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Vellore Institute of Technology
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School of Information Technology & Engineering
Department of Computer Application
Fall Semester 2020-2021

19MCA – Master Thesis – First Review Report

Reg. No: 19MCA0044

Student Name: DINESH M

Guide Name: Dr. ANNY LEEMA A

Master Thesis Title: **FACE AUTHENTICATION USING DEEP
LEARNING ON WEB BASED**

Programming Languages/ Tools / DBMS Used for Implementation:

Front End – HTML, Javascript

Back End – Python

Tool – Anaconda

DBMS – MySQL

Abstract:

The human face is an important biometric quantity which can be used to access a user-based system. As human face images can easily be obtained via web cameras this Method generally apply a series of processes against the input image in order to detect the liveness of the face. Deep-learning-based spoof face detection is proposed to identity and detect the liveness of the input face. A secure system needs Liveness detection in order to guard against such spoofing. In this work, face liveness detection approaches are categorized based on the various types of techniques used for *liveness detection*. This categorization helps to understand different spoof attack scenarios and their relation to the developed solutions.

Introduction:

Face recognition plays a critical role in the authentication of users and is essential for many user-based systems. The past decade has seen the rapid development of face recognition in many fields This project is about adding the security to login into the website. Which is added to an additional way of login and it will reduce the time for the normal way of login If we login to the site the message about the login notification send to their user mobile.

Related Works:

TITLE: 2D and 3D FACE RECOGNITION BASED ON IPC DETECTION AND PATCH OF INTEREST REGIONS

AUTHOR: Mebarka BELAHCENE, Ammar CHOUCANE, Nadia MOKHTARI

YEAR: 2014

DESCRIPTION

In this paper, we propose a framework of Face Recognition System (FRS). Essentially, we are focused on the face detection process and the role of interest regions of the human face. In order to locate exactly the facial area, we propose the use of horizontal and vertical IPC (Integral Projection Curves). The role of important patches of face: nose and eyes is investigated in this work. An efficient method based on PCA (Principal component analysis) followed by EFM (Enhanced Fisher Model) is used to build the characteristic features, these latter are sent to the classification step using two methods, Distance Measurements and SVM (Support Vector Machine). Finally, the effect of fusion of two modalities (2D and 3D) is studied and examined. Experiments are performed on the CASIA3D face database which contains 123 persons under varying of illumination, expression variation.

TITLE: Actualization of Face Detection in FPGA using Neural Network

AUTHOR: Syed Ameer Abbas, G. Vicithra

YEAR: 2016

DESCRIPTION

Face recognition system is an application for identifying a person from the pool of images. Face detection is an application for detecting objects, analyzing the face, understanding the localization of the face and face recognition. The main goal of the work is to identify the face from a given database images. The face images have similar geometrical features and hence discriminating one face from the other in the database is a challenging task. The implementation of Crude method and Viola Jones algorithm is taken for features extraction. The implementation work is done for training with extraction of features for few images. The speed of processing for both methods are analyzed.

TITLE: AUTOMATIC ATTENDANCE MANAGEMENT SYSTEM USING FACE DETECTION

AUTHOR: E.Varadharajan,R.Dharani, S.Jeevitha, B.Kavinmathi, S.Hemalatha

YEAR: 2016

DESCRIPTION

This paper is about the biometric attendance management. The automatic attendance management will replace the manual method, which takes a lot of time consuming and difficult to maintain. There are many biometric processes [10], in that face recognition is the best method. In this paper we are going to describe the attendance without human interference. In this method the camera is fixed in the classroom and it will capture the image, the faces are detected and then it is recognized with the database and finally the attendance is marked. If the attendance is marked as absent the message about the student's absent is send to their parents. There are various methods for comparing the faces. The Eigen face is the one of the method. Eigen faces is set of Eigen vectors which are used in computer vision problem of face recognition.

