



Comparison of the AlexNet based Face Recognition System with the State of the Art Methods

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Abstract— This study proposes a deep learning model for the face recognition problem. The architecture used in this study based on AlexNet, which is a popular pre-trained convolutional neural network (CNN) architecture. Within the proposed model AlexNet architecture is adjusted for face recognition system and adapted to be used only as a feature extractor. Besides, SVM was used as a classifier for the classification phase. This deep learning model for face recognition problem is tested on certain well-known datasets namely and compared with other studies in order to reveal its overall performance.

Keywords—AlexNet, face recognition, deep learning.

I. INTRODUCTION

Face Recognition is an appealing field of computer vision area because of its applications in commercial, security and human interaction systems. In recent years, deep learning technologies have achieved significant successful results by the adaptation of Convolutional Neural Networks (CNN) architecture to computer vision problems such that from face recognition problem to classification and regression problems

CNN's are generally trainable multi-layered architecture designed to learn the needed features of the neural network which is inspired by the biological neuron. CNN learns end-to-end training features in a hierarchical manner due to the characteristics of multi-layered architecture, [1,2]. Being able to learn extracting required features automatically to train a new classifier makes CNN remarkable in comparison with other methods. The architecture of the convolutional neural networks generally consists of three main layers such as a convolution layer, a pooling layer, and a fully connected layer that follow the input layer. Convolutional layer is the basic layer of the CNN and it extracts the features from the image by using filters.

Pooling layer gradually reduces the dimension of the input image by using min, max, avg operators in order to reduces the complexity of the system and avoid overfitting problem. Fully connected layer is usually last layer before classification. Using all of the features that were gathered from former layers to generate features is the aim of this layer.

Several models and methods have been developed in the literature to overcome the face recognition problem. DeepID [3], FaceNet [4], DeepFace [5], WebFace [6] and GoogLeNet [7] are some of the common deep networks for face recognition problem.

In this study, AlexNet which is a pre-trained CNN architecture is used as a feature extractor and multi-class Support Vector Machine (SVM) which is trained and tested with the obtained features is used as a classifier. In order to evaluate the system and compare with others systems, three well known datasets are employed.

II. THE PROPOSED FACE RECOGNITION SYSTEM

In proposed face recognition system, the face recognition problem can be handled with a CNN based system which has SVM classifier in the last layer. For extracting and recognizing the image features, CNN is used, taking advantage of the ability to decide which parts of a face to measure. Therefore, in this study, AlexNet was modified and used for feature extraction and a multi-class SVM was used for classification on a single model which can be seen in fig. 1.

Fig. 1. Diagram of proposed method

