C20 Integrating a Profile of Frontal Face With Its Mirror Image for Facial Reconstruction

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After attending this presentation, attendees will understand the value of computer-generated programs in facial reconstruction when a half frontal profile of the face usually captured in Closed-Circuit Television (CCTV) cameras and other surveillance systems is available for forensic examination.

This presentation will impact the forensic science community by presenting a detailed analysis of the generated computer program, which will help attendees in understanding the concept of using this program for full facial reconstruction.

The face is an important part of the human body that is used to recognize and distinguish one person from a large number of people. This is due to the uniqueness of the human face and the great variability in the features observed in different human faces. Forensic anthropologists and scientists are interested in studying the various features of the face as this is useful for the reconstruction of a human face from an available cranium. Forensic anthropologists and scientists are also interested in establishing the biological profile of the person/deceased, such as estimation of age, sex, race/ethnicity as well as probable stature, in order to have the maximum number of clues for identification of the deceased. In this era of CCTV cameras, facial identification is based upon the comparison of the images obtained from a crime scene; thus, identifying human faces has become an important computer technology. At times with CCTV cameras and other surveillance systems, the complete face is not visible and only half of the frontal facial pose is captured; however, half of the mirror image of the face can be used to reconstruct the complete face of the person in question. In previous studies related to identification or in the field of computers, mirror images have only been used to solve the problem of a non-sufficient training sample and have not been used for full facial reconstruction.

In this presentation, a methodology is presented to generate a mirror image from one facial profile, merging it with the input image to generate a complete face. This procedure is very simple, less time consuming, and computationally efficient. The designed program was tested on a selected sample of five adult females ranging in age from 20 years to 30 years old. The photographs of the participants were taken against realistic backgrounds using standard procedures. The images were processed using IrfanView v. 4.38 software and a novel program was designed using MATLAB® (Version 7.9.0 (R2009B)). The program uses the right frontal profile of the participant's face as input and generates its mirror image. Finally, it merges both the input image and the mirror image to generate the complete face of the individual.

The facial asymmetry cannot be distinguished in the generated images because these images are the result of the mirror image formation of the right profile image of the face; however, even though the differences are discernable between the two types of images (i.e., the generated and the actual images), the faces are recognizable from the reconstructed images. Therefore, the present approach would help to generate a complete facial image in cases in which only one frontal profile (i.e., the left or right side of the face) are available for examination. The proposed methodology would also be useful for improving other facial reconstruction and recognition methods.

Facial Reconstruction, Computer Program, CCTV Captured Images

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