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Facial recognition subsyste-w18017575

KV6002: Team Project and Professionalism

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# Facial recognition subsystem -Alexandru Adonis Neagu

## Initial description:

This main task of this subsystem is to ensure an efficient way to help the user to sign in. Once the webpage is accessed the user will be asked to take a photo using its phone/tablet camera. Next, the system will identify and authenticate the user. If the user authenticated, it will be redirected to its profile from where will be able to make different choices.

## Requirements capture plan - MoSCoW:

Biometrics authentication has grown in popularity in the last decades when talking about data security. Biometrics are used for providing a person authentication to have access to their data. These technologies are gaining ground against the old methods such as the use of password and code. (1),(2),(4) The biometric that will be used in the system is facial recognition. It is the most natural way to authenticate a person. (5),(6)

For such a project a deep learning approach will be used to obtain a model that can identify and authenticate a facial image. Studies showed that a Convolutional Neural Network is very effective in areas such as image recognition and authentication. This approach has been chosen for its ability to deal with raw data and to overcome the disadvantage of feature-based methods that require a significant exertion should be put on to plan and utilise different include extraction techniques which are human-made features. (7)

CNN input and output are array vectors called a feature map. Since this project will deal with images, the array dimension will be 2D. Some pre-processing of the images will have to take place. Once this step is done, the feature extraction process using CNN begins. By analysing those features the classifier will classify the image and train the whole system. Once the training is done the system will be tested by using different images from those used for training to see how the model performs. Further tests will determine the number of nodes and layers that will be used for the best result.

As a programming python will be used and the Integrated development environment for this project will be used anaconda.

* Must:

Identify and authenticate the user into the system

* Should:

Take a small amount of time and have a good performance

* Could:

Be able to make the difference between the real person in front of the device and an actual photograph.

To develop the subsystem, I identify several points that I have to focus on:

**Must:** Collect enough picture samples to be able to train the model. The pictures must be of high quality so that the accuracy of the model can increase. Moreover, a further test must be conducted to find the best combination regarding the number of hidden layers and the nodes. Further optimization will be needed to improve the model.

**Should:** Be able to perform the identification and authentication in a very small amount of time showing the smallest error rate of misclassification.

**Could:** Be able to make a difference between a genuine person and printed picture or any other image that is used to sign in on another user account.

High-level requirements:

* Access to a camera
* Access to high-quality pictures
* Access to a large dataset of user images
* Access to an internet connection

## Dataset:

A picture containing posing, person, group, indoor

Description automatically generatedThe database that will be used to train the system is the Yale Face Database. It is made of 165 grayscale images of 15 individuals. For each person, 11 photos have been taken in a different position and conditions like centre-light, w/glasses, happy, left-light, w/no glasses, normal, right-light, sad, sleepy, surprised, and wink. It is opened source and it can be downloaded from the internet. (8)

## Stakeholders story:

This project scope does not cover testing upon real persons, as an educational institution, the ‘perspective’ stakeholders consist of teachers, parents, and students. Each stakeholder will use the same model to sign on the web page but will have a different level of access.

**Headmaster:**

As a headmaster, I want a facial recognition system so that my students will find it easy to log in to the educational platform without having to memorise a user id and a password.

**Teacher:**

As a teacher, I want an authentication system so that I can easily and quickly have access to the educational platform because the user ID and password can be forgotten which implies a long process to recover them.

**Student1:**

As a student, I want to be able to easily authenticate myself into the system so that the user id and the password will not be necessary to be remembered so I can avoid all the process to reset the password. Moreover, as I want to keep up with the new technologies that appeared on the market I what an educational platform that is as high tech as the popular applications used on the new smartphones.

**Student2:**

As a student, I want to authenticate on the educational system so that I can be sure that all my data is secured, and no other stranger can access it. I consider that is would be neither ethical nor legal that a stranger could have access to important information such as my address, grades or conversations between me and teachers.

**Parent:**

As a parent, I want a modern identification system like the ones implemented on the new smartphones so my child can benefit most from the new system in terms of security and performance.

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