TITLE: CORRELATION-BASED FACE DETECTION FOR
RECOGNIZING FACES IN VIDEOS

AUTHOR: Heng-Wei Hsu¹ , Tung-Yu Wu , Wing Hung Wong and Chen-Yi Lee

YEAR: 2018

DESCRIPTION

Finding the locations and identities of faces in videos is a very important task in numerous applications. In this paper, we propose a correlation-based face detection approach to improve the performance of face recognition tasks for videos. We apply correlation measures to pairs of response maps which are generated from automatically selected neurons in deep convolutional neural network (CNN) models to detect faces in each video frame. The embeddings extracted from faces cropped by our proposed approach are more consistent across each video sequence and more suitable for face recognition and clustering tasks. Experimental results from the YouTube Faces (YTF) dataset demonstrate that our proposed approach is more robust and achieves better recognition accuracy compared to state-of-the-art face detection approaches.

TITLE: Deep Learning based Face Liveness Detection in Videos

AUTHOR: Yaman AKBULUT, Abdulkadir ENGÜR, Ümit BUDAK, Sami EKOC

YEAR: 2017

DESCRIPTION

The human face is an important biometric quantity which can be used to access a user-based system. As human face images can easily be obtained via mobile cameras and social networks, user-based access systems should be robust against spoof face attacks. In other words, a reliable face-based access system can determine both the identity and the liveness of the input face. To this end, various feature-based spoof face detection methods have been proposed. These methods generally apply a series of processes against the input image(s) in order to detect the liveness of the face. In this paper, a deep-learning-based spoof face detection is proposed. Two different deep learning models are used to achieve this, namely local receptive fields (LRF)-ELM and CNN. LRF-ELM is a recently developed model which contains a convolution and a pooling layer before a fully connected layer that makes the model fast. CNN, however, contains a series of convolution and pooling layers. In addition, the CNN model may have more fully connected layers. A series of experiments were conducted on two popular spoof face detection databases, namely NUAA and CASIA. The obtained results were then compared, and the LRF-ELM method yielded better results against both databases.

TITLE: Design of Face Detection and Recognition System for Smart Home Security Application

AUTHOR: Dwi Ana Ratna Wati, Dika Abadianto

YEAR: 2017

DESCRIPTION

This research designs face detection and recognition systems for smart home security application. The design is implemented using MyRIO 1900 and programmed using LabVIEW. The connection between myRIO and computer is wifi network. The image of a person is acquired via webcam connected to MyRIO using USB cable. The face detection system is built based on the template matching, while the face recognition is based on the principle component analysis. The testing is done to examine the performance of the face detection in various change of distance, light intensity, light position angles, person's accessories and shirt colour. The face detection modul has good performance in some conditions as distance between the person and the camera is less than 240 cm, person doesn't use accessories that cover part of face, person doesn't use shirt with colour similar to skin colour, and background colour is difference from skin colour. While the face recognition system has 80% of accuracy when it is tested

using realtime image. The combination with password is needed in order to increase the security level as it is applied in real smart home security systems.

TITLE: Face detection and recognition application for Android

AUTHOR: Monica Chillaron, Larisa Dunai, Guillermo Peris Fajarnes, Ismael Lengua Lengua

YEAR: 2017

DESCRIPTION

This work describes the development of a face detection and recognition application developed into Raspberry Pi and Android. The application connects with the Raspberry Pi by Bluetooth protocols. The object detection is based on boosted cascade while the face recognition is based on Eigenfaces. The developed system may be especially useful for visually impaired users since it can contribute to facilitate their autonomous behavior during their everyday life. The developed device shows great potential for extrapolation to other areas as education of visually impaired users. The developed system may be especially useful for visually impaired users since it can contribute to facilitate their autonomous behavior during their everyday life. The developed device shows great potential for extrapolation to other areas as education of visually impaired users.

