

## PROJECT / Fusion of Palmprint and Iris Recognition in Uncontrolled Environments

# PAIRUE

### Main Objective:

The main objective of this project is to design a biometric identification system to be used in uncontrolled data acquisition scenarios. In order to do this, and thus enjoy all the advantages of this type of systems mentioned above, there are four main challenges that have to be solved. These challenges can be summarized as:

- Acquisition of data with enough discriminating information - This is a fundamental phase in devising any biometric application. The data acquisition setup (operating wavelength, type of illuminant, levels of luminance, number and position of illumination sources) and the protocol demanded to subjects play a crucial role in the quality of the acquired data and determine the success of the biometric recognition task. Thus, a convenient data acquisition framework should be devised in the earliest stages of the project.
- Accurate biometric data segmentation - As mentioned above, traditional biometric applications, such as computer access and border control, require the user to submit a biometric in a highly controlled manner. In this kind of constrained biometric capture, users take deliberate actions to cooperate with the biometric systems, such as facing forward and standing still. This makes it easier for the system to extract the biometric information from the raw image/video data, by performing a simple segmentation. However, when the acquisition scenario is relatively uncontrolled, the acquisition system will have to be able to perform a much more sophisticated segmentation to extract the desired biometric information from the raw image/video and guarantee that it is not confused with noise, which can be quite high.

- Correction of pose and illumination variations - After being able to extract the biometric data (i.e., determine its exact location) from the raw image/video data, the system has to deal with the problem of pose and illumination variations due to unconstrained biometric capture. After all, when the capture is done in an uncontrolled fashion, the biometric data can have different sizes, different orientations, different degrees of deformation and be subjected to different types of illumination, all of which have to be accounted for in order to be able to perform a successful user recognition. This process of dealing with the captured data variability can be seen as a form of normalization.

- Robust user identification - After the biometric data has been normalized, robust recognition algorithms have to be developed for performing the identification itself. To improve the identification performance, more than one biometric trait can be considered, in which case different fusion strategies will have to be considered.

The four main challenges above have to be dealt with, while guaranteeing that the typical requirements imposed on biometric systems, like universality, uniqueness, permanence, collectability, performance or acceptability are also met. This will ensure that the developed identification system will be a successful one.

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