Prime College

Institute of Science and Technology

Tribhuvan University

"Face Detection"

A PROJECT PROPOSAL

[CSC - 404]

Submitted to

Department of Computer Science and Information Technology

Prime College

In partial fulfillment of the requirement for the Bachelor degree in Computer Science and Information Technology

Under the supervision of

Mr. Bikash Balami

Lecturer

Prime College

Submitted by

Anjeela Shova Sthapit (Roll no 2813/070)

Kabita Dhital (Roll no 2821/070)

Sangita Jaiswal (Roll no 2837/070)

Sita Shrestha (Roll no 2843/070)

26th May, 2017

1. Introduction

Human beings are the most intelligent species on the planet having extraordinary capabilities one of which is identifying individuals and differentiating them from one another. This plays a vital role in everyday interaction, communication and other routine activities that enables us to lead a normal, social life. With the advancement of technology and growing use of computers in our day-to-day life, it is essential to develop systems that can precisely detect and recognize human faces. We aim to propose an approach that can achieve the desired goal of face detection and identification effectively. Since working with image intensities is computationally challenging, we have adapted the approach formulated by Viola and Jones that is based on Haar-like features. The cascading of a number of distinctive features using Adaboost results in a strong classifier that can efficiently extract features. This ultimately leads to precise spotting of faces. Our region of interest is then subjected to the popular Local binary patterns (LBP) for further processing. The original LBP operator labels the pixels of an image by thresholding the 3-by-3 neighborhood of each pixel with the center pixel value and considering the result as a binary number. Histograms are then extracted from each sub-region and are concatenated into a single, spatially enhanced feature histogram. This feature histogram is the key factor that along with the SVM classifier recognizes the target image.

Hence, the above stated approach serves our purpose of identifying and analyzing facial images for various applications.

2. Problem Identification

The problem of face recognition can be stated as identifying an individual from others in a set of given images. There are many factors that lead to variations in the images of a single face which add to the complexity of recognizing faces accurately. To identify the target images correctly, these factors need to be taken care of:

1. Physical changes: Changes in facial expressions, aging, appearance such as with or without glasses etc.
2. Acquisition geometry changes: Changes in scale, location and in-plane rotation of the face.
3. Imaging changes: Lighting variation; camera variations.

Taking all these aspects into account, we can analyze the unique features that

differentiates one individual from another creating a feature vector per sample. The test images or the target images are then processed and compared against these feature vectors obtained from the training database. The one with the maximum similarity is the desired label that is assigned to the queried image.

3. Objective

Our objective is to make a system that will use computer vision techniques to automatically detect and identify faces from the digital images which are extracted from the input video. The identification and recognition is based on prominent facial features such as region of the eyes, face shape etc. The main objectives of this project are stated below:

1. We are trying to build a fast and efficient face recognition system that detects faces very quickly in cluttered backgrounds. Using a learning-based approach, namely haar-cascade classifier, we want to minimize the effects of unwanted objects in the real time environment.
2. Once the face detection part is done, our next motive is to train our system with sufficient images .For each image, a feature vector is to be computed using Local Binary Patterns (LBP) where histograms are extracted concatenated for all sub regions in an image.
3. With these feature vectors we wish to label the target images using SVM classification.
4. We aim to compare various recognition techniques and present a tradeoff between accuracy and speed for each of them.

4. Scope

Face recognition has its applicability in various fields. On the basis of results obtained in our analysis, the future scope can be stated as:

1. Room for improving accuracy:

   The accuracy for multiclass classifier can be improved. Various other techniques can be implemented and compared to obtain better accuracy results for a large database.
2. On getting a better accuracy we can use it in different fields for the purpose of security.