TITLE: Face Detection and Recognition Method Based on Skin Color and Depth Information

AUTHOR: Junfeng Qian 'Shiwei Ma 'Zhonghua Hao 'Yujie Shen

YEAR: 2011

DESCRIPTION

An improved face detection and recognition method based on information of skin color and depth obtained by binocular vision system was proposed in this paper. With this method, the face area was detected firstly by using Adaboost algorithm. Afterwards, the real face was distinguished from fake one by using the skin color information and the depth data. Then, by using PCA algorithm, a specific face can be recognized by comparing the principal components of the current face to those of the known individuals in a facial database built in advance. This method was applied to a service robot equipped with a binocular camera system for real-time face detection and recognition experiment, and satisfactory results were obtained.

TITLE: Illumination Invariant Face Detection Using Viola Jones Algorithm

AUTHOR: Mangayarkarasi Nehru, Dr. Padmavathi S

YEAR: 2017

DESCRIPTION

In the recent days, there has been a wide advancement in human computing systems. It always remains a challenge to make the computer system behave like how a human senses things. Computer Vision has been a pioneer in making things more automated and better for humans. This paper presents a study based approach for detecting human faces using the Viola Jones algorithm. We train our computer to automatically identify the human faces from the given images irrespective of the illumination conditions. Based on the experimental results we have discussed about the Viola -Jones Cascade Object Detector which uses various filters and the features to detect the various parts of the face.

TITLE: Matlab Simulation of Algorithms for Face Detection in Video Surveillance

AUTHOR: Cristian sanchez, Diana Martinez-Mosquera, Rosa Navarrete

YEAR: 2019

DESCRIPTION

Face detection is an application widely used in video surveillance systems and it is the first step for subsequent applications such as monitoring and recognition. For facial detection, there are a series of algorithms that allow the face to be extracted in a video image, among which are the Viola & Jones waterfall method and the method by geometric models using the Hausdorff distance. In this article, both algorithms are theoretically analyzed and the best one is determined by efficiency and resource optimization. Considering the most common problems in the detection of faces in a video surveillance system, such as the conditions of brightness and the angle of rotation of the face, tests have been carried out in 13 different scenarios with the best theoretically analyzed algorithm and its combination with another algorithm. The images obtained, using a digital camera in the 13 scenarios, have been analyzed using Matlab code of the Viola & Jones and Viola & Jones algorithm combined with the Kanade-Lucas-Tomasi algorithm to add the feature of completing the tracking of a single object. This paper

presents the detection percentages, false positives and false negatives for each image and for each simulation code, resulting in the scenarios with the most detection problems and the most accurate algorithm in face detection.

TITLE: Multi-face Detection Based on Improved Gaussian Distribution

AUTHOR: Zaiying Liu, Jie Sha, Ping Yang

YEAR: 2013

DESCRIPTION

The appearances of human face, expression, color and so on are different, which bring difficulties to face detection. This paper proposed a novel multi-face detection algorithm mainly based on improved Gaussian distribution model. Utilizing the skin-color model and facial features firstly, most likelihood regions of face candidates can be excluded quickly. Then, two Gaussian distribution curves are acquired by projecting the edge detection image to X-axes and Y-axes respectively. Finally, an accurate face region is found through the solution of Gaussian equation. Experimental results show that the scheme proposed in the paper can improve the multiface detection accuracy and robustness.

TITLE: People Count Estimation Using Hybrid Face Detection Method

AUTHOR: Neethu A, Athi Narayanan S, Kamal Bijlani

YEAR: 2016

DESCRIPTION

People counting systems have wide range of applications and it is a difficult task in image processing. Face detection techniques are widely used to count the presence of people in an image. In this paper we present a hybrid face detection method for people count by combining three efficient face detection methods - Normalized Pixel Difference (NPD) , haar classifier and haar classifier for profile face. NPD is a scale invariant method and its performance is good in difficult backgrounds and low illuminations. A combination of these three face detectors are used in order to improve the accuracy and to reduce false detections. Experimental results shows that our proposed hybrid method effectively count the number of people and reduced the false detection rates. The accuracy of the proposed method is up to 90.20%.

