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# Automatic Tagging and Face Detection Mechanism Using Deep Neural Network

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## Abstract:

With the tremendous increase in video and image database there is a great need of automatic understanding and examination of data by the intelligent systems as manually it is becoming out of reach. Narrowing it down to one specific domain, one of the most specific objects that can be traced in the images are people i.e. faces. Face detection is becoming a challenge by its increasing use in number of applications. It is the first step for face recognition, face analysis and detection of other features of face. This paper considers the problem of multi-view face detection. While there has been significant research on this problem, current state-of-the-art approaches for this task require annotation of facial landmarks,or annotation of face poses. They also require training dozens of models to fully capture faces in all orientations, e.g. 22 models in HeadHunter method. In this paper proposes Deep Dense Face Detector (DDFD), a method that does not require pose/landmark annotation and is able to detect faces in a wide range of orientations using a single model based on deep convolutional neural networks. The proposed method has minimal complexity; unlike other recent deep learning object detection methods, it does not require additional components such as segmentation, bounding-box regression, or SVM classifiers.

*Keywords* **—Face Detection, Face Recognition, Tagging, Deep Learning, Convolution Neural Network**

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## I. INTRODUCTION

With the wide spread use of smartphones and fast mobile networks, millions of photos are uploaded everyday to the cloud storages such as Dropbox or social networks such as Facebook, Twitter, Instagram, Google+, and Flicker. Organizing and retrieving relevant information from these photos is very challenging and directly impact user experience on those platforms. For example, users commonly look for photos that were taken at a particular location, at a particular time, or with a particular friend. The former two queries are fairly straightforward, as almost all of today's cameras embed time and GPS location into photos. The last query, i.e. contextual query, is more challenging as there is no explicit signal about the identities of people in the photos. The key for this identification is the detection of human faces. This has made low complexity, rapid and accurate face detection an essential component for cloud based photosharing/storage platforms. For the past two decades, face detection has always been an active research area in the vision community. The seminal work of Viola and Jones [40] made it possible to rapidly detect up-right faces in real-time with very low computational complexity. Their detector, called detector cascadeconsists of a sequence of simple-to-complex face classifiers and has attracted

  

extensive research efforts. Moreover, detector cascade has been deployed in many commercial products such as smartphones and digital cameras. While cascade detectors can accurately find visible up-right faces, they often fail to detect faces from different angles, e.g. side view or partially occluded faces. This failure can significantly impact the performance of photo organizing software/applications since user generated content often contains faces from different angles or faces that are not fully visible.It is possible to utilize the high capacity of deep convolutional neural networks for feature extraction/classification, and train a single model for the task of multi-view face detection.

## II. EXISTING SYSTEM

In earlier systems, Eigen faces areused for the feature extraction of the faces. One of the lack of eigenface for prediction the face recogniton is not good accuracy. As far as face recognition is concerned, there proposes an efficient end-to-end face detection and recognition framework based on deep convolutional neural networks for home service robots. Also present a method for face recognition adapted to real-world conditions that can be trained using very few training examples and is computationally efficient..Putranto et al. uses naive Bayes for classifying the result of Eigenface feature extraction to predict the face.

The results show that the proposed method can predict the face image up to 70%. But accuracy of feature extraction is not good. Considering different orientation for detecting faces, Sachin Sudhakar Farfade et al recently proposed a method that does not require pose or landmark annotation to recognize faces in a wide range of orientations called Deep Dense Face Detector (DDFD). They used a single model based on deep CNN to achieve this. To extend this approach, provide a tagging system for the detected faces. For the face detection, use Deep Dense Face Detector as proposed earlier. All the identified faces are recognized using Local Binary Patterns Histograms (LBPH) method provided by OpenCV which provided an accuracy of 85% for tagging the faces which are successfully detected.

Recent approaches to face detection and recognition are based on detecting facial landmarks, i.e., nose, mouth, right eye and left eye. It makes for a robust detection pipeline for faces that are not correctly aligned such as partial profile faces. It is not very sturdy though and may be affected by severe pose changes, but this approach is far better than a single sliding window approach. Several Convolutional Neural Networks (CNN) models consisting of many layers of CNN for detecting different facial landmarks and combine the results in the output network. Convolution Neural Networks receive inputs being the raw image pixels and gives output being the class of the image. The last layer is a regular fully connected layer and has a loss function. To deal with the part of the recognition, OpenCV provides three methods for face recognition: Eigenfaces, Fisherfaces and Local Binary Patterns Histograms (LBPH).Of these the existing system uses Eigenfaces for the feature extraction. One of the lack of eigenface for prediction the face recogniton is not good accuracy.

In order to overcome the disadvantage of the existing approach,a new method called Deep Dense Face Detector (DDFD), a method that does not require pose/landmark annotation and is able to detect faces in a wide range of orientations using a single model based on deep convolutional neural networks is proposed for the face detection and tagging. The proposed method has minimal complexity; unlike other recent deep learning object detection methods ,it does not require additional components such as segmentation, bounding-box regression, or SVM classifiers.

## III. PAGE STYLE

In the proposed system, the concept of multi-view face detection using CNN used by Sachin Sudhakar Farfade are extended to provide a tagging system for the detected faces. For the face detection, Deep Dense Face Detector is used which does not require pose or landmark annotation and can identify faces in a wide range of orientations using a single model based on deep CNN. All the detected faces are recognized using Local Binary Patterns Histograms (LBPH) method provided by OpenCV. Precision, recall, and F-measure are the parameters used to

  

measure the performance of the algorithm. An accuracy of 85% is achieved for tagging the faces which are successfully detected.DDFD is independent of common modules in recent deep learning object detection methods such as bounding-box regression, SVM, or image segmentation.

It compares the proposed method with R-CNN and other face detection methods that are developedspecifically for multi-view face detection e.g. cascadebased and DPM-based. It shows that our detector is able to achieve similar or better results even without using pose annotation or information about facial landmarks. Finally, analyzed performance of our proposed face detector on a variety of face images and found that there seems to be a correlation between distribution of positive examples in the training set and scores of the proposed detector. In future we are planning to use better sampling strategies and more sophisticated data augmentation techniques to further improve performance of the proposed method for detecting occluded and rotated faces.

### *A. LBPH(Local Binary Histogram Patterns*

It is a type of visual descriptor. It is a very efficient texture operator which labels the pixels of an image by thresholding the neighborhood of each pixel and considers the result as a binary number.

LBP Feature Vector Creation:

- Divide the examined window into cells.
- For each pixel in a cell, compare the pixel to each of its 8 neighbors.
- Where the center pixel's value is greater than the neighbor's value, write 0.Otherwise write 1.This gives an 8 digit binary number.
- Compute the histogram of the frequency of each number occurring.
- Optionally normalize the histogram.
- Concatinate histograms of all cells. This gives a feature vector for entire window.

The proposed system is very efficient than the existing system.

## IV. CONCLUSIONS

On concluding, this paper proposes Deep Dense Face Detector (DDFD), a method that does not require pose/landmark annotation and is able to detect faces in a wide range of orientations using a single model based on deep convolutional neural networks. The proposed method has minimal complexity; unlike other recent deep learning object detection methods, it does not require additional components such as segmentation, bounding-box regression, or SVM classifiers.

For the face detection, use Deep Dense Face Detector as proposed earlier. All the identified faces are recognized using Local Binary Patterns Histograms (LBPH) method provided by OpenCV which provided an accuracy of 85% for tagging the faces which are successfully detected.

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