Facial Recognition using Eigenfaces: Conclusion*

Aron Yu
Catherine Elder
Jeff Yeh
Norman Pai

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Abstract

Conclusion

1 Conclusion

This project yielded fairly accurate face detection results using the eigenface method. Interestingly, we found that a database of some 200 images can be accurately represented with only about 6 eigenfaces. This demonstrates that the eigenface method is useful for its ability to compress large datasets into a small number of eigenfaces and weights. We predict that our results will scale, that is, the number of eigenfaces needed to represent a database of 1,000 or 1,000,000 images will be far fewer than the number of images. Based on our results, we hypothesize that more diverse datasets require slightly more eigenfaces for accurate representation. Our project demonstrates that the eigenface method is an efficient and accurate technique for facial recognition.

1.1 Further work

To improve the results of the eigenface method implemented, a normalization program could be developed to determine the facial metrics and normalize the photos such that facial features are held in constant positions and contrast and light intensities between photos are balanced. Localizing of the features would keep head positions fairly consistent and yield better eigenfaces.

Creating a program to extract faces from their environment (for example, by using a matched filter) would expand the possible applications of this project. Individual faces could be extracted from security cameras or group pictures.

A larger and more diverse dataset would also increase face identification and recognition. We would like to include people of diverse ages, since everyone in both the JAFFE and Rice datasets was in their teens or twenties. Increasing the size and quality of the dataset would boost the recognition rate. We would like to see how many eigenfaces are needed to represent a dataset of 1,000 or 1,000,000 images.

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Because both our datasets have emotions as a variable, it would be interesting to create an "emotion detector", as was done with the JAFFE data. Despite the fact that emotions look different on every person (fear was found to be an especially problematic emotion), emotion recognition rates of over 67% were attainedusing Gabor wavelets[2] . It would be interesting to see how the eigenface method compares.

2 Facial Recognition Source Codes

- If you would like to try out out our facial recognition code for yourself, you can download them here[1]. This code allows you to input one test image and matches it to the closest image in the given dataset. The JAFFE dataset is included for testing.
- If you would like to test with our full code or to obtain the HFH dataset, please contact Aron Yu (aron.yu@rice.edu[2])
- GUI version of the code coming soon...

[1] See the file at <http://cnx.org/content/m33177/latest/SingleRun.rar>
[2] aron.yu@rice.edu