

**MESH TRANSMUTATION USING LINEAR TRANSFORMATIONS
APPLIED TO FACIAL IMAGES**

Undergraduate Thesis
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ABSTRACT

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The study was conducted to: exhibit mesh transmutation; exhibit standard matrix that will form linear transformations; apply mesh transmutation and linear transformations in facial images; and to compare the linear transformations of the different images.

A total of 140 matrices, 140 triangles and 10 triangulations were made for the successful transformations of the begin-picture and end-picture. $m = 2n - 2 - k$ was used to determine the number of triangles where n is the number of vertex points chosen and k is the number of vertex points lying on the boundary of the rectangle. $w_i = Mv_i + b$ was also used to find the standard matrix of the 14 vectors in a triangulation, where M is a 2×2 matrix (m_{11}, m_{12}, m_{21} and m_{22}) and b is the 2D vector (b_1 and b_2).

There were slight changes occurred in every triangulations. From first to second triangulation, second to third triangulation and so on and so forth. The transformations that have been made were only focused on the key features of the pictures. The transformations were noticed in the middle part of the image (the nose, eyebrow, cheeks and lips). Many transformations were made before the begin-picture transformed to end-picture. The begin-picture was taken 10 years ago while the end-picture was taken last January 2013. The target year of the researcher was 10, that is why, 10 triangulations was done. SCILAB was used for the easier way of computing matrix and Computer Graphics

Software (Morpheus Photo Morpher and Face Morpher Lite) was also used for the image manipulation technique.

Every process in the Picture 1 was done in the Picture 2. Picture 1 and Picture 2 have the same number of vertex points, triangles and triangulations. After that, the difference between the two pictures (images) appeared. The face of the first image was more stretched compared to the second one. They have different linear transformations and when applied, different transformations changed. So that comparing two different images, they have no the same transformations. It was closely alike but it is not possible to form the same transformations.