INSTITUTO SUPERIOR DE ENGENHARIA DE LISBOA
MESTRADO EM ENGENHARIA INFORMÁTICA E DE COMPUTADORES
MESTRADO EM ENGENHARIA INFORMÁTICA E MULTIMÉDIA
SISTEMAS BIOMÉTRICOS / BIOMETRIC SYSTEMS

Laboratory Project 1 - 2024/2025 (October, 4)
Due date (Code and Report): November, 6

Please submit the code and the report on the Moodle system. More details at the end of this page.

1. Guide 1 - exercise 1.
2. Guide 1 - exercise 2
3. An ECG Biometric System is composed by several processing blocks (Preprocessing, Feature Extraction, and Classification). In this project, we aim to implement the full system and enhance the functionally of one of the blocks, either (at your choice):

   (i) **Preprocessing** - including Filtering, Outlier Detection, and Clustering;
   (ii) **Feature Extraction** - including template selection and feature weighting/time/amplitude normalization;
   (iii) **Classification** - including different classifiers (either combining or in different architectures);
   (iv) **Evaluation** - classical k-fold cross-validation, leave-one-out cross-validation, for authentication and identification.

   For the evaluation task, consider: the Equal Error Rate (EER) and Area Under the Curve (AUC) metrics for the authentication scenario; the accuracy for the identification scenario.

   (a) Report some experimental results on the Physionet ECG-ID Database, available at `https://physionet.org/content/ecgiddb/1.0.0/`.
   (b) Report some experimental results on the Biometric Systems Course Database collected in classes.

Here are some relevant aspects about the **code and work** to be developed on this laboratory project:

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(1) The code should be written and organized following the adequate software development procedures and techniques.

(2) The work should be carried out in teams composed of (preferably) two students.

(3) Each work team addresses one specific block. Altogether, the entire set of groups from the class must address all blocks. Thus, each work team should communicate to the teachers (andre.lourenco@isel.pt; artur.ferreira@isel.pt) about their preferences (first, second, and third preference). If needed, the teachers will reassign the blocks to achieve balance among the class.

Here are some relevant aspects about the **report** intended for this laboratory project:

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(1) The report must be succinct and organized into 3 sections, one per exercise.

(2) Each section must be organized into sub-sections, with the relevant aspects of the devised solution.

(3) For each exercise, the report should provide a clear description of the response to the aspects requested in the statement. It should also contain all requested experimental results and the respective comments, analysis, and explanations.

(4) The report should not contain the written code. This should be submmitted in a separate electronic format, duly commented and organized.