International Journal of Criminal Investigation
Volume 3
Issue 2 / 2013
133-136

EVOLUTION IN IDENTIFY INDIVIDUALS WAYS BY EXTERNAL ANSWER TO DESCRIPTION

Emilian STANCU
J.S.D., Faculty of Law, Bucharest University

The Roman philosopher Cicero said that "everything is in the face", and truly the human face is a complex, multifunctional part of our anatomy which tells the world, who we are and what we are feeling both emotionally and physically, as well as performing a number of essential physiological functions. We all have to live with our own face and with how others perceive us through its appearance. It can affect our self-esteem and if we are unhappy with it we may try to alter it.

Its physical appearance and its perception by others act together powerfully to set us a real challenge in identifying an individual. This is particularly so when we try to reconstruct a face from a skull of unknown provenance.

We start with the not insignificant difficulty of trying to achieve a recognition from an acquaintance of the deceased, when we have no idea who the person was to begin with or how they were remembered during life - were they happy and smiling, sad or angry? Did they have a condition which in some way characterized their facial appearance - we know that chronic pain or severe mental disorders such as schizophrenia can significantly alter facial affect in a person. Nevertheless, despite these obstacles, identifying an individual from their facial appearance remains a fascinating challenge for us worthy of serious academic study and development.

I am also mindful that facial identification, in this day and age, is an important tool to be considered both as a primary and secondary characteristic of identity, especially with the need to identify victims of conflicts around the globe that are found in mass graves and also those who have perished from apparently ever increasing natural mass disasters. There has never at any time been a problem of such magnitude needing to be resolved, and the application of different facial identification techniques may in many instances be of significant assistance.

Facial image identification is becoming an important theme in forensic anthropology because surveillance

"Promovarea cercetării ştiinţifice din domeniul criminalisticii în activitatea judiciară" POSDRU/86/1.2/S/62307
Proiect cofinanţat din Fondul Social European prin Programul Operaţional Sectorial Dezvoltarea Resurselor Umane 2007-2013

cameras are used as a silent witness in crime scenes such as convenience stores, banks, and parking garages. Facial image identification is generally approached in three ways: morphological comparison of facial features, anthropometrical analysis, and face-to-face superimposition.

In order to assess two facial images, the video superimposition technique has been applied to facial image comparison. Maples and Austin (1992) reported the video superimposition technique was useful in cases when it is possible for laboratory personnel to photograph a suspect at the correct position relative to the camera.

Vanezis and Brierley (1996) applied the video superimposition technique to identify the facial image of suspects in 46 criminal cases. They stated that direct comparisons could be made in 36 cases, including 20 major viewpoint discrepancy cases.

As described previously, the comparison of facial images taken with a surveillance camera and mug shots of suspects often is a difficult task because surveillance cameras usually look down upon the scene, whereas mug shots are frontal and lateral or oblique images. To solve this problem, Vanezis and Brierley (1996) developed a face-to-face video superimposition system using 3D physiognomic analysis. This system was a useful tool for facial image identification because the video superimposition of two facial images could be performed under the same facial orientation.

Facial images can play a useful role in the identification of criminals. Despite this advantage, several problems such as operation time and anthropometrical analysis arose in the old system.

Recently, a facial image identification system using both a 3D facial range finder "Fiore" (NEC Engineering, Japan) and a 2D/3D facial image superimposition method was developed. This system has proven to be a useful tool for facial image identification, because the superimposition of two facial images can be performed under the same facial orientation by rotating the 3D facial image, and the shape and positional relationships of their facial components can be compared to each other in the same condition. Furthermore, this system enabled morphometric matching using facial outlines and anatomical landmarks, giving objective results based on numerical data. This facial identification system was set up for one-to-one comparison, not for one-to-many comparison.

