

**Summary of**  
**Face Recognition and Identification**  
**using Deep Learning Approach**

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# **Face Recognition and Identification using Deep Learning Approach**

## **Abstract**

The purpose of this study was : a face recognition and identification system is designed and developed using deep learning approach. The overall procedure of developing this face recognition system from training the data using CNN approach to face recognition is described. It was an experimental research study that is verified with the large number of face images being trained into a classifier can achieve accuracy of 91.7% in recognising image and 86.7% in real-time video.

## **Introduction**

Face recognition is part of computer vision. Face recognition is used to identifying a person in biometric method based on image on their face. Deep learning can achieve a nice approximation of a complex function through increment of hidden layers, hence, it is capable to achieve astonish result in the face recognition. It is a part of machine language that teaches computer to do as what human does naturally. Thus, deep learning was chosen as a means of implementation in this paper.

It is experimented that OpenCV is much faster than Matlab up to 30 times and can be up to 100 times for Erosion algorithm. Therefore, OpenCV was chosen to be applied in this paper.

## **Interface**

To do face recognition, there must be an input to be detected and verified, camera has to be set up for recording or capturing images

The input can be images and recorded video or real-time video. After the input is provided, faces in the images or videos are to be detected.

When the classifier is trained, it can be utilized to start to recognition work. It can be used in either video or image to recognize one or more person

In face detection, Haar feature-based cascade classifiers is used and the classifier used is Haar Cascade for frontal face. A Haar Cascade is basically a classifier which is used to detect the object for which it has been trained for, from the source

TensorFlow is the framework that is being used in the system classifier section. Classifier is trained and used in the recognition process

## Accuracy of results

The accuracy of the system is tested via recognition of three peoples with multiple times at different locations, mainly to test how light intensity affect the accuracy of the system. The accuracy is verified using confusion matrix.

**Distance of Face Detection:** The distance between face and camera is affecting the recognition process. When the distance is close or less than 60cm, the proposed system can barely detect the face. In the other hand, when the distance is extended to more than 60cm, the recognition takes place.

**Lighting Condition:** The accuracy of the system is different depending on light intensity. It is clearly shown that high lighting intensity provides better accuracy compared to that of low lighting intensity. However, the proposed system shows true recognition even in darker surroundings.

**Accuracy of Face Recognition:** When the photos where all tested with the proposed face recognition system, the data is computed in confusion matrix to calculate the accuracy of the system. For the first person, 17 out of 20 recognitions are true(correctly recognized). For second person, 18 of his photos are recognized correctly while for the last person, all photos are recognized correctly. Thus, the accuracy obtained with respect to each person. The overall accuracy of the system for face recognition from images is 91.7%.

**Accuracy of Face Recognition based on Real-time Video:** The candidates will show themselves to the webcam to undergo recognition where each of them has to do it 20 times at different location. When collection of data is done, the data is computed into confusion matrix. The overall accuracy of the face recognition on real-time video is 86.7%.

## Discussions and Conclusion

There are few factors that can affect the accuracy of the system. When the light intensity is insufficient, the accuracy is relatively low compared to higher light intensity. Other than that, classifier is the main element in the recognition process. The longer the classifier is trained, the better the classifier is performed. The images that are used to train the classifier must be in variety of conditions in order to generate a robust classifier.

**References:**

[Face Recognition and Identification using Deep Learning Approach-KH Teoh<sup>2</sup>, RC Ismail<sup>1,2</sup>, SZM Naziri<sup>2</sup>, R Hussin<sup>2</sup>, MNM Isa<sup>2</sup> and MSSM Basir<sup>3</sup>-Published under licence by IOP Publishing Ltd](#)