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CSE40535 Deliverable 1

Project 4: Face Recognition ReadMe

A. Current database download: https://www.bioid.com/facedb/

*** **Note**: You also mentioned to us in class that we could consider using ND CVRL's 2D face database, so we would be open to using that instead.

The database we downloaded contains images stored in files using the portable gray map (PGM) data format. There are 1520 images total, and from this total there are multiple facial expressions of each candidate included. Contained within each image file is a 4-line header followed by the image data. Each line of the header is formatted in the following way, beginning with the first line: the format of the image data (P5 indicating in binary), the image width in text form, the image height in text form, and the maximum allowed gray value (255). Following the header, the image data is stored line-by-line using one byte per pixel. Every image within the dataset has a corresponding text file that contains the following information about eye location: the x and y coordinates of the left eye and the x and y coordinates of the right eye, where 'left' and 'right' refer to the person's left and right. From this sample size, we should have a sufficient amount of images to divide into training, validation, and "unknown" testing components.

B. Proposed Solution

From the dataset, we can take the provided eye positions in relation to the face image in order to calculate the relative eye distance. Most software for facial recognition compares stable features that can persist through changes in appearance, including eye shape and distance between eyes for template matching. Implementing this would involve using OpenCV or deep learning. We would need to find face locations and encodings, extract features using face embedding, and use face recognition to compare the faces.

Ideally, we would like to use a deep learning model for feature extraction and then use a SVM for matching.

For Viola-Jones Algorithm:

Reference:

https://towardsdatascience.com/the-intuition-behind-facial-detection-the-viola-jones-algorithm-29d9106b6999

The Viola-Jones Algorithm is an object-recognition framework that allows detection of image features in real-time. The two stages involve training and detection.

The LBP method

Reference:

https://www.sciencedirect.com/topics/engineering/local-binary-pattern#:~:text=Local%20Binary%20Pattern%20(LBP)%20is,scale%20contrast%20in%20an%20image.

other links:

- https://towardsdatascience.com/face-detection-for-beginners-e58e8f21aad9
- https://machinelearningmastery.com/how-to-perform-face-detection-with-classical-and-deep-learning-methods-in-python-with-keras/#:~:text=Face%20detection%20is%20a%20computer,involves%20finding%20faces%20in%20photos.&text=More%20recently%20deep%20learning%20methods,Network%2C%20or%20MTCNN%20for%20short.
- https://www.pyimagesearch.com/2018/09/24/opencv-face-recognition/
- https://towardsdatascience.com/https-medium-com-pupalerushikesh-svm-f4b42800e989#:~:text=SVM%20or%20Support%20Vector%20Machine,separates%20the%20data%20into%20classes.