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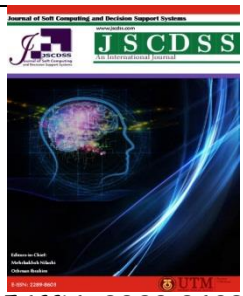

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VGG based Convolutional Neural Network for Disguised Face Recognition

Mahsa Ghorbanali [a,*]
[a] Amirkabir University of Technology, Department of Computer Engineering, 424 Hafez Ave., Tehran, Iran

*** Corresponding author email address**: m.ghorbanali@aut.ac.ir

Abstract

Nowadays, with the increase in the number of data, including image, signal and audio data, the need for computer systems and automated algorithms seems more than ever. The field that automates this operation is called machine learning, which is a subset of artificial intelligence. In recent years, new methods of deep learning have been proposed that are based on neural networks and have a large number of layers. Disguised face processing is one of the subsets of image processing that has many applications such as identifying criminals. Convolutional neural networks are among the deep learning structures that have been very successful in image processing. In this article we used Disguised Faces in the Wild (DFW) which contains approximately 11000 images from 1000 subjects. These images include normal faces and also face with different lightning, pose, background and different make up. We used batch normalization and dropout to overcome overfat. We used activation function RELU that leads negative numbers to 0 and its function is: max (0, x) which means that it would be never saturated in positive region. In addition, ADAM (adaptive momentum estimation) was used as optimization algorithm. Our proposed architecture has 16 layers including 14 convolution layers and two fully connected layers. Finally, the proposed method reached 84 percent accuracy.

Keywords: Disguised Face Recognition, Artificial Intelligence, Deep learning, ADAM, Batch Normalization, Zero Padding.

1. Introduction

Machine learning is a science that tries to build human abilities on the computer as well (Nilashi et al., 2020a). The ability to recognize faces inherently is one of human abilities. Humans can recognize the faces of different people even after many years and disfigurement. Therefore, computer face recognition is of special importance and its applications can be used to identify criminals (Deb et al., 2017).

Today, in many fields, there is a need for equipment that recognizes the identity of individuals based on their body characteristics. In addition, card passwords now restrict access, but these methods can easily be cracked and are unreliable. However, the face is a fixed feature, and this shows the importance of research on this issue more than ever (Zhang et al., 2018).

There is a lot of difference and variety in people's faces, so that faces cannot be classified into specific categories. In addition, changes such as the length of the hair and bear or the way it is arranged, as well as age, may cause changes in the face. In addition, the change in the face may be due to the shooting conditions. These conditions can include changes in light intensity as well as how the face is positioned (angle and rotation), which in some cases can cause problems in face recognition. For these reasons, extracting specific features from a face is different from extracting features from a person's image by changing the shooting conditions. Sometimes the features extracted from the faces of different people (due to the similarity and multiplicity of faces) are very similar and it is hard to distinguish the image. A face recognition procedure is a procedure that recognizes a person based on a vector of specific features. However, there is not a fully robust face recognition technique (Santurkar et al., 2018).

Deep learning methods operate in such a way that there is no need for the feature extraction step, which means that these structures act as both classification and feature extraction operations. Deep structures have been widely used for image and audio processing. Deep structures are based on neural networks, which have more hidden layers and more neurons (Pfister et al., 2015).

In recent years, with the development of computer systems and the increase for data, the interest in using deep learning methods has increased, especially in the field of image processing . These structures include convolutional, recurrent, and other neural networks.

One of the basic problems of image processing with deep learning methods is the low amounts of data. Deep networks, on the other hand, often face the problem of over-fitting due to the large number of layers and low amounts of data, and do not have the power to detect test