

Mandate of the LHC Machine Learning Working Group

October 12, 2016

Machine Learning (ML) techniques are used by the LHC experiments in many facets of data analysis, monitoring and processing. As the field of ML is growing, the number of High-Energy Physics (HEP) applications and use cases are expanding.

The Inter-experimental Machine Learning (IML) working group facilitates the advancement and application of ML methods for the LHC experiments. It identifies areas of common interest and importance to the LHC community. It forms dedicated task forces for long-term developments and organizes workshops on common topics of direct interest for LHC experiments (and the HEP field at large).

The working group promotes communication among the LHC experiments and the HEP and ML communities and provides support for the integration of core ML software for the LHC. It steers the creation of common benchmarks for experiments and the identification and evaluation of new machine learning methods. It also organizes ML education and training for the benefit of the LHC community.

Group activities

The IML working group holds regular meetings open to all interested parties and maintains a discussion forum to facilitate the exchange of information among the LHC experiments in machine learning. The IML working group also fosters connections with other HEP experiments and the ML community at large.

Software

The IML working group reviews the latest tools and software used in the ML community and coordinates the development of interfaces to HEP software. The IML benefits from close communication with the CERN software (EP-SFT) group: a coordinated effort allows for a more efficient integration of ML tools into HEP software, providing LHC users with access to state-of-the-art ML developments.

Benchmarks

The IML group will coordinate the creation and maintenance of common benchmarks for the comparison of different ML methods and tools. These benchmarks may take the form of generic detector simulations (Delphes, PGS, etc) or public datasets from HEP-ML challenges, open data, etc.

Education and training

The group will organize tutorials on core HEP-ML software. The IML will coordinate the creation of documentation for the use of ML tools in HEP. This documentation will be collected on the IML webpage.

Group Coordination

The coordination of the group is composed of one representative from the ALICE, ATLAS, CMS, and LHCb experiments, appointed by the respective experiment's physics coordinators, and one LPCC contact. They regularly report on the progress and plans of the working group to the Physics Coordinators.

Organization and meetings

The organization of meetings will be the responsibility of the coordinators. Coordinators may create task forces or dedicated workshops to follow-up on specific topics of interest for the LHC experiments and the HEP community at large. These task forces will generally be formed by representatives from all interested experiments. Participation in the group-related activities, attendance and contributions to the meetings are open to all interested parties.

Talks given by members of the experiments should not include any internal information, unless previously approved by the relevant experiment, according to the rules for public presentations and approval procedures. In case of uncertainty, the experiment's representative in the IML should be contacted to handle the case according to the rules of the collaboration.

Use of experimental results and data

By its nature, the working group will only deal with public information. Should the need arise to handle exceptions, a procedure will be defined in agreement with the management of the relevant experiment(s) on a case-by-case basis.