5. Research Methodology

5.1 Literature Review

S.no	Title	Year	Journal/conferences	Objectives	Method	Challenges
1.	*Introduction to Face Detection and Face Recognition.*	2010	Robotics & computer vision technologies.	To detect and recognize face.	Viola-Jones method for detection and Eigenfaces for recognition.	Less accuracy in preprocessing and recognition.
2.	Face Detection using Neural Networks	2014	Meng Electronic Engineering School of Electronics and Physical Sciences.	To determine whether the original input image is thought to contain a face or not.	Using feature based and image based approach for face detection.	Problems of different light condition and background.
3.	A MACHINE LEARNING APPROACH TO DETERMINING TAG RELEVANCE IN GEOTAGGED FLICKR IMAGERY.	2012	CLARITY Centre for Sensor Research Dublin City University Ireland	Classifying tags describing commonly photographed.	Machine learning based approach	Metric performs poorly on this dataset due to the high distribution.
4.	Object Detection, Tracking and Recognition for Multiple Smart Cameras	2016	Aswin C. Sankaranaraya, Student Member IEEE, Ashok Veeraraghavan, Student Member IEEE,andRamaChellapp Fellow IEEE.	Detection, tracking, and recognition of objects, specifically using distrib- uted networks of cameras.	Distributed visual Distributed visual sensing algorithms.	Challenges for optimizing for power,energy, and/or bandwidth constraints, distributed function estimation, distributed processing, mobile camera control.
5.	REAL-TIME FACE DETECTION AND TRACKING	2012	Thu-Thao Nguyen MEng Field Advisor: Bruce Robert Land,.	To implement a real-time system on an FPG.A board to detect and track a human's face.	Algorithm involved color-based skin segmentation and image filtering.	In the presence of three or more people, the system could only detect the faces but failed at tracking them.

6.	Object Detection using Haar-like Features.	2010	Visual Recognition and Search,Harshdeep Singh.	To detect face Features.	Using boosted cascades Of Haar-like Features.	Training classifiers is slow.
7.	Training support vector machine:an application to face detection	1997	Center for Biological and Computational Learning and Operations Research Center Massachusetts Institute of Technology.	Training polynomial, neural network, or Radial Basis Functions Classifiers.	Detects faces by exhaustively scanning an image for face-like patterns at many possible scales, by dividing the original image into overlapping sub-images.	SVM produces multiple solutions based on local minima, which makes them not trustable over different samples.
8.	Local Binary Patterns and Its Application to Facial Image Analysis.	2010	Di Huang, Caifeng Shan, Mohsen Ardebilian, Yunhong Wang, and Liming Chen	Exploited for facial representation in different tasks containing face detection, face recognition, facial expression analysis, demographic (gender, race, age,etc.) classification	Local Binary Pattern(LBP)	LBP operator is that its small 3x3 neighborhood cannot capture dominant features with large scale structures.
9.	Face Recognition Using LBP, FLD and SVM with Single Training Sample Per Person.	2014	Mustafa Zuhaer Nayef Al-Dabagh	Face recognition system using single training sample per person.	local binary pattern (LBP) for pre-processing, Fisher's linear discriminant (FLD) for features extraction and support vector machine (SVM) for	visual stimulus due to illumination conditions, viewing directions, facial expressions, aging, and disguises

Feasibility Study

The study determines if the new proposed system is useful to the organization or not. The system does not count if it's not useful to the organization. In parallel, the study also determines if the system can be built correctly and precisely on time with available resources meeting all the constraints.

Face Detection is technically feasible since user only require web camera to use the system.

Similarly, it is operationally feasible because this system is easy to use. And the system is economically feasible because we don't require money to use it since it can be downloaded free of cost on mobile and used.

Hardware and Software Requirements

Software Requirements

1. Opencv 2.0
2. Python 2.7

Hardware Requirements

1. Web camera

Data Set

1. Dataset created by group of people manually.

Working Schedule

Working Schedule is shown in Gantt chart below:

