

Implementation of a Software Application for Researching the Face Recognition Algorithm

Oleksandr Mordyk¹Oleksandr Tsymbal²¹Kharkiv National University of Radio Electronics, 14 Nauky Ave, Kharkiv UA-61166, Ukraine, oleksandr.mordyk@nure.ua²Kharkiv National University of Radio Electronics, 14 Nauky Ave, Kharkiv UA-61166, Ukraine, oleksandr.tsymbal@nure.ua

Abstract. Deep learning has recently attracted more and more interest in face recognition. Face recognition is a computer vision problem. There may be slight differences in the faces of humans but overall, it is safe to say that there are certain features that are associated with all the human faces.

Keywords: OpenCV, Viola-Jones algorithm, EigenFaces, FisherFaces, LBP, AAM, ASM.

I. INTRODUCTION INTO FACE RECOGNITION

Today there are many recognition and detection algorithms faces in the image. In addition, each of them has input parameters that affect the result. The result also depends on lighting, contrast, angle and turning the face. Thus, there are a huge number of algorithm to detect and face recognition in the image. Determination of the best parameters of algorithms with so many variations are almost impossible by hand. To solve this problem, a software application is being developed that will simplify the study of face recognition algorithms.

The Viola-Jones algorithm was chosen for face detection, since it is the most suitable in terms of accuracy/speed of face detection from video stream. Also this application was tested with algorithms EigenFaces, FisherFaces, LBP, AAM, ASM.

Development tools was selected: QT, C++, PostgreSQL, OpenCV.

II. PROBLEM DESCRIPTION

Exist a lot of software solutions that allow you to use face recognition algorithms. These solutions have a number of disadvantages:

- Their functionality is limited to one or three face recognition algorithms;
- It is necessary to manually enter the parameters of the algorithms in the program code and choose the algorithm itself;
- This solution do not have a graphical interface;
- There is no possibility of changing the original image, such as hue, brightness, contrast.

III. SOLUTION

First need to review methods and algorithms for detection and recognition faces of people. The face recognition problem is subdivided into the face detection problem into image and the task of recognizing faces in the image. For each of these subtasks use their own methods and algorithms. The second step is review suitable development tools and select the most suitable development tools for studying face recognition algorithms.

Yan, Kriegman, and Ahuja presented a classification[1] for face detection methods. These methods divided into four categories as we can see at fig/ 1:

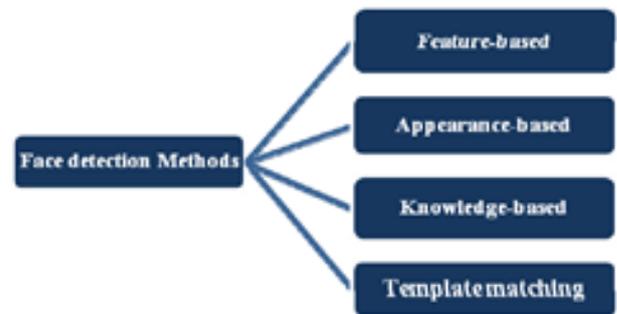


Figure 1. Face detection methods

The knowledge-based method depends on the set of rules, and it is based on human knowledge to detect the faces.

The feature-based method is to locate faces by extracting structural features of the face.

Template Matching method uses predefined face templates to locate or detect the faces by the correlation between the templates and input images.

The appearance-based method depends on a set of delegate training face images to find out face models.

The Viola-Jones object detection framework is an object detection framework which was proposed in 2001 by Paul Viola and Michael Jones. Although it can be trained to detect a variety of object classes, it was motivated primarily by the problem of face detection.

In fig. 2, shows the architecture of the application.

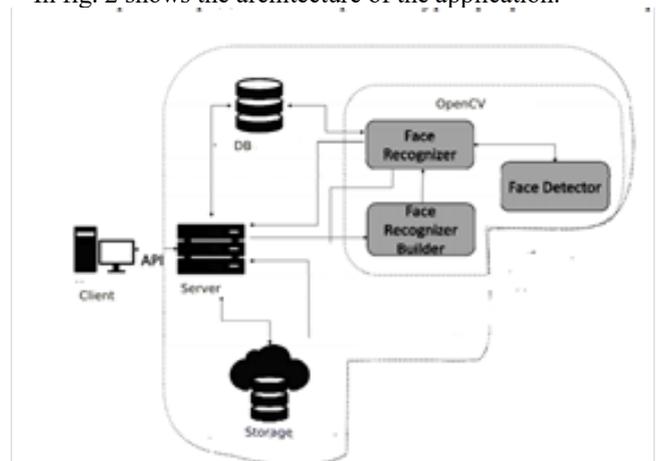


Figure 2. Application architecture

The user through the client application uploads a face image to the database on the server, it can also set various settings images such as brightness, contrast and others, choose an algorithm face recognition, set the algorithm parameters and send to the server image, where it will be processed by the computer vision module.

The found face will be classified based on the faces in the database. Based on the classification results, the user will be returned to the estimated face class and graphs of the dependence of the accuracy of face recognition on the set image parameters and the algorithm.

An example of a work application is shown in Figures 3.

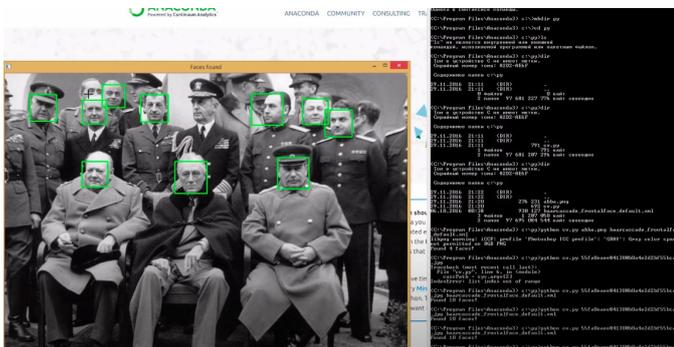


Figure 3. Application example

IV. CONCLUSIONS

Implemented the software application for the study of face recognition algorithms. Also selected the most suitable face detection algorithm by using accuracy/speed faces from the detection video stream. This algorithm is the Viola Jones method. Algorithms for face recognition have been selected, which will be provided to the user for study.

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