3D Face Recognition by Using Deep Learning

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Abstract – Since 3D depth images have more information and the 3D face recognition is attracting more interest of the researchers in machine learning. In this paper we try to acquire a method of the 3D face recognition which has high accuracy by using only 3D low resolution frames taken from a video as an input. Moreover, we use deep learning to enhance the computational process and precision while operating with a huge amount of data.

1.　Introduction

Because of its natural, direct and not obsessive essence of data acquisition, face recognition surpasses other biometrics by its many approachable benefits. Therefore, face recognition and its algorithms have become popular among research institutes in machine learning in a few last decades. Nevertheless, there are several obstacles with face recognition, such as occlusions, background noise, variations in term of age, gender, ethnicity, hair style, light illumination and additional accessories (i.e. eye-glasses, beard, mustache, caps and objects covering the part of the face, etc.) and peripheral devices which are might be gaudy to set up or handle and costly to provide. Hence, in the following research we endeavor to develop a technique which comprises all the problems in face recognition mentioned above.

2.　Related works

From the previously introduced study, a novel approach is able to satisfy real world 3D image recognition demands due to the fact that it covers all the main challenges, such as changes in facial expressions, occlusions and large pose variations [1]. The following study creates a method that considers the new generation low-cost and low-resolution customer depth cameras to receive the input data. These devices carry out color-depth image acquisition over time at the speed of standard frame-rate, but with low-resolution compared to other 3D scanners. Summing up, the study defines a super-resolution method for 3D faces by which the research processed a set of 3D low resolution frames [2].

3.　Deep learning

In the research, we are going to integrate a deep learning approach. Deep learning neural network transcend conventional neural networks due to its unsupervised or supervised manner for both unsupervised and supervised learning tasks. The difference and advantage of deep learning is also maintenance with much more large amount of data and high precision in data analysis, so in this paper the architecture of our technique is going to be built as a deep neural network by using TensorFlow library, one of the most and foremost fast growing neural network libraries, provided by Google.

Conclusion

To sum up, we are trying to create a toolbox for 3D face recognition on real time eliminating the foregoing major challenges with a utilization of 3D cheap and low-resolution cameras by integrating deep learning neural network.

References

1.　3D Face Recognition under Expressions, Occlusions, and Pose Variations http://ieeexplore.ieee.org/document/6468044/

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3.　TensorFlow https://www.tensorflow.org/