Human and Algorithm Facial Recognition Performance: Face in a Crowd

Master of Science
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Technology Organisation

CERTIFICATE OF ORIGINAL AUTHORSHIP

I certify that the work in this thesis has not previously been submitted for a degree nor has it been submitted as part of requirements for a degree except as fully acknowledged within the text.

I also certify that the thesis has been written by me. Any help that I have received in my research work and the preparation of the thesis itself has been acknowledged. In addition, I certify that all information sources and literature used are indicated in the thesis.

Signature of Student

Date

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Abstract

Developing a method of identifying persons of interest (POIs) in uncontrolled environments, accurately and rapidly, is paramount in the 21st century. One such technique to do this is by using automated facial recognition systems (FRS). To date, FRS have mainly been tested in laboratory conditions (controlled) however there is little publically available research to indicate the performance levels, and therefore the feasibility of using FRS in public, uncontrolled environments, known as face-in-a-crowd (FIAC). This research project was hence directed at determining the feasibility of FIAC technology in uncontrolled, operational environments with the aim of being able to identify POIs. This was done by processing imagery obtained from a range of environments and camera technologies through one of the latest FR algorithms to evaluate the current level of FIAC performance. The hypothesis was that FR performance with higher resolution imagery would produce better FR results and that FIAC will be feasible in an operational environment when certain variables are controlled, such as camera type (resolution), lighting and number of people in the field of view. Key findings from this research revealed that although facial recognition algorithms for FIAC applications have shown improvement over the past decade, the feasibility of its deployment into uncontrolled environments remains unclear. The results support previous literature regarding the quality of the imagery being processed largely affecting the FRS performance, as imagery produced from high resolution cameras produced better performance results than imagery produced from CCTV cameras. The results suggest the current FR technology can potentially be viable in a FIAC scenario, if the operational environment can be modified to become better suited for optimal image acquisition. However, in areas where the environmental constraints were less controlled, the performance levels are seen to decrease significantly. The essential conclusion is that the data be processed with new versions of the algorithms that can track subjects through the environment, which is expected to vastly increase the performance, as well as potentially run an additional trial in alternate locations to gain a greater understanding of the feasibility of FIAC generically.

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