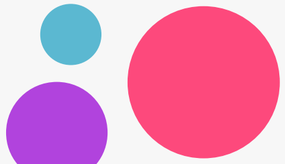
Read Me

1. Download and install OpenCV & python IDLE before trying this project.
2. Do not modify the project code or change the video path.
3. Import the missing libraries numpy and cv2.
4. Download the haarcascade_frontalface_alt.xml
5. Enjoy! :)



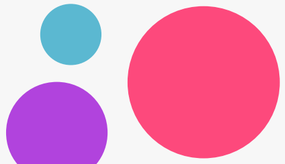
LakeDiamond

Face Detection

14 - 12 - 2018

Table of Content

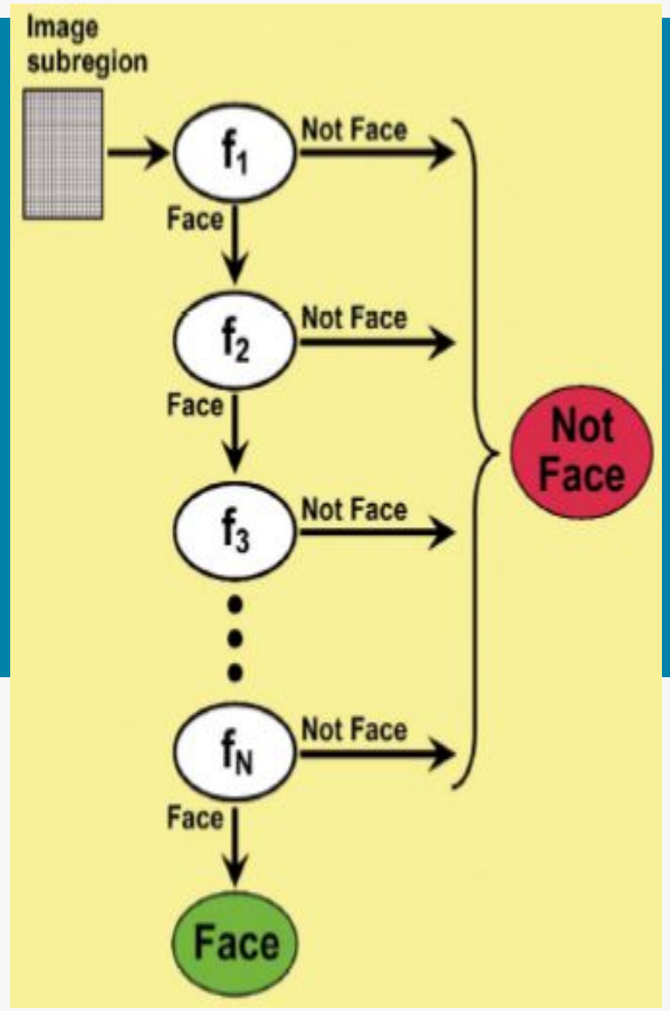
1. Introduction
2. Face detection classifier
3. Recognition steps
4. EignenFaces algorithm steps
5. Implementation
6. Conclusion



1

INTRODUCTION

Face detection



The face recognition determines the locations and sizes of human faces, It detects facial features.

A reliable face-detection approach based on the genetic algorithm and the eigen-face technique: OpenCV already contains many pre-trained XML classifiers, stored in **opencv/data/haarcascades/**

Different Methods of face detection are available:

- **Eigenfaces**
- **Fisherfaces**
- **Local Binary Patterns Histograms (LBPH)**

Face detection process

1 Face detection

Read training images detect faces from each image.

2 Data gathering

Extract unique characteristics face that it can use to differentiate him from another person

3 Data comparison

Despite variations in light or expression, it will compare those unique features to all the features of all the people

4 Face recognition

Train OpenCV's LBPH recognizer by feeding it the data we prepared in step 1.

1

Face detection classifier

Algorithm	Advantages	Disadvantages
Haar	1. High detection accuracy 2. Low false positive rate	1. Computationally complex and slow 2. Longer training time 3. Less accurate on black faces 4. Limitations in difficult lightening conditions 5. Less robust to occlusion
LBP	1. Computationally simple and fast 2. Shorter training time 3. Robust to local illumination changes 4. Robust to occlusion	1. Less accurate 2. High false positive rate

THEORY OF FACE DETECTION CLASSIFIERS

In our case more accurate detections are required tthis is why we used Haar classifier:

More suitable in technology such as security systems or high-end stalking.

