FCTUC DEPARTAMENTO DE ENGENHARIA INFORMÁTICA
FACULDADE DE CIÊNCIAS E TECNOLOGIA
UNIVERSIDADE DE COIMBRA

Data Science Topics

November 11th, 2024

Practical Exam

Observations:

1. This exam has a duration of 45 minutes + 15 extra minutes of tolerance.
2. You must answer it on your computer with all communications disabled.
3. You can solve it in either an interactive python notebook (.ipynb) or a python (.py) file.
4. When you finish, submit your answers (1 file only) in *inforestudante*. You must ask the professor permission to activate the communications of your computer in order to submit it.

Questions:

1) For the first 100 examples of each class:
    a. Load the sound into a numpy array.
    b. Compute the envelope of the signal by applying a moving average with a window of 200 points to the absolute values of the signal.
    c. Apply a downsample/decimation with a factor of 50 to the resulting envelope.
    d. Extract the standard deviation of the resulting downsampled envelop.
2) For each class, compute the outliers of the extracted metric using the z-score method with a k value of 3.5.
3) Make a scatter plot with the classes along the x-axis and the metric values along the y-axis, highlighting the outliers with a different color.