Dissertation Title	Facial Reconstruction from Skull Using Free Form Deformation
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ABSTRACT

The purpose of facial reconstruction is to estimate the facial outlook from a discovered skull with the intention of providing a positive effect for deceased identification. At present, the reconstruction is performed by a forensic artist. This method is done manually using clay modeling. It is very subjective and not reproducible. Other drawbacks are that it is very time consumed, and hard to change and modify the model. Therefore computerizing the process is challenging and makes the reconstruction more scientific. This work proposed a novel method for computerized facial reconstruction through the use of Free Form Deformation. In the experiment, all heads in the head database were aligned to be same position, proportion and orientation as questioned skull using Iterative Closest Point algorithm which is a straightforward algorithm that minimizes the difference between two surfaces. Partial similarity between skulls in the database and questioned skull were assessed using Cylindrical Projection approach. Each part of skulls in the head database which was the best match to the corresponding part of questioned skull was selected as reference part. All reference parts were deformed according to questioned skull using Free Form Deformation. Deforming of soft tissue after the skull gave the desired face shape. The resulting faces from this experiment shows promising for forensic facial identification in the face pool test achieving approximately 45% success rate.

Keywords: Facial Reconstruction/Free Form Deformation/Cylindrical Projection/Iterative Closest Point/Partial Similarity