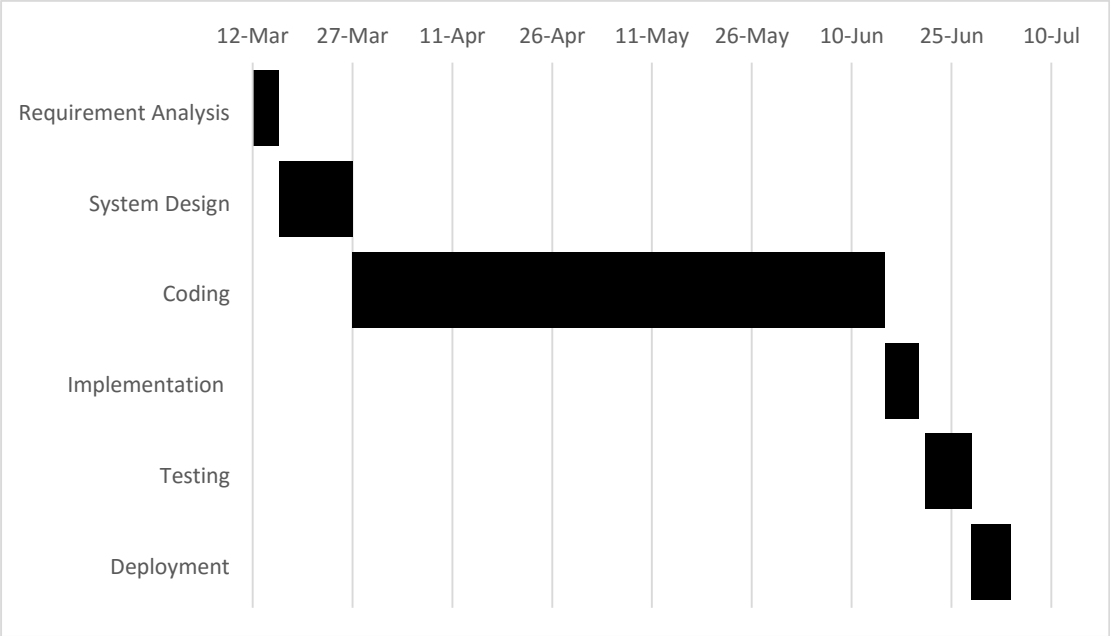

Figure 2: Gantt chart for working schedule

Expected Outcome

On getting a better accuracy we can use it in different fields for the purpose of security and for detection.

1 References

[1] Di Huang, Caifeng Shan, Mohsen Ardebilian, Yunhong Wang,2014, Local Binary Patterns and Its Application to Facial Analysis:A Survey Image, Nov 2011.

[2] Yi-Qing Wang, An Analysis of the Viola-Jones Face Detection Algorithm, Image Processing On Line,June 2014.

[3] Sander Soo, Institute of Computer Science, University of Tartu, Object detection using Haar cascade Classifier.

[4] Md. Abdur Rahim, Md. Najmul Hossain, Tanzillah Wahid and Md. Shafiul Azam, Face Recognition using Local Binary Patterns (LBP), Global Journals Inc. (USA),2013.

[5] Hsin-Hung Liu, Shih-Chung Hsu and Chung-Lin Huang, SINGLE-SAMPLE-PER-PERSONBASED FACE RECOGNITION USING FAST DISCRIMINATIVE MULTI-MANIFOLD ANALYSIS.

[6] Phil Brimblecombe, Face Detection using Neural Networks,H615 Meng Electronic Engineering School of Electronics and Physical Sciences.

[7] P.Latha, Dr.L.Ganesan and Dr.S.Annadura, Face Recognition using Neural Networks,P.Latha, Dr.L.Ganesan Dr. S.Annadura.

[8] W.Q. Zheng, J.S. Yu, Yuexian Zou. An experimental study of speech emotion recognition based on deep convolutional neural networks. 2015 International Conference on Affective Computing and Intelligent Interaction (ACII),Sep 2015.

[9] Thu-Thao Nguyen, REAL-TIME FACE DETECTION AND TRACKING, June 2010.
[10] Aswin C. Sankaranarayanan, Student Member IEEE, Ashok Veeraraghavan, Student Member IEEE, and Rama Chellappa, Fellow IEEE, Object Detection, Tracking and Recognition for Multiple Smart Cameras,2008.
[11] Mark Hughes, Noel E. OConnor, A MACHINE LEARNING APPROACH TO DETERMINING TAG RELEVANCE IN GEOTAGGED FLICKR IMAGERY,2012.
[12] Puja, Er.Rachna Rajput, Feature Extraction in Face Recognition using SVM-LBP Detection Technique, International Journal of Innovative Research in Computer and Communication Engineering, Oct 2016.

