

IML meeting – NEWS

Lorenzo Moneta (CERN) Markus Stoye (Imperial College, DSI)
Paul Seyfert (CERN) Rüdiger Haake (Yale University)
Steven Schramm (Université de Genève)



- Editing meeting on Friday
- Thanks to all contributors and commentators
 - Comment deadline extended until 1st November



Recordings online

IML Machine Learning Working Group: unsupervised searches and unfolding with ML

Friday 12 Oct 2018, 15:00 → 18:00 Europe/Zurich
40-S2-A01 : Salle Anderson (CERN)

Videoconference Rooms IML-MachineLearning-WG

15:00 → 15:10 Introduction and news ⓘ 10m

Speakers: Lorenzo Moneta (CERN), Markus Stoffe (Imperial College (UK)), Paul Seyfert (CERN), Rüdiger Heide (Fakultät für Physik (DE)), Steven Schwenn (Università di Genova (IT))

[StevenSchwenn...](#)

15:10 → 15:20 ML community white paper path forward ⓘ 10m

Speaker: Dr. Sergei Gleizer (University of Florida (US))

[arXiv link](#) [Authorship details L...](#) [HEPMLCWP_Serg...](#) [Hypothesis \(comm...](#)

15:25 → 15:55 Guiding New Physics Searches with Unsupervised Learning ⓘ 20m

I will describe an approach to search for new phenomena in data, by detecting discrepancies between two datasets. These could be, for example, a simulated standard-model background, and an observed dataset containing a potential hidden signal of New Physics.

I will propose a new statistical test, built upon a test statistic which measures deviations between two samples, using a Nearest Neighbors approach to estimate the local ratio of the density of points.

The test is model-independent and non-parametric, requiring no knowledge of the shape of the underlying distributions, and it does not bin the data, thus retaining full information from the multidimensional feature space.

As a by-product, the technique is also a useful tool to identify regions of interest for further study.

As a proof-of-concept, I will show the power of the method when applied to synthetic Gaussian data, and to a simulated dark matter signal at the LHC.

Speaker: Andrea De Simone (SSSA)

[arXiv 1807.04036](#) [DeSimone.pdf](#) [Recording](#)

16:00 → 16:30 Learning New Physics from a machine ⓘ 20m

We propose using neural networks to detect data departures from a given reference model, with no prior bias on the nature of the new physics responsible for the discrepancy. The model-independent nature of our approach, and its ability to deal with rare signals such as those expected at the LHC, is quantitatively assessed in toy examples.

Speaker: Andrea Wulzer (CERN)

[arXiv 1806.02350](#) [Recording](#) [talk_wulzer.pdf](#)

16:35 → 16:55 Machine learning as an instrument for data unfolding ⓘ 20m

Speaker: Alexander Glazov (Deutsches Elektronen-Synchrotron DESY)

[arXiv 1712.01814](#) [IML_181012.pdf](#) [Recording](#)

- Instead of written minutes we now organise recordings for talks
- (with approval by the speaker, not automatically)
- e.g. last meeting's talks accessible on the indico agenda
- Big thanks to the recording service



Upcoming events

2018-10-31 Data science seminar: Full Event Interpretation at Belle 2

2018-11-30 Next IML meeting (Filtration plant 222/R-001)

open topic: anything ML related that you're working on
that didn't fit topical meetings



Upcoming conferences/workshops

- 2018-11-14 – 2018-11-16 [ML4Jets](#) abstract deadline tomorrow
ML as applied to jet physics
- 2019-01-22 – 2019-01-25 [PHYSTAT-nu](#) abstract deadline tomorrow
statistics, including ML, for neutrino physics
- 2019-03-11 – 2019-03-15 [ACAT](#) abstract deadline 2018-11-20
Empowering the Revolution: Bringing ML to HPC
- 2019-04-02 – 2019-04-05 [Connecting the Dots](#) abstract deadline Sunday
track reconstruction, pattern recognition, and ML with tracks



Today's meeting

IML Machine Learning Working Group: unsupervised searches, part 2

Tuesday 30 Oct 2018, 15:00 → 18:00 Europe/Zurich

500-1-001 - Main Auditorium (CERN)

Videoconference
Rooms

IML-MachineLearning-WG

Join



15:00 → 15:10 Introduction and news

10m

Speakers: Lorenzo Moneta (CERN), Markus Stoye (Imperial College (GB)), Paul Seyfert (CERN), Rudiger Haake (Yale University (US)), Steven Schramm (Universite de Geneve (CH))

15:15 → 15:35 Searching for new physics without knowing the signal model

20m

Speakers: Jeroen Schouwenberg (Nikhef National institute for subatomic physics (NL)), Sascha Caron (Nikhef National institute for subatomic physics (NL)), Simone Amoroso (Deutsches Elektronen-Synchrotron (DE))

15:40 → 16:00 CWoLa hunting

20m

Speakers: Ben Nachman (Lawrence Berkeley National Lab. (US)), Jack Collins (University of Maryland and Johns Hopkins University)

16:05 → 16:25 QCD or What?

20m

arXiv:1808.08979

Speaker: Jennifer Thompson (TTP Heidelberg)

16:30 → 16:50 The Unsupervised Collider Searches DarkMachines Project

20m

Speaker: Amir Farbin (University of Texas at Arlington (US))

16:55 → 17:15 Searching for New Physics with Deep Autoencoders

20m

<https://arxiv.org/abs/1808.08992>

Speaker: David Shih (Rutgers University)



Run 344910
Timestamp: 2015-11-25 11:23:36(UTC)
System: P409
Energy: 0.00 TeV



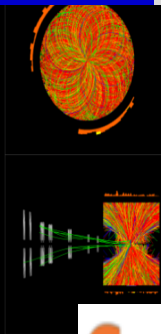
CMS Experiment at LHC, CERN
Data recorded: Wed Nov 25 12:21:51 2015 CET
Run/Event: 262548 / 14592169
Lumi section: 309

SQFT

Event 2598326
Run 168486
Wed, 25 Nov 2015 12:51:53

CEST

first, stable beams heavy-ion collisions

Run 344910
Timestamp: 2015-11-05 11:03:36(UTC)
System: P409
Energy: 0.0 TeVCMS Experiment at LHC, CERN
Data recorded: Wed Nov 25 12:21:51 2015 CET
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CEST

first stable beams heavy-ion collisions

slides (excl. cern logo) will appear on
<https://gitlab.cern.ch/pseyfert/slides-imlnews-2018-10-30>

