

2. INTRODUCTION

Face recognition is the most popular area of research in computer science. It is a computer technology which is being used in a variety of applications that identifies human faces in digital images. The research under this field is expanding in many areas of science such as psychology. Face detection is one of the most talked about in technology. Localization of human faces is considered as the primary and the initial stage in study of face detection. For example, in home video surveillance etc. Face recognition can be referred to as extraction of facial features using pattern recognition system.

3. LITERATURE REVIEW

The review of the literature related to the existing system gives the facilitates to the user for either filtering or editing images as Photoshop but are complicated to use and are costly. Some websites such as Flickr allows users to host images and videos. It also allows users to share and embed this images and videos at online community. Google Photos allows users to share and store personal images. It includes lot of features for searching images but requires an internet connection and the storage size is limited for free users. Another system for organizing and editing images is Picasa which was discontinued by Google in March 2015. Picasa is not feasible for searching images as it provides ambiguity.

Overcome this problem we are aimed at developing a system that will help user to search a specific person's image from a collection of images, given a person's image as input. Following Papers were referred to study different algorithms that will help to satisfy the requirements for problem statement.

- Paper by International Conference on Energy, Communication, Data Analytics and Soft Computing (ICECDS-2017) on A Comparative Study on Face Detection Algorithms. Ramakrishna B. B., Assistant Professor, Department of Computer Science and Engineering, VCET, Puttur, Karnataka, India ramakrishu@gmail.com, M. Sharmila Kumari, Professor and Head, Department of Computer Science and Engineering, PACE, Mangalore, Karnataka, India sharmilabp@gmail.com.
- Paper by International Conferences on Electronics, Communication and Aerospace Technology (ICECA-2017) on Face Detection and Tracking using OpenCV. Kruti Goyal, ASET, Department of Computer Science and Engineering, Amity University, Nodia, India kaaggoyal@gmail.com, Kartikey Agarwal, ASET, Department of Computer Science and Engineering, Amity University, Nodia, India Ktal36@gmail.com, Rishi Kumar, ASET, Department of Computer Science and Engineering, Amity University, Nodia, India, Rkumar25@amity.edu.

4. PROPOSED SYSTEM

4.1 Modules

1. Face Detection
2. Aligning
3. Feature Extraction
4. Face Recognition
5. Image Sorting and Display

1) Face Detection

Face detection is a computer technology being used in variety of applications that identifies human faces in digital images. Face detection also refers to the psychological process by which human locate and attend to faces in a visual scene. Following are some of popular face detection algorithms being used:

i. Haar Cascades (Viola-Jones)

A very fast and accurate approach to detect a face was developed by Viola and Jones in the year 2001. This algorithm has four main concepts which are: the Haar-like features, the integral images, the use of AdaBoost in machine training, and a cascade of classifiers.

We are going to use this algorithm for Face Detection as it most efficient amongst all other algorithms.

ii. Camshift Algorithm

Tracking algorithm based on Camshift algorithm is more and more noticed by means of its favourable performance in reality and robust. Camshift algorithm is widely used in face tracking about apperceiving user interface now. Camshift algorithm makes use of color information in region to track object and adopts a non-parameter technique and searches movement target by clustering method.

iii. NPD Algorithm

A new type of feature, called Normalized Pixel Difference (NPD) is proposed which is efficient to compute and has several desirable properties, including scale invariance, boundedness, and enabling reconstruction of the original images.

2) Aligning

Aligning is the process of rotating and scaling the face in order to bring all the key features at some position to make the image clear. This step allows the recognition

function to work on much clear input, making recognition perform much better. Aligning is done to obtain a normalized rotation, translation, and scale representation of face. The reason to perform this normalization is due to the fact that many face recognition algorithms can benefit from applying facial alignment before trying to identify the face.

3) Feature Extraction

Features extraction is a very important step in face recognition. The recognition rate of system depends on the meaningful data extracted from the face image. Feature are nothing but the properties of human faces that are used to differentiate among different people. Following are some of the methods that are used for feature extraction:

i. Traditional Method

We are going to use this method in our project. Following are some of the measurements that are used in this method:

- Distance between the eyes
- Width of the nose
- Depth of the eye sockets
- The shape of the cheekbones
- The length of the jawline, etc

ii. 3D Recognition

This technique uses rays. By using rays it creates 3d view of persons face and authenticate user. This technique is used in iphone to unlock device.

iii. Skin Texture Analysis

This method analyzes skin surface condition i.e. checks whether there is any spot present on the face.

