Minicolloque n° MMM12 ☐ **Oral** ☒ **Poster**

Machine Learning analysis of *LabQuakes* time series

Louis Combe[a*], Victor Levy dit Vehel[a], Osvanny Ramos[a] and Olivier Cochet-Escartin[a]

a. Institut Lumière Matière, UMR5306 Université Lyon 1-CNRS, 69622 Villeurbanne, France

* email : louis.combe@univ-lyon1.fr

The LabQuake experiment, based on the continuous and slow shear of a compressed granular system, mimics the behavior of a tectonic fault. Elastic energy is slowly stored in the granular structure and liberated by sudden reorganization events accompanied by acoustic emissions [1]. We investigate prediction possibilities for the events of highest energy, by splitting the acoustic time series recorded in the LabQuake experiment in numerous time windows, which are labelled 1 or 0, depending on their proximity with a large event. This creates a dataset on which we train several Machine Learning models, trying to predict the labels of each time window. Our experiment provides multiscale aperiodic events, making the classification on the full dataset very complex. We then start by classifying on a subset of our dataset, focusing only on windows close to extreme events, and windows far of any event.

This poster will describe in more details how the dataset is built, along with the networks we trained on this dataset and the result of simplified classification.

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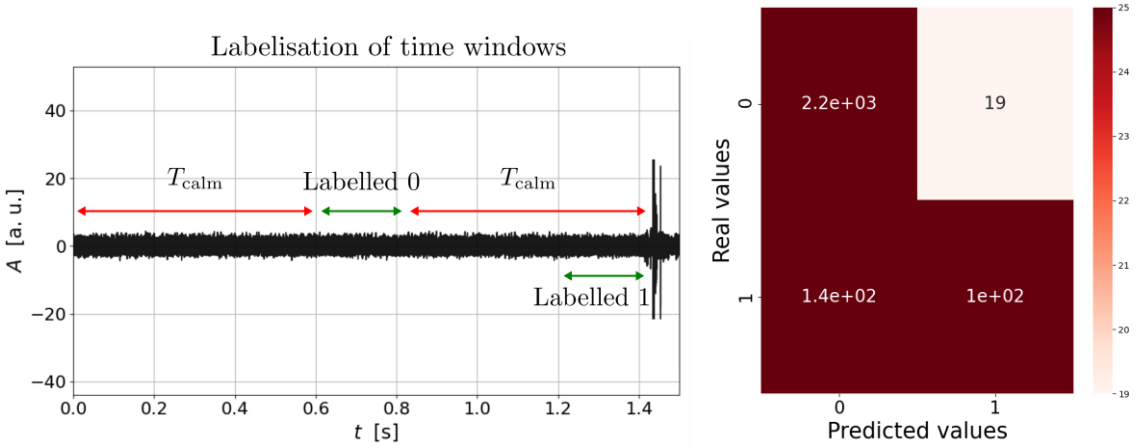

Figure 1 (Left) Time windows are labelled 0 or 1 depending on their proximity from high energy events. (Right) Confusion matrix of our simplified classification. We have very high precision, and find ~40 % of the events.

1] S. Lherminier, R. Planet, V. Levy dit Vehel, G. Simon, K. J. Måløy, L. Vanel and O. Ramos, *Continuously sheared granular matter reproduces in detail seismicity laws*, Phys. Rev. Lett. 122, 218501 (2019).