

Face Recognition Using Local Binary Pattern Histogram (LBPH)

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ABSTRACT: The Face recognition is the process of comparing and identifying the captured image with the help of the Local binary pattern histogram (LBPH). This system mainly divided into two phases i.e Face detection and Face recognition. Primary Face is detected using Face detection algorithms like HAAR cascade classifier and after that LBPH is used for Face recognition purpose which creates and compares histograms. In LBPH it basically uses parameters like radius, neighbors, grid x and grid y. Firstly it divides that particular pixel into 3x3 matrix and assign a threshold value to each block. Each assigned value is compared with central threshold value. After some more computational steps histogram is created and combined histogram of each pixel is get compared with the histogram stored in database and respective result is displayed.

KEYWORDS: Face detection, Face recognition, LBPH, Histogram comparison.

I. INTRODUCTION

The Face recognition is method used for identification or recognition of the person from his facial characteristics. It has become very popular in the last two decades with the rise in quality of videos/cameras. It is now used for main purposes like home security, device protection.

The first step of the recognition system is face detection which checks whether human face is present in the captured image or not. For this we use HAAR Cascade classifier which extracts the features from the captured image. For feature extraction we apply different haar features like edge features, line features. If face is detected then and then only next step that is face recognition starts otherwise process will be terminated.

After successful face detection next phase that is face recognition starts. There are many different face recognition algorithms are present. For example PCA, HMM AND AMM are some of popular algorithms. For face recognition Along with face detection opencv is best option. Opencv is one of the best open source –machine library. Opencv For face recognition we have used Local Binary pattern Histogram(LBPH) as it can be easily understand and computationally simple with minimum difficulties .

This algorithm uses four measures like GRID X, GRID Y, neighbours and radius. With the help of radius circular LBP is generated which denotes the radius around the central pixel and generally set to 1.

Neighbours are the total sample points present around the central pixel. Total blocks present in horizontal direction are denoted by Grid X and Grid Y gives the block present in vertical direction. If number of cells is high then with respect to that dimensionality increases. With the help of this parameters Face recognition is done.

II. RELATED WORK

There are many algorithm are developed to recognize human face efficiently but still there are some errors and also each algorithm has some disadvantage.

Author prof. Gondole and Prof. P. A. Salunkhe proposed a paper which uses LBP operator to detect and fetch the

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histogram for the face recognition purpose[7]. It compares histograms of two different images for the recognition. It compares histogram of captured image with images stored in database and on the basis of the result shows if face is recognised or not.

Author Ramandeep Kaur and Himanshi proposed a paper in which they used PCA .It is one of the most effective approach for face recognition[1].It uses Eigen face approach which transforms faces into number of essential features .it is a initial step in human face processing. Recognition is completed by producing new image in the eigenface set. The main advantage of this approach is his simplicity and it is faster than others but PCA has some disadvantages like it assumes that the principle components are a linear combination of original features. if this is not true , PCA will not give sensible result.

Author L. Cuimei, Q. Zhiliang, J. Nan Wianhua proposed a paper in which they used HAAR cascade classifier for the face detection classifier. Haar cascade classifier uses different type of HAAR features like line features ,edge features for the detection purpose[3].

Author M. Turk, A. Pentland proposed a paper in which they used Eigen faces for face recognition it is another algorithm developed for face recognition. It is the application of well known PCA algorithm.

Fisher face is based on the LDA criterion which uses training labels. face recognition using fisher face method is based on the reduction of face space dimension using principle component analysis method . Generally there bit difference Between eigenface and pca . Eigenface tries to maximize variation. So ,with PCA they usually get a decent model of the face .Fisher face wants to maximize the mean distance to different classes while minimize the variance within class

Author K.Kadir,H.Nasir proposed a paper in which they describes comparative study between LBP and Haar Like features using Opencv[1].Comparison is made between this two algorithm to calculate the speed of the detection.

III. ALGORITHM

First we have to understand following parameters before going into algorithm.

1. Radius- Circular local binary pattern is formed using Radius.
2. Neighbours – They are the samples used to form circular local binary pattern.

LBP comprises of following steps-

1. Train the dataset - First we have to train our dataset which is the input of our algorithm. Dataset contains Images of human faces that we want to recognize. Each face in the dataset is assigned with unique id. Same face must have same id.

2. Create Intermediate image –it is the main starting step of this algorithm .Intermediate image is created which Describes all important facial features of original image. This is done using a sliding window, based on the Parameters radius and neighbours.

3. Extracting the Histograms – the output of the second step which is generated image is used to divide the image Into multiples grids.