TITLE: Real-time face detection based on YOLO

AUTHOR: Wang Yang, Zheng Jiachun

YEAR: 2018

DESCRIPTION

As a target detection system, YOLO has a fast detection speed and is suitable for target detection in real-time environment. Compared with other similar target detection systems, it has better detection accuracy and faster detection time. This paper is based on YOLO network and applied to face detection. In this paper, YOLO target detection system is applied to face detection. Experimental results show that the face detection method based on YOLO has stronger robustness and faster detection speed. Still in a complex environment can guarantee the high detection accuracy. At the same time, the detection speed can meet real-time detection requirements

TITLE: Single-stage Joint Face Detection and Alignment

AUTHOR: Jiankang Deng , Jia Guo , Stefanos Zafeiriou

YEAR: 2019

DESCRIPTION

In practice, there are huge demands to localize faces in images and videos under unconstrained pose variation, illumination change, severe occlusion and low resolution, which pose a great challenge to existing face detectors. This challenge report presents a single-stage joint face detection and alignment method. In detail, we employ feature pyramid network, single-stage detection, context modelling, multi-task learning and cascade regression to construct a practical face detector. On the Wider Face Hard validation subset, our single model achieves state-of-the-art performance (92.0% AP) compared with both academic and commercial face detectors for detecting unconstrained faces in cluttered scenes. In the Wider Face AND PERSON CHALLENGE 2019, our ensemble model achieves 56.66% average AP (runner-up) in the face detection track. To facilitate further research on the topic, the training code and models have been provided publicly available.

TITLE: Spoofing Face Detection based on Spatial and Temporal Features Analysis

AUTHOR: Chin-Lun Lai , Jun-Horng Chen, Jing-Ying Hsu, Chih-Hong Chu

YEAR: 2013

DESCRIPTION

In this paper, an intuitive spoofing face detection method is proposed to increase the reliability of face recognition systems. Via the simple spatial-temporal spectral analysis and border edge detection, people with fake face as the recognition system input will be pick out efficiently and effectively. Experimental results show that the proposed method is competitive and practical to be implemented in the portable equipments with face recognition function to improve the system reliability.

TITLE: Survey of Face Detection on Low-quality Images

AUTHOR: Yuqian Zhou, Ding Liu, Thomas Huang

YEAR: 2018

DESCRIPTION

Face detection is a well-explored problem. Many challenges on face detectors like extreme pose, illumination, low resolution and small scales are studied in the previous work. However, previous proposed models are mostly trained and tested on good-quality images which are not always the case for practical applications like surveillance systems. In this paper, we first review the current state-of-the-art face detectors and their performance on benchmark dataset FDDB, and compare the design protocols of the algorithms. Secondly, we investigate their performance degradation while testing on low-quality images with different levels of blur, noise, and contrast. Our results demonstrate that both hand-crafted and deep-learning based face detectors are not robust enough for low-quality images. It inspires researchers to produce more robust design for face detection in the wild.

TITLE: Vehicle Driver Face Detection in Various Sunlight Environments using Composed Face Images

