PERIOCULAR RECOGNITION IN THE VISIBLE SPECTRUM

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Problem Statement

The aim of the model is to address the issues with facial recognition systems such as occlusions and design a periocular recognition system, given an image, which may only contain facial information in and around the periocular region as input and perform recognition.

Background

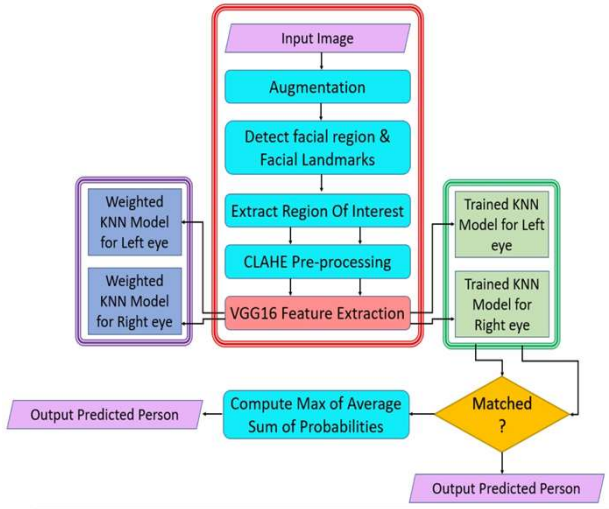
Facial recognition currently deployed in surveillance environments help prevent crime, detect casualties, access control, authorization, privacy, security, etc. Despite of wide usage, shortcomings exist that include facial expression changes, aging, occlusions, etc. The proposed method, Periocular recognition, has emerged to address the issues that facial recognition poses.

Dataset, Features & Requirements

- The dataset used for the project is a custom made dataset shot on 24 subjects in a controlled environment
- The product developed provides various functionalities to the users such as:
  - Training Dataset
  - Retrieving Model Accuracy
  - Create/Edit Database
  - Recognition
- Requirements for the project:
  - Software Requirements: OpenCV, dlib, Caffe, Tensorflow, Keras, Drive, Google Collab

Design Approach/Methods

The project design includes seven elements which have sequential interactions with each other. These elements are the augmentor, face detector, facial landmarks detector, region of interest extractor, feature extractor, trainer and tester. All these elements put together help deliver all the product functionalities to the user.



Results and Discussions

The experiment stipulates that the canthus points are essential components for periocular identification. As compared to other approaches in the literature, the DNN model is capable of substantially neutralizing the effect of pose variance and achieving a reasonably good match. An accuracy percentage of 90.18% is obtained using the proposed model for a dataset containing images of 24 test subjects.

Summary of Project Outcome

The product returned the predicted person along with the user inputted image on successful recognition.
The initial target was to address the issue that existing facial recognition systems faced due to occlusions. This target was met by this project and was seen that a fair accuracy was obtained.

Conclusion and Future Work

The project was found to work well on even little training data.
It was seen that the recognition process was successful even with low quality images.
The advancements and future that could be done are listed below:

- Multispectral implementation of periocular recognition that includes the IR Spectrum.
- Study the impact of cosmetics on texture of the periocular region and the resulting effect on recognition accuracy.
- Pose compensation CNN implementation to deal with error cases.
- Restoration algorithms to deal with blurred images.
- Recurrent Neural Networks implementation for exploiting dynamic information.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