



Laboratório de Instrumentação e Física Experimental de Partículas

Competence Center - Big Data

6th Informal Meeting - 1st June 2018

ATTENDEES (via zoom)

Nuno Castro, Giles Strong, Vladimir Solovov, Guilherme Milhano, Helmut Wolters, Marcin Stolarski, Andrey Morozov, Ricardo Barrué, Diogo Barros

NOTES

- **Agenda:** <https://indico.lip.pt/event/449/>
- **Introduction:**
 - PTDC project on Big data was funded. Resources available in this context - mainly for human resources but also for some hardware. A researcher position at LIP (1 year, extendable) on machine learning will be opened soon (probably in July).
 - Dedicated servers for machine learning training will be installed in Lisboa and Minho. Further news on this will be sent as soon as possible.
 - The 2nd edition of the school and symposium on data science is being discussed. Preliminary contacts done with the University of Minho to host this edition (2019).
 - COST action on ML for the detection of gravitational waves was approved. Some of the competence center members participate. The goal is to explore opportunities in terms of contacts, participation in schools and workshops, etc.
- **Vladimir Solovov - Journal Club: use of machine learning for the calibration of particle physics detectors**
 - Scintillation cameras: the problem of position reconstruction. A detector model is needed and the calibration is rather time-consuming.
 - Iterative procedure for the calibration of SC.

- ML for scintillation cameras (SC) successfully tested. Maximum likelihood, neural network and nearest neighbour (kNN) tested. For each of them, a model is needed and this can be obtained with different methods (each of them with advantages and drawbacks). ML methods are very promising but still rather experimental.
- kNN calibration: pencil beam replaced by a knife-edge beam, allowing to use 2x1D scans (2D) or 3x1D scans (3D), instead of N^2 or N^3 scans. Another approach is to use kNN to filter undesired events.
- Manifold learning. Would it work on data from a SC? Scikit-learn package used.
- Locally linear embedding (LLE) tested in a 8x8 array of SiPMs.
- LLE for clinical camera: manifold mapping.
- Neural networks: FANN being used - planning to upgrade to KERAS. Runs in a laptop.

NEXT MEETING

Next meeting will be held on the 6th July: <https://indico.lip.pt/event/454/>

Giles Strong will discuss a paper on the tuning of hyperparameters in neural networks (<https://arxiv.org/abs/1803.09820>). We need, as usual, volunteers for the following ones.