Baby Face Generator

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Detecting faces and extracting key facial features remains an active research area with a wide range of applications. This project seeks to leverage these facial feature detection methods and morphing methods for an entertaining application: to intelligently combine the faces of two individuals to form a composite baby image. The algorithm will involve a number of topics covered in class lectures including color balancing, image segmentation, face detection, eigenimages, and edge detection.

The first portion of the project involves implementing an algorithm for detecting human faces and localizing the key facial features. The implementation will build upon several face detection and facial feature extraction algorithms including Turk and Pentland's work using eigenfaces to locate faces [1], Huang and Chen's work using active contour models for facial feature extraction [2], and Saber and Tekalp's work using color, shape, and symmetry-based cost functions for facial detection and feature extraction [3]. Additionally, the input faces' ethnicities will be classified using eigenimages or fisher images and combined to select the baby's ethnicity from a predefined database.

The second portion of the project involves combining the identified facial features of the two individuals to form a composite image. This algorithm incorporates facial morphing techniques including Beier's field-morphing algorithm [4] to properly weight and combine the input faces. A randomized weighting method will be used for selecting which features from the input images will appear in the output image so that a different baby image is generated each time the program runs. Finally, the composite image will include color correction to increase the natural appearance of the image.

The final implementation of the baby face generator will include a user-friendly interface implemented in MATLAB. This project does not require a DROID camera phone.

REFERENCES

[1] M. Turk and A. Pentland, "Eigenfaces for recognition," *Journal of cognitive neuroscience*, vol. 3, no. 1, pp. 71–86, 1991.

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[3] E. Saber and A. M. Tekalp, "Frontal-view face detection and facial feature extraction using color, shape and symmetry based cost functions," *Pattern Recognition Letters*, vol. 19, no. 8, pp. 669 – 680, 1998.

[4] T. Beier and S. Neely, "Feature-based image metamorphosis," in *ACM SIGGRAPH Computer Graphics*, vol. 26, no. 2. ACM, 1992, pp. 35–42.