Informatics Simulation & Exploration of Mobile License Plate Detection Employing Infrared, Canny Edge Detection, Binary Threshold and Contour Detection for Submission in Limited Light Conditions

A thesis presented in partial fulfilment of the requirements for the degree of

Master of Engineering

In

Information and Communication

at Massey University, Albany,

New Zealand.

Binny Paul

2011

Abstract

In modern societies, vehicle surveillance is considered as an important device that allows law enforcement to govern the society and ensure citizens' personal safety. Over the past three decades, there have been many submissions of the research into vehicle surveillance. Such research is typically broken down into two parts: license plate recognition and character recognition. This thesis focuses on licence plate recognition. As surveillance operates 24 hours a day, 365 days a year, which includes night time or limited light conditions, there has been no compelling evidence to show a mobile licence plate recognition system with optimum performance under limited light or night time conditions. Thus, the motivation of this thesis is to ascertain evidence of performance under limited light conditions. The CMOS camera, the infrared lens filter, and the infrared light source are included in the hardware design apparatus of the hardware architecture necessary for collecting image samples of real world settings. To locate the license plate, a software algorithm is envisaged as to reduce image noise and locate license plate in the image. To minimise image noise, the pre-processing techniques applied are the Gaussian blur, pyramid decomposition and up-sampling. To locate a license plate, the two unique techniques investigated are Canny edge detection and the binary threshold. Other algorithms included in the software design are dilation used for filling gaps in edge boundaries, followed by contour sets used for identifying unique object boundaries and simplifying boundary edges by means of the Dogual-Peucker algorithm. To sustain optimum performance, the Canny edge hysteresis threshold level was examined together with the iteration level of the binary threshold. The surveillance model was tested in four different environments, but only three were successful. The average accuracy across the three environment settings (1500 images) was 97.53%, which is above the accepted level in this industry.

Acknowledgements

First and foremost, I want to thank my supervisors Dr Fakhrul Alam and Dr Johan Potgieter, whose encouragement, supervision and support from the preliminary to the concluding level enabled me to develop an understanding of the subject. It has been an honor to be their student. They have taught me, both consciously and unconsciously, how good research is done.

I owe my deepest gratitude to Nick Ewings and Dhiren Rugnathji, whose enormous effort was invaluable to me at the stage of the data collection.

I appreciate the contribution made by Oliver Grant and Yvette Hodgson, who spent their time proof reading the thesis.

I want to particularly acknowledge the unconditional support from my father Paul, and mother Parimala who made completion of this thesis possible.

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