

Face Recognition Based on Convolutional Neural Network

Submitted in partial fulfillment of the requirements
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by

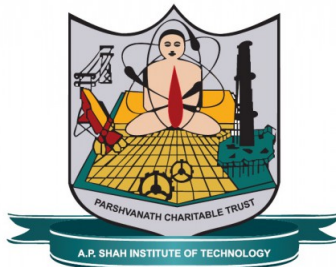
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CERTIFICATE

This is to certify that the project Synopsis entitled “*Face Recognition Based on Convolutional Neural Network*” is a bonafide work of “*Abhishek Bhoir (15202003) ,Sameer Khambe (15202010) and Abhishek Pandey (14102058)*” submitted to the University of Mumbai in partial fulfillment of the requirement for the award of the degree of *Bachelor of Engineering* in *Computer Engineering*.

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Abstract

The face is one of the easiest ways to distinguish the individual identity of each other. Face recognition is a personal identification system that uses personal characteristics of a person to identify the person's identity. Face recognition is of great importance to real world applications such as video surveillance, human machine interaction and security systems. As compared to traditional machine learning approaches, deep learning based methods have shown better performances in terms of accuracy and speed of processing in image recognition. Despite complexities arising due to variations in camera parameters, illumination and face orientations, significant progress has been made in the field with deep learning algorithms now competing with human-level accuracy.

Introduction

Face recognition is the task of identifying an already detected object as a known or unknown face. Often the problem of face recognition is confused with the problem of face detection. Face Recognition on the other hand is to decide if the "face" is someone known, or unknown, using for this purpose a database of faces in order to validate this input face. Face detection is used in many places now a days especially the websites hosting images like picassa, photobucket and Facebook. The automatically tagging feature adds a new dimension to sharing pictures among the people who are in the picture and also gives the idea to other people about who the person is in the image. In our project, we have studied and implemented a pretty simple but very effective face detection algorithm which takes human skin colour into account. Our aim, which we believe we have reached, was to develop a method of face recognition that is fast, robust, reasonably simple and accurate with a relatively simple and easy to understand algorithms and techniques. The examples provided in this thesis are real-time and taken from our own surroundings. Computational models of face recognition are interesting because they can contribute not only to theoretical knowledge but also to practical applications. Computers that detect and recognize faces could be applied to a wide variety of tasks including criminal identification, security system, image and film processing, identity verification, tagging purposes and human-computer interaction. Unfortunately, developing a computational model of face detection and recognition is quite difficult because faces are complex, multidimensional and meaningful visual stimuli.

Objectives

The main Objective of our project is to detect face with maximum accuracy. To have an accurate detection of individuals face image, is one of the most important processes involved in our face recognition system. Face Detection or acquisition step can capture a face image from different surrounding equipment. The face image can be an image file format that is located on either an optical or magnetic disk. It can also be captured by a digital camera directly or it can be scanned from photo paper with help of a scanner machine

Literature Review

Face detection is a computer technology that determines the location and size of human face in arbitrary (digital) image. The facial features are detected and any other objects like trees, buildings and bodies etc are ignored from the digital image. It can be regarded as a specific case of object-class detection, where the task is finding the location and sizes of all objects in an image that belong to a given class. Face detection, can be regarded as a more general case of face localization. In face localization, the task is to find the locations and sizes of a known number of faces (usually one). Basically there are two types of approaches to detect facial part in the given image i.e. feature base and image base approach. Feature base approach tries to extract features of the image and match it against the knowledge of the face features. While image base approach tries to get best match between training and testing images.

Proposed System Architecture/Working

The block schema of the proposed CNN recognition algorithm is given in Fig. 1. The algorithm is mainly carried out in three steps as below:

1. Build a CNN structure with eight layers made up of convolutional, max pooling, convolutional, max pooling, convolutional, and convolutional layers respectively
2. After extracting all features, use Softmax classifier for classification.

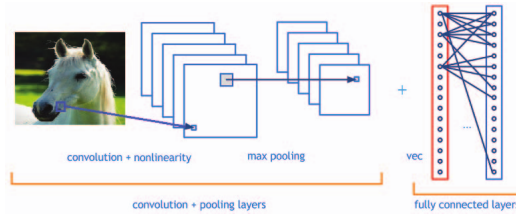


Figure 1: A traditional Convolutional Neural Networks design.

Summary

The work presented in this report is related to Face Recognition System. The prominent features of the proposed algorithm is that it employs the batch normalization for the outputs of the first and final convolutional layers and that makes the network reach higher accuracy rates. In fully connected layer step, Softmax Classifier was used to classify the faces. The performance of the proposed algorithm was tested on Georgia Tech Face Database. The results showed satisfying recognition rates according to studies in the literature.

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1 Publication

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