Instituto Superior de Engenharia de Lisboa

**Computer Vision and Mixed Reality**

**Report**

*Feature Based*

*Face Detection and Recognition for Augmented Reality*

Mestrado em Engenharia Informática e Multimédia

Rodrigo Dias, 45881

Semestre de Verão, 2021/2022

For the face detection, it was used the Cascade Classifier to detect faces and eyes. It was created a class to handle the face detection, the eye detection and the alignment needed (rotation, scale, and translation). It was needed to calibrate the behavior of the classifier to correctly detect the eyes. Otherwise, there were times where the nose would be considered as an eye.

**Normalization**

First, we used this to find the faces in each image, which returns the part of the image containing the face and then apply the eyes detection. This is to better avoid detecting eyes were there’s no face.

Afterwards, each image is downscaled to 56x46 pixels and turned to grayscale and, having the location of both eyes, the face is aligned accordingly using *warpAffine*, putting the eyes in line 26, columns 16 and 31, therefore normalizing the entire image.

Doing this to a set of images (57 in total), the dataset was prepared to apply the *eigenfaces* and *fisherfaces* algorithm.

Before applying these algorithms, the dataset was split into training and test sets, having 1 image from each class in the test set. The training set now has 52 images while the test has only 5. Then the training set was randomized to better apply the algorithms and the test set was ordered.

**Eigenfaces**