4) Face Recognition

A face or facial recognition system is a technology capable of identifying or verifying a person from a digital image or a video frame from a video source. There are multiple methods in which facial recognition systems work, but in general, they work by comparing selected facial features from given image with faces within a database. Following are some of the most popular face recognition algorithms being used:

Local Binary Pattern Histogram (LBPH)

LBP is a type of visual descriptor used for classification in computer vision. It is the most powerful feature for texture classification. It has further been determined that when LBP is combined with Histogram of oriented gradients (HOG) descriptor, it

improves the detection performance considerably on some datasets. LBPH works as follows:

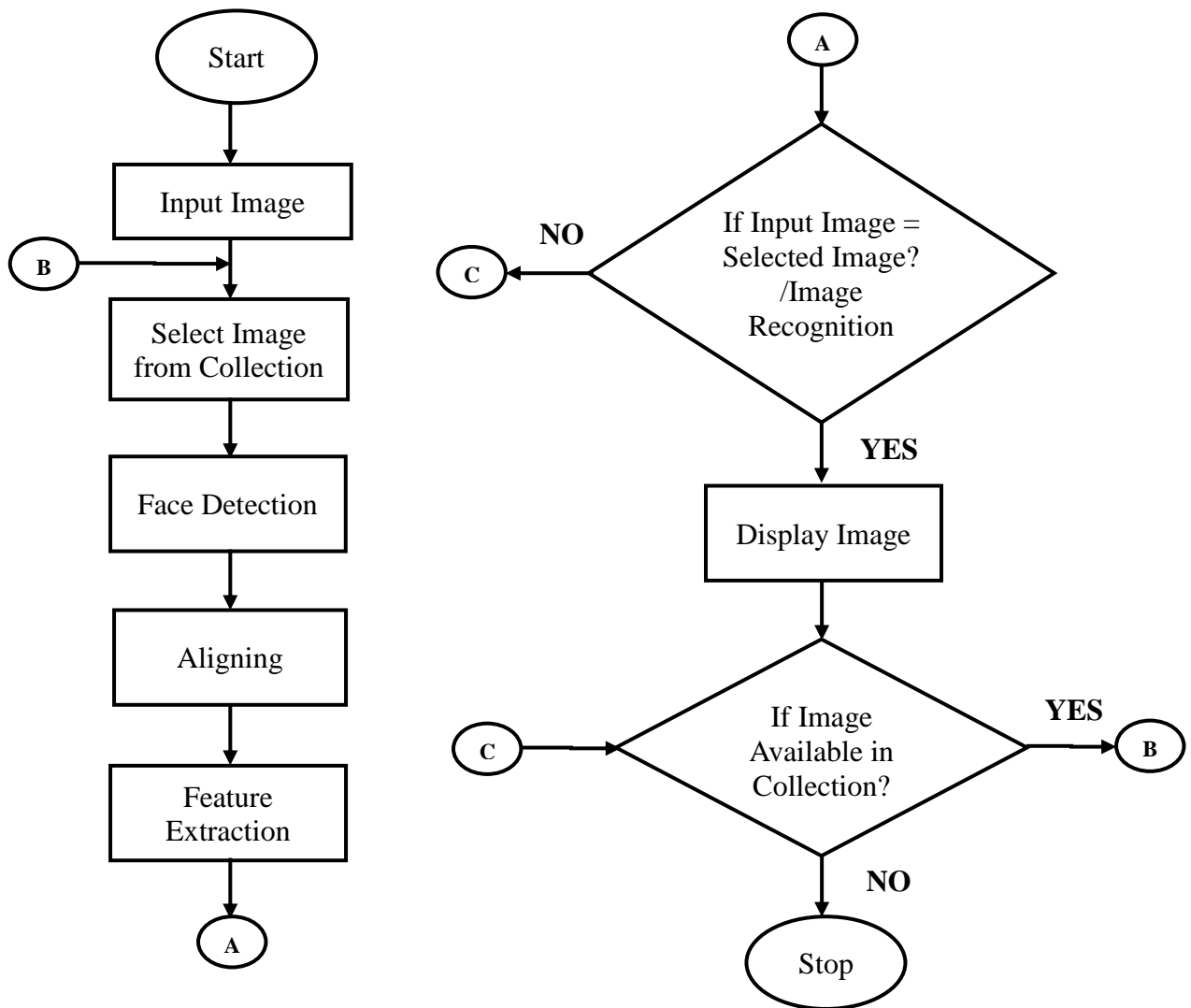
- Divide the examined window into cells.
- For each pixel in a cell, compare the pixel to each of its 8 neighbours. Follow the pixels along a circle, i.e. clockwise or counter-clockwise.
- Where the center pixel's value is greater than the neighbour's value, write '0'. Otherwise, write '1'. This gives an 8-digit binary number.
- Compute the histogram, over the cell, of the frequency of each 'number' occurring. This histogram can be seen as 256-dimensional feature vector.
- Optionally normalize the histogram.
- Concatenate histograms of all cells. This gives a feature vector for the entire window.

The feature vector can now be processed using Support Vector Machine (SVM).

5) Image Sorting and Display

Once the images with specific persons faces are found the images are displayed to the user. The images are sorted using the most relevant images and displayed to the user. The user can select the required images and move the images to specified directory.

4.2 Flow Chart



5. HARDWARE AND SOFTWARE REQUIREMENTS

5.1 Hardware Requirements:

1. 4GB and above RAM
2. 80 GB and above Hard Disk Space
3. Intel i3 Processor and above

5.2 Software Requirements:

1. Tensor Flow
2. OpenCV
3. Python