4. Extraction of Histogram- now we can extract the histogram of each region as follows

5. Comparison between histogram of input image and Histogram stored in database.

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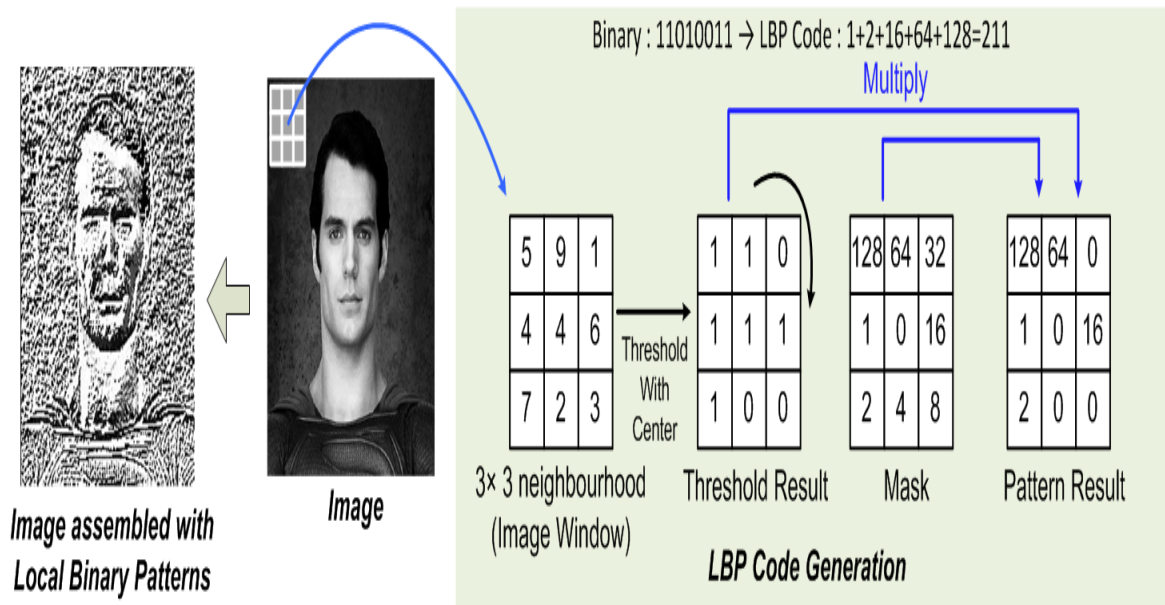


Fig. 1. LBP operator process for face recognition

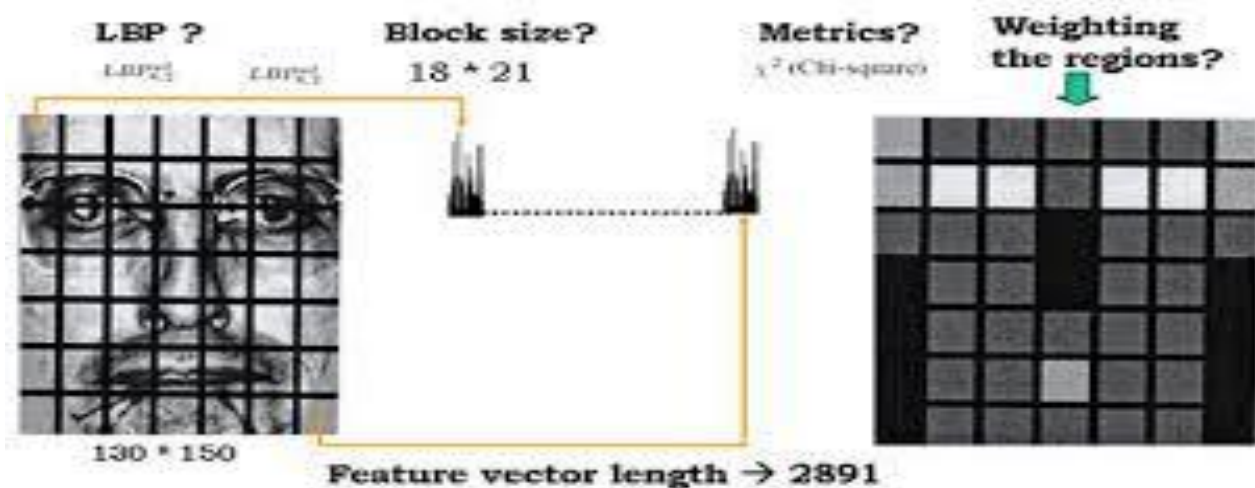


Fig. 2. Histogram creation in LBP

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IV. EXPERIMENTAL RESULTS



Fig. 3. Recognised Face

V. CONCLUSION

We have implemented the face recognition using LBPH and Our algorithms successfully detects and recognises the person if captured images's histogram matches with the any histogram of stored images..It is very useful in the authentication and security area.and can be used to recognise the criminals as well as in home security.

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