Sindh Madressatul Islam University

Faculty of Computer Science

Fall 2022

Course: Final Years Project Proposal

Coordinator Name: Miss Sahar Zafar Jumani

FINAL YEAR PROJECT PROPOSAL

Student Name: ZEESHAN SAEED

ID: (CSC-19F-170)

Section: "7-C"

Student Name: ZOHAIB RAFIQ

ID: (CSC-19F-171)

Section: “7-C

Student Name: WASEEM AZAM

ID: (CSC-19F- 165)

Section: “7-C

1. Introduction

Humans are the most intelligent species on the planet with extraordinary abilities, one of which is recognizing and distinguishing individuals from one another. It plays an important role in everyday interaction, communication, and other normal activities that enable us to live a normal, social life. With the advancement of technology and the increasing use of computers in our daily lives, it is important to develop systems that can accurately identify and recognize human faces. Our goal is to propose an approach that effectively achieves the desired goal of face recognition and identification. Since working with image intensities is computationally challenging, we adopted the method developed by Viola and Jones that is based on necklace-like features. Cascading multiple specific features using Ad boost results in a robust classifier that can efficiently extract features. This ultimately leads to precise scars on the face. Our region of interest is then subjected to the popular Local Binary Pattern (LBP) for further processing. The original LBP operator labels the pixels of an image by concatenating the 3-by-3 neighborhood of each pixel with the central pixel value and viewing the result as a binary number. Histograms are then extracted from each subregion and combined into a single, spatially refined feature histogram. This feature recognizes the histogram and SVM classifier of the target image.

Therefore, the approach described above fulfills our objective of recognizing and analyzing face images for various applications.

2. Problem Identification

The problem of face recognition can be defined as identifying an individual from others in a given set of images. There are many factors that contribute to variations in images of the same face which add to the complexity of accurately recognizing faces. In order to correctly recognize target images, these factors need to be taken into account:

1. *Changes in facial expressions, aging, appearance such as with or without glasses, etc.*
2. *Acquisition geometry changes: Changes in scale, location, and in-plane rotation of the face.*
3. *Imaging changes: Lighting variation; camera variations.*
4. *differentiates one individual from another creating a feature vector per sample. The*
5. *test images or the target images are then processed and compared against these feature vectors obtained from the training database.*

3. Objective

Our goal is to build a system that uses computer vision techniques to automatically detect and identify faces from digital images extracted from the input video. Recognition and recognition are based on salient features of the face such as eye area, face shape, etc. The main objectives of this project are stated below:

1. ***We are trying to build a fast and efficient face recognition system that detects faces very quickly in cluttered backgrounds. Using a learning-based approach, namely the haar-cascade classifier, we want to minimize the effects of unwanted objects in the real-time environment.***

2. ***Once the face detection part is done, our next motive is to train our system with sufficient images. For each image, a feature vector is to be computed using Local Binary Patterns (LBP) where histograms are extracted and concatenated for all sub-regions in an image.***

3. With these feature vectors, we wish to label the target pictures victimization Associate in Nursing SVM classifier.

4. We aim to compare various recognition techniques and present a trade-off between accuracy and speed for each of them.

4. Scope

Face recognition has its applicability in various fields. On the basis of the results

obtained in our analysis, the future scope can be stated as:

1. *Room for improving accuracy:*

The accuracy of the multiclass classifier will be improved. varied alternative techniques can be enforced and compared to get higher accuracy results for an oversized database.

2. *On getting better accuracy we can use it in different fields for the purpose of security.*

Feasibility Study

The study determines if the new planned system is helpful to the organization or not. The system doesn't count if it's not useful to the organization. In parallel, the study additionally determines if the system is designed properly and exactly on time with offered resources meeting all the constraints.

Face Detection

Is technically feasible since users only require a web camera to use the system.

Similarly, it's operationally possible as a result of this method is simple to use. and therefore the system is economically feasible because we have a tendency to don't need cash to use it since it will be downloaded freed from price on mobile and used.

Hardware and Software Requirements

Software Requirements

1. OpenCV 2.0
2. Python 2.7

Hardware Requirements

1. Web camera

Data Set

1. Dataset created by a group of people manually.

ZEESHAN SAEED

Contact No. 0313-2789816
zeeshansheikh0313@gmail.com

SUMMARY:

I always will learn new things and develop my skills stronger. I aim to learn everything I want or find Important in my life and not only learn but also teach it to others.

SKILLS:

- Good communication skills.
- Ability to work in physically and mentally demanding environments.
- Problem-solving.
- Teamwork and collaboration.
- Time Management Abilities.

PROFESSIONAL EXPERIENCE:

- 3 Months as a bidder job in DesignDot

EDUCATIONAL QUALIFICATION:

- 2023 – Sindh Madressatul Islam University
  BS Computer Science (Last Semester)
- Continue PIAIC Course

COMPUTER SKILLS:

- Linux
- Docker
- Kubernetes
- Html
- CSS
- JavaScript

PROJECTS:

Different projects.
https://github.com/m-zeeshan-saeed

ACTIVITIES:

- Reading Books and course-related research articles.
- Art & Crafts.
- Photo editing.

