

# Performance Comparison of Hybrid Methods on Facial Detection

A Survey, review and compare performance of Facial Detection

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**Abstract**—This paper surveys, reviews, and compares performance of facial detection using two hybrid methods: PCA+EBGM and PCA+LDA. The results of these hybrid methods provide data which gauges different performances. In PCA+LDA, linear combination for comparing and extracting classifier of data images into parts with input images and training images is used. In PCA+EBGM, the same linear method as was used with PCA+LDA—such as the incident light, the position of the face, and expression—cannot be used. Because PCA+EBGM using eyes alignment must be carefully considered, so that the method is highly accurate. Moreover, two points can be used for this method. However, this hybrid is faster, more precise, and will be more effective for greater amounts of data.

*Keywords*—Haar features; AdaBoost; Cascade Classifiers; Principal Component Analysis; Linear Discriminant Analysis of Principal Components; Elastic Bunch Graph Matching; Hybrid method; Cascade Classifiers; Eigenfaces; Fisherfaces; Gabor Wavelet; Gabor filter

## I. INTRODUCTION

This paper compares the usability in Hybrid method between PCA+LDA and PCA+EBGM in order to test face detection performance. The main reason for the observation of both hybrid methods is to compare popularity at present. The Hybrid method outperforms traditional methods such as PCA, LDA, EBGM (as well as others). Due to the fact that traditional methods have a low-performance in pose angle, lighting, and other issues, we gathered the advantages of various methods to enhance efficiency and accuracy.

Face recognition is one way of human identification characteristics on the face from digital images or videos as well as the use of a facial recognition database. The result of the comparison shows a relationship between the input images and the database images. The face recognition system has been continuously developed for more than 10 years. Because automatic detection and tracking of faces is important, researchers have developed an algorithm to make the job more refined. This algorithm couldn't have been developed in a more opportune time as its usage in present times has proven

beneficial: tracking suspects, identifying terrorist in black list, or acknowledging suspicious radicals. For example, in foreign countries the facial recognition system has been installed in airports to prevent criminals attempting to flee from the country and is used for verification in cases with these said villains.

## II. BACKGROUND

### A. Facial Detection System

The principle function of facial recognition is designed to make a comparison between faces of target individuals and faces already in the database tanks to the algorithm. This process of creating templates and procedures may differ depending on a comparison of each system's design. The general face recognition system comprises of two main stages: face detection and face recognition. Stage 1, face detection: this stage is used to detect face from image source for easy decomposition in next step.

For example, one of face detection analysis is fast and high accuracy, invented by Paul Viola and Michael J. Jones [1]. In 2001, It is called Viola-Jones method by public. This algorithm presents an overlapping image and integral image that allows faster calculation and improves algorithm by Adaboost in section critical features: give classifiers of the most effective, moreover, it also explains that combining classifiers of cascade model, which allows the background of the photo is rejected faster, and calculates on more interested objects of the area. The basis of Viola-Jones algorithm is sub-window scanning for face detection of input images. Viola-Jones has proposed a new way to resize the image detection by Haar features which instead scale of input images and use detector to detect the object for several times : different sizes each time, which provide faster than traditional procedure.

The major advantage of Viola-Jones method is that it uses only on feature, Haar, to scan images for several times. In contrast, the traditional method uses more than one. Therefore, Viola-Jones can work more efficiently than the traditional on in terms of speed of calculation.