But the LBP classifier is faster, therefore, should be used in mobile applications or embedded systems which is not our case.

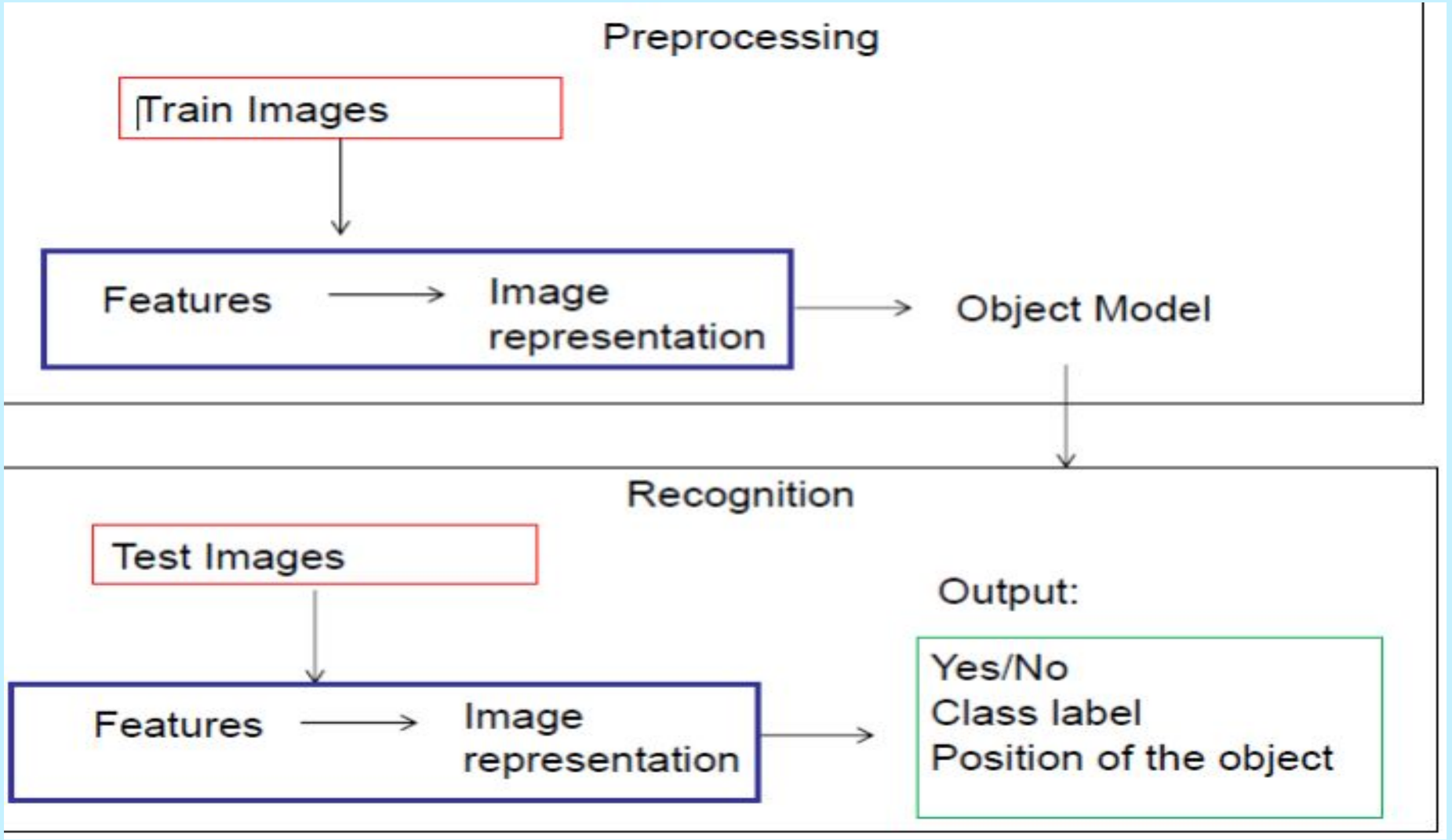
What is haar classifier?

Let’s Begin Now!

- A supervised classifier, it has mainly been used for facial detection but it can also be trained to detect other objects.
- OpenCV provides a lot of functionality for machine learning techniques and the Haar Classifier is one of them.
- The Haar Cascade is by superimposing the positive image over a set of negative images. The training is generally done on a server and on various stages.