Sindh Madressatul Islam University

Faculty of Computer Science

Fall 2022

Course: Final Years Project Proposal

Coordinator Name: Miss Sahar Zafar Jumani

FINAL YEAR PROJECT PROPOSAL

Student Name: ZEESHAN SAEED

ID: (CSC-19F-170)

Section: "7-C"

Student Name: ZOHAIB RAFIQ

ID: (CSC-19F-171)

Section: “7-C

Student Name: WASEEM AZAM

ID: (CSC-19F- 165)

Section: “7-C

1. Introduction

Humans are the most intelligent species on the planet with extraordinary abilities, one of which is recognizing and distinguishing individuals from one another. It plays an important role in everyday interaction, communication, and other normal activities that enable us to live a normal, social life. With the advancement of technology and the increasing use of computers in our daily lives, it is important to develop systems that can accurately identify and recognize human faces. Our goal is to propose an approach that effectively achieves the desired goal of face recognition and identification. Since working with image intensities is computationally challenging, we adopted the method developed by Viola and Jones that is based on necklace-like features. Cascading multiple specific features using Ad boost results in a robust classifier that can efficiently extract features. This ultimately leads to precise scars on the face. Our region of interest is then subjected to the popular Local Binary Pattern (LBP) for further processing. The original LBP operator labels the pixels of an image by concatenating the 3-by-3 neighborhood of each pixel with the central pixel value and viewing the result as a binary number. Histograms are then extracted from each subregion and combined into a single, spatially refined feature histogram. This feature recognizes the histogram and SVM classifier of the target image.

Therefore, the approach described above fulfills our objective of recognizing and analyzing face images for various applications.

2. Problem Identification

The problem of face recognition can be defined as identifying an individual from others in a given set of images. There are many factors that contribute to variations in images of the same face which add to the complexity of accurately recognizing faces. In order to correctly recognize target images, these factors need to be taken into account:

1. *Changes in facial expressions, aging, appearance such as with or without glasses, etc.*
2. *Acquisition geometry changes: Changes in scale, location, and in-plane rotation of the face.*
3. *Imaging changes: Lighting variation; camera variations.*
4. *differentiates one individual from another creating a feature vector per sample. The*
5. *test images or the target images are then processed and compared against these feature vectors obtained from the training database.*

3. Objective

Our goal is to build a system that uses computer vision techniques to automatically detect and identify faces from digital images extracted from the input video. Recognition and recognition are based on salient features of the face such as eye area, face shape, etc. The main objectives of this project are stated below:

1. ***We are trying to build a fast and efficient face recognition system that detects faces very quickly in cluttered backgrounds. Using a learning-based approach, namely the haar-cascade classifier, we want to minimize the effects of unwanted objects in the real-time environment.***

2. ***Once the face detection part is done, our next motive is to train our system with sufficient images. For each image, a feature vector is to be computed using Local Binary Patterns (LBP) where histograms are extracted and concatenated for all sub-regions in an image.***

3. With these feature vectors, we wish to label the target pictures victimization Associate in Nursing SVM classifier.

4. We aim to compare various recognition techniques and present a trade-off between accuracy and speed for each of them.

4. Scope

Face recognition has its applicability in various fields. On the basis of the results

obtained in our analysis, the future scope can be stated as:

1. *Room for improving accuracy:*

The accuracy of the multiclass classifier will be improved. varied alternative techniques can be enforced and compared to get higher accuracy results for an oversized database.

2. *On getting better accuracy we can use it in different fields for the purpose of security.*

Feasibility Study

The study determines if the new planned system is helpful to the organization or not. The system doesn't count if it's not useful to the organization. In parallel, the study additionally determines if the system is designed properly and exactly on time with offered resources meeting all the constraints.

Face Detection

Is technically feasible since users only require a web camera to use the system.

Similarly, it's operationally possible as a result of this method is simple to use. and therefore the system is economically feasible because we have a tendency to don't need cash to use it since it will be downloaded freed from price on mobile and used.

Hardware and Software Requirements

Software Requirements

1. OpenCV 2.0
2. Python 2.7

Hardware Requirements

1. Web camera

Data Set

1. Dataset created by a group of people manually.