Human identification at a distance: The impact of image quality and image restoration techniques on human face matching performance

Joseph Andrew Calleja

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Abstract

The suitability of surveillance for facial identification has been questioned given the low quality of such imagery often captured at a distance. The Defence Science and Technology (DST) Group have developed the Zephyrus normalised cross-correlation (NCC) restoration technique to enhance long-range images, and demonstrated an improvement in facial recognition (FR) algorithm performance. However, whether this technique could improve human face matching performance was not known. This study aimed to understand the impact of image quality and the Zephyrus NCC image restoration technique on human face matching performance during the conduct of a simultaneous one-to-one face matching task. Participants (N = 50) from the University of Adelaide and the general public examined 120 facial image pairs in a repeated measures design, and were asked if they were of the same or different people. The quality of one image (the target image) varied in each pair, and was either a passport-quality, restored surveillance, or an unrestored surveillance image. The other image (the exemplar image) was always of passport-quality. Face matching decisions with passport-quality target images were the fastest, most accurate, and most confident, overall. However, decisions with restored surveillance target images were the slowest, least accurate, and least confident, overall. This may have been due to the restricted number of restored images accessible, and/or the distortion of spatial frequencies necessary to support facial identification. Future research could implement an objective image quality measure, assess the performance of many commercial FR algorithms alongside human performance, and explore various restoration techniques for long-range imagery.

Declaration

This thesis contains no material which has been accepted for the award of any other degree or diploma in any University, and to the best of my knowledge, contains no materials previously published except where due reference is made. I give consent to this copy of my thesis, when deposited in the University Library, being available for loan and photocopying.

Joseph Andrew Calleja
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