H68   Advances in Computer Graphic Facial Recognition Software: Matching Facial Approximations to Antemortem Photographs

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After attending this presentation, attendees will understand the intro- ductory nature of automated facial approximation technologies and the use of facial approximation software in comparative isolation of images from large photographic image data sets to identify unidentified human remains.

Conventional facial approximation techniques suffer from a range of subjective inaccuracies that prevent human observers from accurately iden- tifying an approximation with a known photograph of the victim. The use of automated facial recognition technology to analyze automated facial approximations will eliminate much of the subjectivity from the traditional process and strengthen the reliability of identifying unknown remains.

A recent Bureau of Justice Statistics preliminary report states there are over 40,000 sets of unidentified human remains curated by medical examiners, coroners, and forensic anthropologists in the United States.[1] Additionally, hundreds or thousands of mutilated/disfigured and/or decom- posing remains may result from genocide, warfare or mass natural or human- made disasters. Traditional methods of facial approximation are unable to effectively address these issues. Clearly, there is an urgent need to be able to systematically and correctly process large numbers of victims in a cost- efficient and expeditious manner.

One such method in development is a computerized facial approxi- mation system termed ReFace (Reality Enhancement Facial Approximation by Computational Estimation). Developed by the Federal Bureau of Inves- tigation with General Electric Global Research, the prototype extrapolates an approximation of a face from a skull using a database library of computed tomography (CT) scans of living individuals. The purpose of this collabo- ration was to determine whether facial recognition software could more accu- rately match computer images with antemortem photographs than could be achieved by human examiners. Previous research has tested the success of the subjective human examiners in matching ReFace generated approxima- tions with antemortem photographs.[2]

Facial approximations from 50 skulls from the William M. Bass Donated Skeletal Collection at the University of Tennessee were prepared using prototype facial approximation software. Antemortem photographs of the test subjects were added to the photographic database of the facial recog- nition software. Each facial approximation was entered into the facial recog- nition system as an "unknown" with the anticipation that the actual antemortem photograph of test subjects would be selected as a potential match by the facial recognition software.

The results were analyzed by those not involved in the approximation preparation or with the recognition testing. These results and the applicability of this method for forensic casework will be discussed.

References:

1   Ritter, N. 2007. Missing Persons and Unidentified Remains: The Nation's Silent Mass Disaster. National Institute of Justice Journal 256:2-7.
2   Moyers, D.K. 2007. Validation Study of ReFace (Reality Enhanced Facial Approximation by Computational Estimation). Unpublished M.A.Thesis, University of Tennessee at Knoxville

Facial Recognition, Facial Approximation, Computer Prototype