task is to graph the position of the power cable on the pantograph over time from the video. Note that both the suspension cable and the power cable are visible and that we only want to track the power cable. Note further that at some times in the video there are two or more power cables visible. We only want to track the lowest cable which is powering the train. See if you can work out a way to separate the cables.

(10 Marks)



The aim is not to get a perfect answer, but to show that you know how to approach the problem and can describe the image analysis challenges, therefore your assignment needs considerable focus on method selection, algorithms, and discussion of the results obtained. The assignment should be presented in the form of a brief report including code, images, and descriptive text.

(Total: 20 Marks)

Assignment 1 Marking Scheme and Criteria

Q1

- Coding of a solution to locate one number plate, description and explanation of method, related images and graphs
 - (5 marks)
- Testing method on all other number plates, modification of method as required, showing related images with detection overlay
 - (2 marks)
- Comment on the many challenges to number plate detection including lighting, different shaped plates, different coloured plates, perspective distortion, angle of rotation, and so on and suggest possible solutions.
 - (3 marks)

Q2

- Coding of a solution to locate intersection of power cable and pantograph, description and explanation of method, related images and graphs showing processing of subsequent frames
 - (5 marks)
- Describe how the power cable and suspension cable might be differentiated
 - (2 marks)
- Comment on the many challenges to pantograph detection including lighting, day night vision, rain, clouds etc and suggest possible solutions.
 - (3 marks)