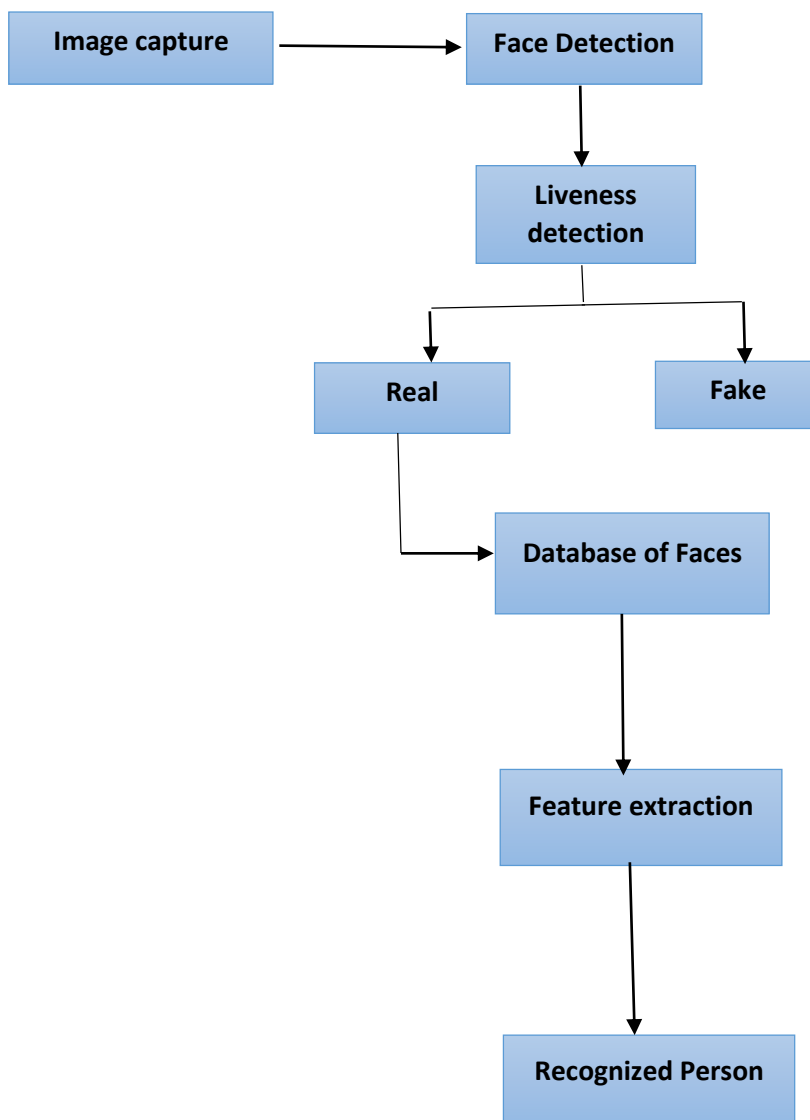
AUTHOR: Haruo Matsuo, Tomokazu Sato, Naokazu Yokoya

YEAR: 2014

DESCRIPTION

The purpose of this study is to increase the face detection accuracy in vehicle cabin. Although existing face detectors employed in consumer applications already have sufficient face detection accuracy for many situations, we revealed that detection rate of existing face detector is drastically decreased by shadow on the drivers face caused by sunlight whose relative direction to the driver is continuously changed while driving. In order to overcome this problem, we increase the number of drivers faces in training dataset by synthesizing the shadowed drivers faces from various directions of sunlight which are created using an image composing technique. In experiment, we found that the 20% to 40% shadowed faces should be blended into training dataset in terms of the generality and the adaptability for robust face detection.

Flow Diagram



Module Description:

Image capture

In image capture process It detect our face through the webcam

Face Detection

Face detection is concerned with finding whether or not there are any faces in a given image and detect the face with 68 landmarks point

Liveness

It is an easy way to spoof face recognition systems by facial a secure system needs Liveness detection in order to guard against such spoofing.

Database of Faces

It is a collection of all face image that is organized so that it can be easily accessed, managed

Feature extraction

Feature Extraction aims to reduce the number of features in a dataset by creating new features from the existing ones These new reduced set of features should then be able to summarize most of the information contained in the original set of features.

Recognized Person

At the last step recognized person will able to login into the site.

Conclusion:

In this paper we have proposed a new secure way of login into the browser. The proposed liveness face detection to identify the spoof images are implemented, in order to increase the level of security. Performance of face recognition is high.

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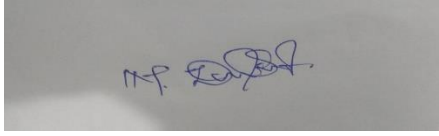
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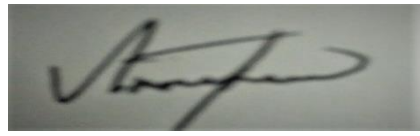
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Student Digital Signature



Guide Digital Signature