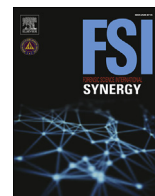


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Application of facial recognition technology on identification of the dead during large scale disasters



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Artificial Intelligence (AI) has become part of our life in many areas, including access control, surveillance, security and smart city solutions. China is using AI in a massive scale where facial recognition and augmented reality technologies enable authorities to monitor individuals and grant users faster and more reliable access to certain places, resources and information. According to the China Internet Report (2019), at the Futian station in Shenzhen, instead of presenting a ticket or scanning a QR code on their smartphones, commuters can scan their faces on a tablet-sized screen mounted on the entrance gate and have the fare automatically deducted from their linked accounts. Upon checking into a hotel, Alibaba's FlyZoo Hotel, which was just opened in December 2018, features AI robots that look after room service and laundry and checking in hotel room via facial recognition. In Beijing, the 3D image analysis and pattern recognition technology have helped police authorities track down a criminal who had been evading justice for 20 years. Similarly, in Shenzhen, high-definition cameras and AI technology assist in catching traffic rules violators. A Beijing-based augmented reality company has developed smart glasses, which let police access real-time facial, identification card and vehicle plate information that are linked with a national database [1,2]. As a disruptive technology, AI has been changing all aspects of humanity and society, and is expected to promote both public health and people's physical and psychological health, during normal situations as well as during a public health crisis such as the COVID-19 pandemic [3].

Facial recognition, an important branch and application of AI technology, is one type of biometric recognition technology, including but not limited to gait recognition, iris recognition,

fingerprint recognition, and voice recognition [2,3]. It has emerged as a solution to address several contemporary needs of identifying and verifying an individual's identity. It fulfils the biometric system requirements, which tries to recognize the status of an individual by using features distinctive from the body and functionalities that are more familiar with the operation of visual surveillance [4]. Thinking out of the box, the facial recognition technology can form a new perspective in managing the dead and facilitating the human identification needs especially in large scale disasters. The conventional way of disaster victim identification (DVI) is conducted through the primary identifiers, namely, friction ridge analysis, forensic odontology and DNA comparison, which have been internationally accepted as the most reliable method by which identification can be confirmed [5]. However, these primary methods of identification have certain limitations that continuously challenge the DVI operation particularly on the condition of the human remains, availability of antemortem records of dental and fingerprints as well as the cost of DNA analysis.

A study by Caplova et al. (2017) mentioned that the use of the physical appearance of the deceased has become more important because the available antemortem information for comparisons may consist only of physical descriptions and photographs [6]. All personal identification methods are based on morphological features of the human body. The human face, in particular, is individual, and it is widely used for personal identification of living persons in different contexts, including eyewitness recognition, and the assessment of images by experts in criminal proceedings. The facial recognition method had been used for personal identification in mass disasters, such as the Thailand tsunami where victims were identified by physical appearance and the photographs of the dead bodies in early stages [7]. From the total number of identified victims, 32.2% of the cases were successfully identified

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visually although error rates were high too [8]. The possibility to have the facial photos of the disaster victims secured and captured within the first 48 hours' post-disaster, before decomposition commences, allow the potential to match the victims' faces to any possible government database available, i.e. image data generated at the airport immigration gate, leading to positive identification. What if facial recognition can be used as the fourth primary identifier in helping to speed up the identification process and at the same time ensure disaster victims are treated with dignity and respect in accordance with the International Committee of the Red Cross (ICRC)? The paradigm shift of adopting the facial recognition and AI technology in the identification process as means of providing closure to families and protecting the dignity of the dead person, could be the way forward in humanitarian forensic action.

Declaration of competing interest

The authors declared that they have no conflict of interest.

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