

Accuracy Assessment Of A Forensic Facial Reconstruction Initiative In Sri Lanka Via 2d Facial Landmarks Comparison

Muditha Vidanapathirana¹, Roshan N Rajapakse², Damitha. D Karunaratne², K. Damitha Sandaruwan², Nuwan Dhammika², Rasika Ranepura², Subhashini Samaraweera³, Amaratne RRGs⁴

¹Department of Forensic Medicine, Faculty of Medical Sciences, University of Sri Jayawardhanapura., Sri Lanka, ²University of Colombo School of Computing, Colombo, Sri Lanka, ³Department of Radiology, Sri Jayawardenapura General Hospital, Sri Jayawardenepura Kotte, Sri Lanka, ⁴Office of the JMO, Base Hospital, Puttalam, Sri Lanka

Introduction: At times Forensic Investigators are presented with human remains that are highly decomposed or mutilated and are beyond simple identification. At these instances the only remaining option is the process of facial reconstruction. However since this process was not carried out in Sri Lanka, we introduced a 3D computer graphics and facial anatomy based forensic facial reconstruction approach to the local officials. This study related to the accuracy assessment of 4 outputs which were obtained from the process introduced in our previous studies.

Method: The skulls for the process were obtained from CT scan data of live subjects from two medical institutes in Colombo. The computer modelling of the facial muscles were then performed on the digital sculpting environment to arrive at the outputs. The 3D model of the actual face of the subject was then obtained from surface reconstruction of the same CT scan data which was utilized to render the skull. Once the frontal 2D images were captured of both the final output model and actual face of the subject, 2D landmarks comparison was performed via the interface developed for this project. This interface performed automated detection of the said landmarks from the 2D images and variance calculations.

Results: This method resulted in close linear measurement values for most 2D facial landmarks in consideration for the comparisons performed. The mean percentage variance was below 12.00 for most landmarks. However, comparatively high variances were present for landmarks pertaining to the nose and mouth.

Conclusion : Since forensic facial reconstruction is a complex and subjective process, thorough evaluation is required to validate the process followed. The evaluation results illustrate that the computerized digital sculpting method followed in this study produces acceptable outputs. Yet, the results also showed that, facial features such as nose mouth can have high facial reconstruction error.

Keywords: Forensic Facial Reconstruction, Digital Sculpting, Accuracy Assessment, 2D Facial Landmarks