For one-to-many comparison, facial recognition systems have been developed and commercially released. These facial recognition systems are based on several different mathematical approaches such as

"Promovarea cercetării ştiinţifice din domeniul criminalisticii în activitatea judiciară" POSDRU/86/1.2/S/62307
Proiect cofinanţat din Fondul Social European prin Programul Operaţional Sectorial Dezvoltarea Resurselor Umane 2007-2013

statistical information methods, graph matching, and neural networks.

Commercially available software packages are designed to verify a facial image of a known person belonging to a relatively small database of facial images, and are restricted to comparison of nearly frontal images of the face under the 2D image mode. Thus, it seems that these programs are not adequate for police investigation, because the facial image taken at the crime scene is not, in most cases, a frontal view. A possible exception to this is the use of passport photographs in illegal immigration cases.

If a robust system for identifying facial images taken from severely disadvantageous angles is developed, the 3D facial images could be effectively used as a database.

References:

Fraser N. L., Yoshino M., Imaizumi K., Blackwell S. A., Thomas C. D. L. and Clement J. G. (2003) "A Japanese Computer-Assisted Facial Identification System Successfully Identifies non-Japanese Faces", *Forensic Sci. Int.* 135, 122-128.

Gutta S. and Wechsler H. (1998) "Modular Forensic Architectures", in: *Face Recognition* (H. Wechsler *et al.*, eds.). Springer, Berlin, pp. 327-347.

Howell A. J. (1999a) "Introduction to Face Recognition", in: *Intelligent Biometric Techniques in Fingerprint and Face Recognition* (L. C. Jain *et al.*, eds.). CRC Press, Boca Raton, pp. 217-283.

Howell A. J. (1999b) "Face Unit Radial Basis Function Networks", in: *Intelligent Biometric Techniques in Fingerprint and Face Recognition* (L. C. Jain *et al.*, eds.). CRC Press, Boca Raton, pp. 317-334.

Moghaddan B. and Pentland A. (1998) "Beyond Linear Eigenspaces: Bayesian Matching for Face Recognition", in: *Face Recognition* (H. Wechsler *et al.*, eds.). Springer, Berlin, pp. 230-243.

Pandya A. S. and Szabo R. R. (1999) "Neural Networks for Face Recognition", in: Intelligent Biometric Techniques in Fingerprint and Face Recognition *(L. C. Jain* et al., *eds.). CRC Press, Boca Raton, pp. 287-314.*

Peacock C., Goode A. and Brett A. (2004) "Automatic Forensic Face Recognition from Digital Images", *Science & Justice* 44, 29-34.

Poulton G. T. (1998) "Face Recognition Research at CSIRO", in: *Face Recognition* (H. Wechsler *et al.*, eds.). Springer, Berlin, pp. 599-609.

Sinha P. (1998) "A Symmetry Perceiving Adaptive Neural Network and Facial

"Promovarea cercetării ştiinţifice din domeniul criminalisticii în activitatea judiciară" POSDRU/86/1.2/S/62307
Proiect cofinanţat din Fondul Social European prin Programul Operaţional Sectorial Dezvoltarea Resurselor Umane 2007-2013

Image Recognition", *Forensic Sci. Int.* 98, 67-89.

Wiskott L., Fellous J. M., Kruger N. and von der Malsburg C. (1999) "Face Recognition by Elastic Bunch Graph Matching", in: *Intelligent Biometric Techniques in Fingerprint and Face Recognition*(L. C. Jain *et al.*, eds.). CRC Press, Boca Raton, pp. 355-396.

Wurts R. P. (1999) "Face Recognition from Correspondence Maps", in: *Intelligent Biometric Techniques in Fingerprint and Face Recognition* (L. C. Jain *et al.*, eds.).CRC Press, Boca Raton, pp. 337-353.

"Promovarea cercetării ştiinţifice din domeniul criminalisticii în activitatea judiciară"
POSDRU/86/1.2/S/62307
Proiect cofinanţat din Fondul Social European prin Programul Operaţional Sectorial Dezvoltarea Resurselor Umane 2007-2013