2

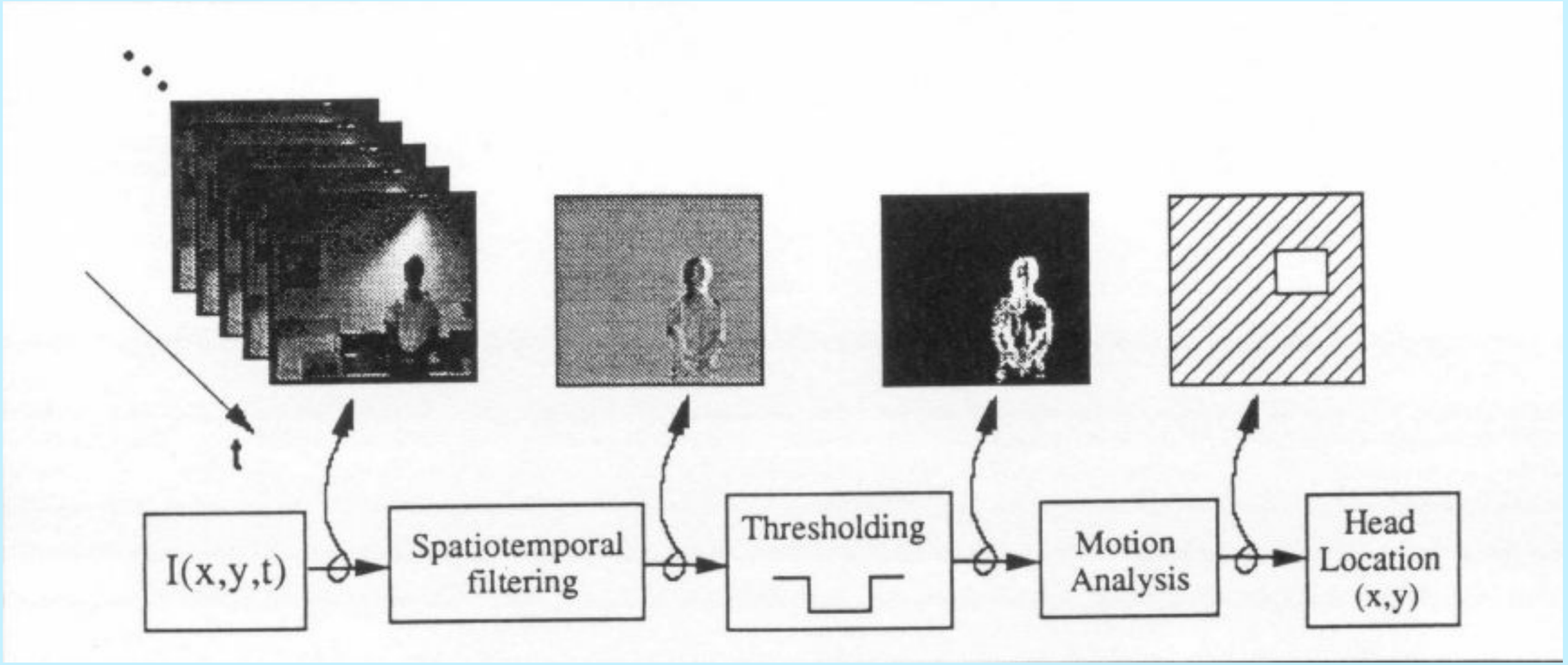
Recognition steps


Preprocessing
Train Images
Features
Image representation
Object Model
Recognition
Test Images
Features
Image representation
Output:
Yes/No
Class label
Position of the object

