HAND GESTURE RECOGNITION

Team: Atomei Georgiana & Sandu Diana

This project demonstrated that a simple computer application can be designed to *detect* and *recognize* simple *hand gestures*. The program was able to correctly interpret the gestures most of the time.

In machine learning projects in general, you usually go through a data **preprocessing** step. The acquired data come from different sources. So, they need to be standardized. Preprocessing is used to conduct steps that reduce the complexity and increase the accuracy of the applied algorithm. What we applied on this project is:

-*image resizing* (all the picture must be the same size)

-*convert color images to grayscale*(to reduce the computation complexity)

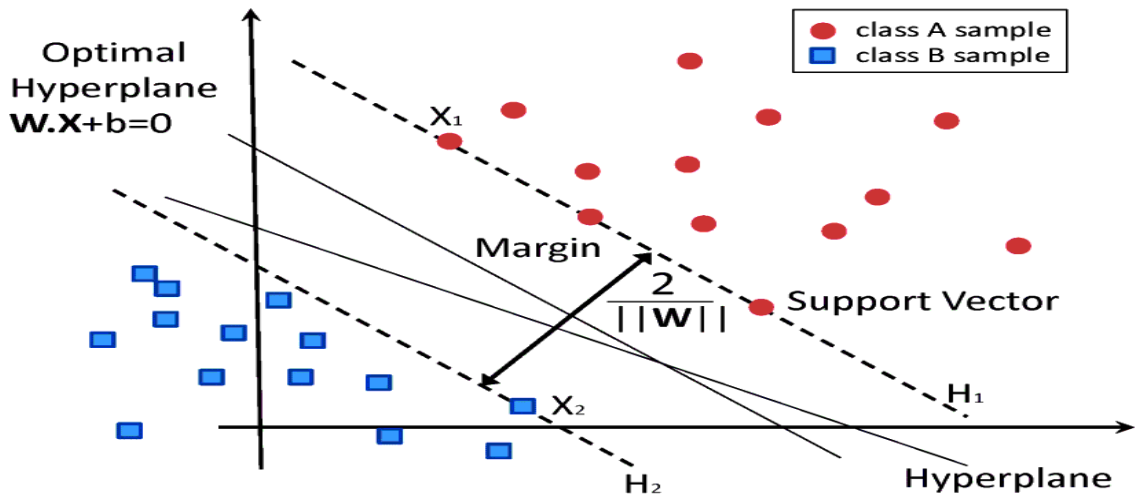
-*binarizing the images*(for partitioning the image into a foreground and background)

-*morphological opening/closing*(to smooth the image)

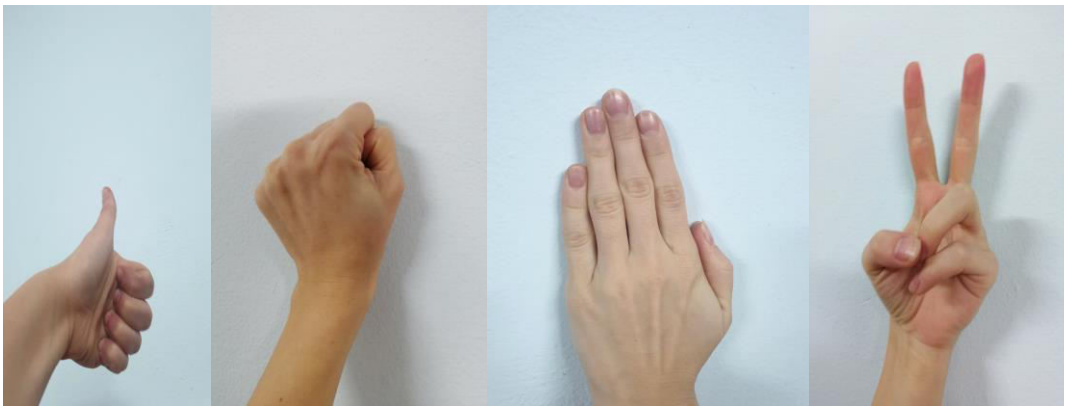
In order to facilitate the hand region extraction we assume that the gestures are performed against a uniform background, brighter than the hand region.

In computer vision a physical object maps to a particular segmented region in the image from which object descriptors or features may be derived. A ***feature*** is any characteristic of an image, or any region within it, that can be measured. Objects with common features may be grouped into classes, where the combination of features may be considered a ***pattern***. Object recognition may be understood to be the assignment of classes to objects based on their respective patterns. The program that does this assignment is called a ***classifier***.

The project is based on ***Support Vector Machine*** which is a *discriminative classifier* formally defined by a separating hyperplane. In other words, given *labeled training data* (supervised learning), the algorithm outputs an optimal hyperplane which categorizes new examples.

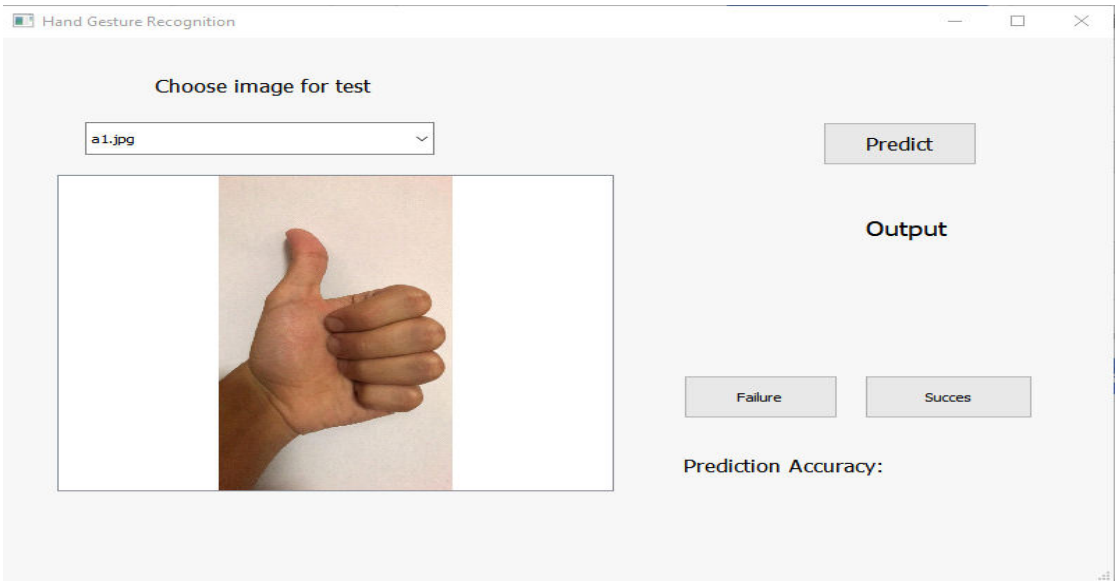


The ability of a classifier to classify objects based on its decision rule may be understood as classifier learning, and the set of the feature vectors (objects) inputs and corresponding outputs of classifications (both positive and negative results) is called the **training set**. We used 4 kind of gestures*: like*(img.A), *fist*(img.B), *palm*(img.C), *peace*(img.D).



A. **B.** **C.** **D.**

After that, we used a second set of images named test set for providing an *unbiased evaluation* of a final model fit on the training set.



Source code: https://github.com/gatomei/PI-proiect