FACE RECOGNITION APPROACHES USED IN THE STUDY

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A R T I C L E I N F O.	**Abstract**
Keywords: Holistic, Binary, PCA, transformation, recognition, challenges, visual.	This thesis is concerned with investigating the main three groups which are: holistic (linear and nonlinear), hybrid, and deep learning-based approach. In addition, these categories as well as the algorithms that are associated with them shall be introduced.

Traditional Approach

Despite the great advances that have occurred in the face recognition as various algo-rithms have been applied, there remain some challenges that needs to be addressed. These include facial expressions, illumination, face rotation and face occlusion. Certain visual descriptors are being adapted to solve these challenges. One texture descriptor which has been used is Local Binary Pattern. (LBP). This is a method that depends on pixel-based texture extraction. With the development of local feature descriptors in other computer vision applications, the popularity of feature-based methods will be increased face recognition. As it can be seen in

Figure 1., histograms of LBP descriptors were taken out from local regions and then forming a global feature vector.
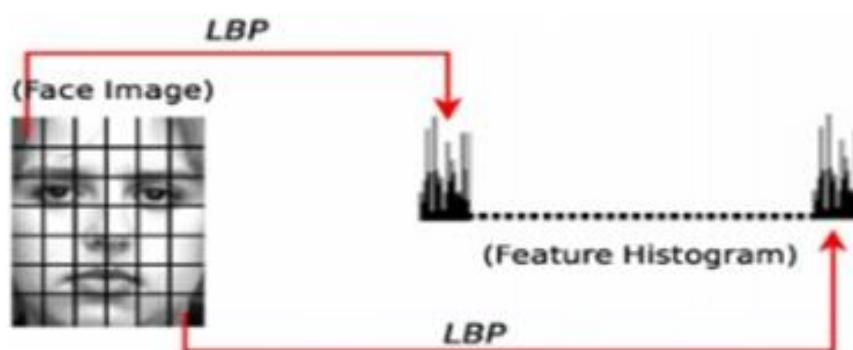

Figure 1. LBP-based face description.

Holistic Approach

In the holistic approach a linear transformation is applied to the face images to convert it into smaller dimensions. This kind of transformations has some significant drawbacks. The main drawback of linear holistic approaches is that they do not preserve distinctive features. Eigenfaces, Fisher faces, and support vector machines are important examples of holistic approaches. Figure 2. illustrate the

comparison of PCA (which is the most common technique in face recognition) and other face recognition techniques based on holistic approaches. Some of the main linear holistic approaches are represented in Figure 2.
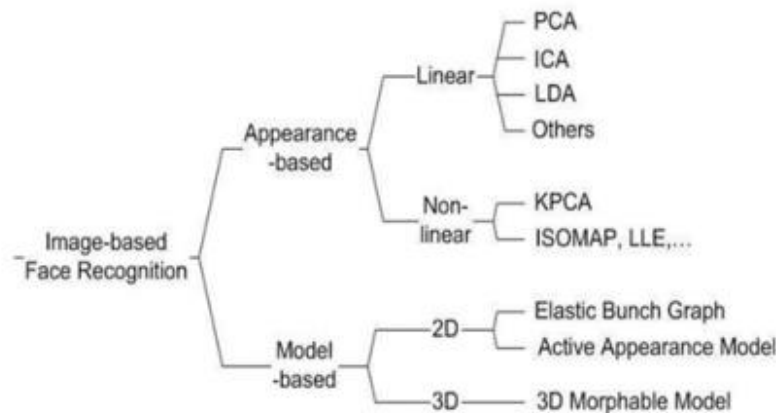

Figure 2. Face recognition algorithms.

Holistic example: In 1991 Turk and Pentland used eigenfaces to achieve the first manifestations of machine recognition of faces. A two-dimensional recognition problem was addressed in their approach. Different stages of the eigenfaces based recognition system were highlighted within the flowchart presented in Figure 3.

➢ Inserting the images set into a database is considered as the first stage; this

➢ training set has a significant role as they shall be used in comparing the images and in creating the eigenfaces;

➢ The second stage represents creating the eigenfaces. They are developed by extracting the characteristic features of the face and normalizing the input images in order to line up face elements such as mouth and eyes. Then, these images are resized to the same dimensions. There is a mathematical tool (PCA) which is able to extract the eigenfaces from the image data;

➢ Every image shall be presented separately as the center point of weight, when the eigenfaces are developed;

➢ System indication by accepting the queries of entering or rejection;

➢ A comparison is made between the weight of the incoming unknown images and the weight of the other images that are existing on the system. In the case of the

weight of the input images was greater it has to be considered as unidentified. When the system finds the images, that have a close weight to those images in the database, the identification of the images is complete. The image input in the database which has a very close weight shall be kept as a "hit" of the system's user.
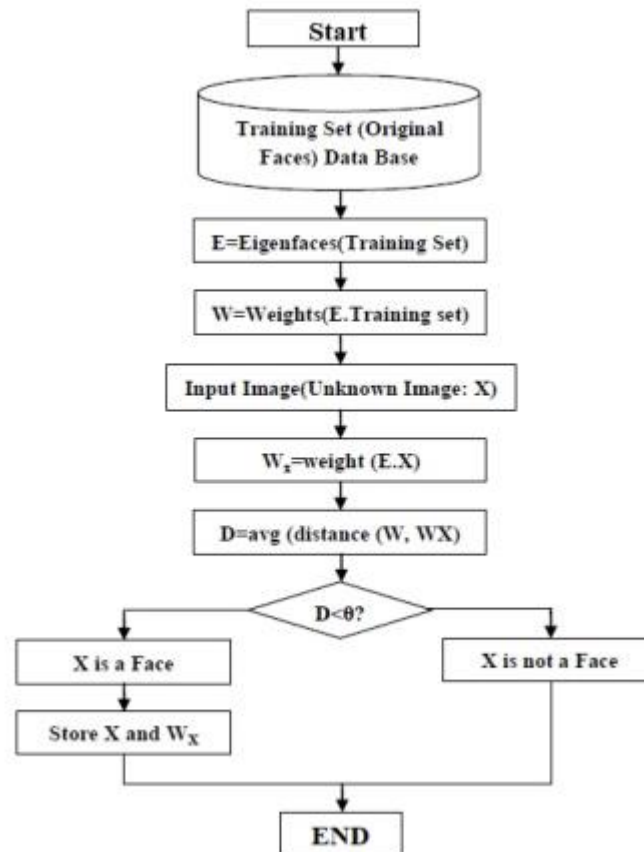
Figure 3. Low chart of the eigenface-based algorithm.

CONCLUSION

Face recognition is one of the most important issues which become interesting area for researchers. It is a challenging in the field of computer vision. Because of many algorithms used in different fields the face recognition has received great attention. This paper provided an up-to-date review of human face recognition algorithms. The algorithms Principal Component Analysis (PCA) is the most successful techniques in face recognition systems as a statistical method for dimensionality reduction, but there is a problem related to accuracy and classification time.

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