Click

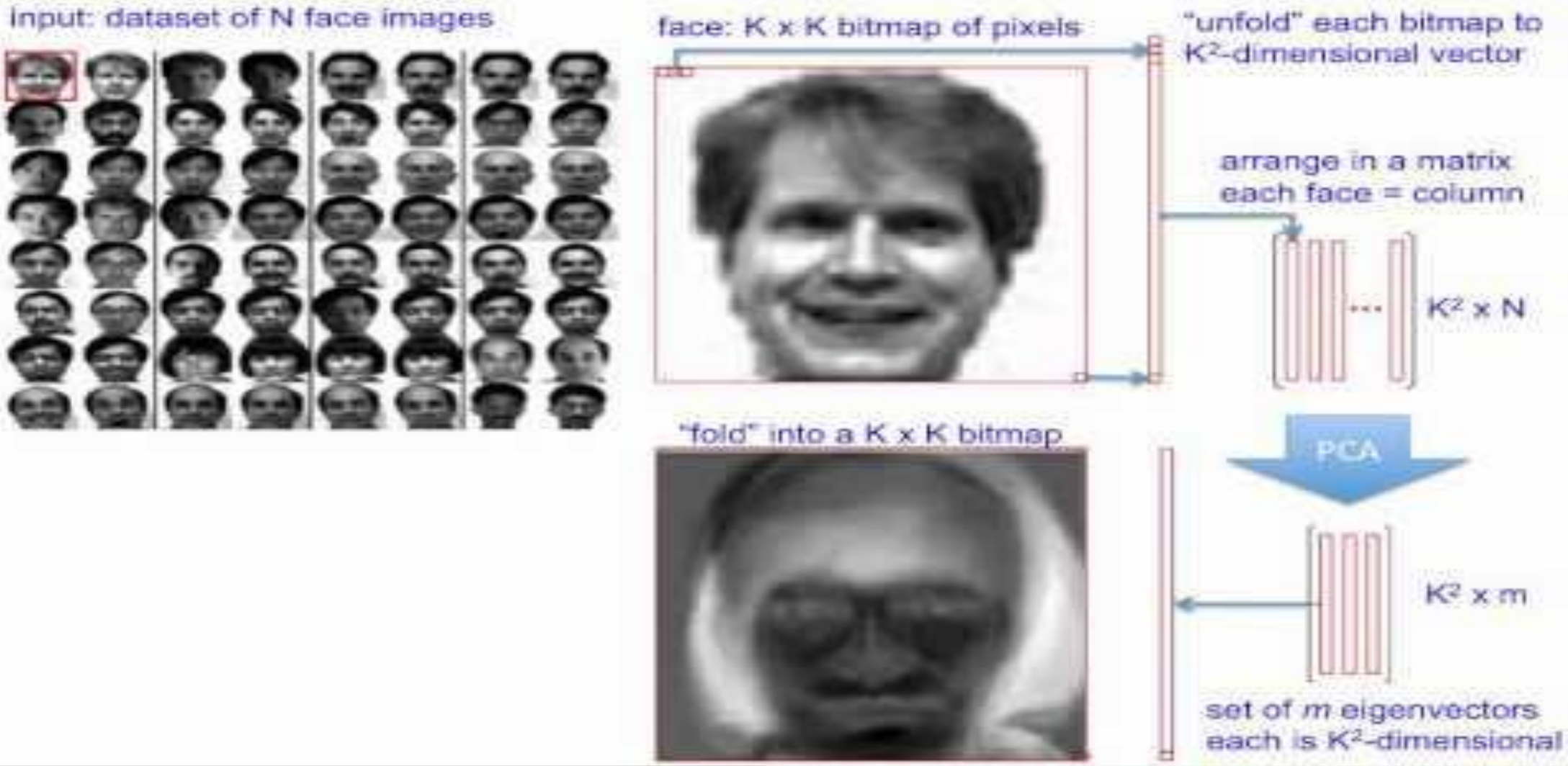
2

PCA,EigenFaces


t
I(x,y,t)
Spatiotemporal filtering
Thresholding
Motion Analysis
Head Location (x,y)

5 Steps

PCA example: Eigen Faces



Eigen faces steps

2

Implementation

Implementation

Pillars

4 pillars and descriptions

01

Prepare a training set of face images Convert all the images in vector form.

02

Subtract the mean

03

Calculate the eigenvectors and eigenvalues of the covariance matrix

04

Choose the principal components.

The number of principal components k is determined arbitrarily by setting a threshold ε on the total variance.

Why Eigenface?

2 Columns

Strengths

- **Eigenface provides an easy and cheap way to realize face recognition**
- **Once eigenfaces of a database are calculated, face recognition can be achieved in real time.**
- **It has the ability to leverage existing image acquisition equipment.**
- **It can search against static images such as driver's license photographs.**
- **It is the only biometric able to operate without user cooperation.**

Weaknesses

- **Changes in acquisition environment reduce matching accuracy.**
- **Very sensitive to lighting, scale and translation; requires a highly controlled environment.**
- **Changes in physiological characteristics reduce matching accuracy.**
- **It has the potential for privacy abuse due to non-cooperative enrollment and identification capabilities.**

2

Conclusion

Documentation

Face detection algorithm using the haar cascade classifier algorithm.

Thank You

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Contact

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I find a way or I make one..!