

Data Science and Machine Learning Workshop

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Program Introduction

M. Gonzalez-Berges, M. Lonza

Welcome!

Workshop Motivation

The fields of large scale data analytics and machine learning have made impressive progress in recent years. Many applications have been successful in applying techniques in these fields for problems in areas such as health, language processing, search engines, etc. Many tools have been developed to facilitate the application of these techniques (e.g. libraries like Scikit-learn, TensorFlow, Keras, PyTorch, etc or frameworks like Apache Spark, Caffe, etc)

Although some examples exist of applications in scientific installations, there is a feeling that the applicability of modern data science / artificial intelligence tools to monitor & control scientific installations is not fully explored. The workshop is intended to discuss the applicability of modern data science / artificial intelligence tools to monitor & control scientific installations.

Explore applicability of modern data science / artificial intelligence tools to monitor & control scientific installations

The workshop will start in the morning, introductory tutorials to machine learning. In the afternoon, speakers are welcome to share their experience with presentations/demonstrations of solutions that worked or didn't work well. A final discussion will take place on possible next steps.

Correlated topics: data analytics, statistical analysis, data mining, deep learning, neural networks, expert systems, automatic optimization, robotics, etc.

Timetable – Morning I

Welcome	<i>Manuel Gonzalez Berges et al.</i>
<i>Marriott at The Brooklyn Bridge</i>	08:30 - 08:35
Workshop Introduction	<i>Manuel Gonzalez Berges et al.</i>
<i>Marriott at The Brooklyn Bridge</i>	08:35 - 08:45
Machine Learning Introduction	<i>Alfredo Canziani</i>
<i>Marriott at The Brooklyn Bridge</i>	08:45 - 09:15
Tutorial: Classification and Regression with Neural Networks	<i>Alfredo Canziani</i>
<i>Marriott at The Brooklyn Bridge</i>	09:15 - 10:00
Coffee	
<i>Marriott at The Brooklyn Bridge</i>	10:00 - 10:30


Timetable – Morning II

Unsupervised Learning	<i>Alfredo Canziani</i>
<i>Marriott at The Brooklyn Bridge</i>	10:30 - 11:00
Tutorial: Reinforcement Learning	<i>Gianluca Valentino</i>
<i>Marriott at The Brooklyn Bridge</i>	11:00 - 12:15
Lunch	12:15 - 13:30

Timetable – Afternoon I

Harnessing data science for the control of systems	<i>Sandra Biedron</i>
<i>Marriott at The Brooklyn Bridge</i>	13:30 - 13:55
Adaptive Machine Learning for Particle Accelerators	<i>alex scheinker</i>
<i>Marriott at The Brooklyn Bridge</i>	13:55 - 14:10
Surrogate Modelling	<i>Andreas Adelmann</i>
<i>Marriott at The Brooklyn Bridge</i>	14:10 - 14:25
A Brief Overview of Machine Learning at Jefferson Lab	<i>Dr Chris Tennant</i>
<i>Marriott at The Brooklyn Bridge</i>	14:25 - 14:40
New Techniques for Operational Control and Performance Optimization at the Light Source BESSY II	<i>Luis Vera Ramirez</i>
<i>Marriott at The Brooklyn Bridge</i>	14:40 - 14:55
CTLearn: Deep Learning for Gamma-ray Astronomy	<i>Qi Feng</i>
<i>Marriott at The Brooklyn Bridge</i>	14:55 - 15:10
Applications of optimiser and ML algorithms at CERN by the beam transfer, machine operators and IT compute & monitoring groups	<i>Pieter Van Trappen</i>
Coffee	
<i>Marriott at The Brooklyn Bridge</i>	15:30 - 16:00

Timetable – Afternoon II

Machine Learning for Automatic LHC Collimator Alignment <i>Marriott at The Brooklyn Bridge</i>	<i>Gabriella Azzopardi</i> 	16:00 - 16:15
Reinforcement Learning for FEL performance optimization <i>Marriott at The Brooklyn Bridge</i>	<i>Niky Bruchon</i>	16:15 - 16:30
Machine Learning Based Reconfiguration of the BNL ATR Line <i>Marriott at The Brooklyn Bridge</i>	<i>Dr Jonathan Edelen</i>	16:30 - 16:45
Machine Learning for High Energy Photon Source (HEPS) <i>Marriott at The Brooklyn Bridge</i>	<i>Paul Chu</i>	16:45 - 17:00
Wrap-up <i>Marriott at The Brooklyn Bridge</i>		17:00 - 17:15

Meet and Greet

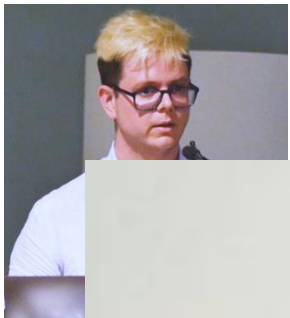
Will take place in Salon A, B, C, D, starting at 6pm-7:30pm (open bar), 6pm-8pm (food) on Sunday, October 6th, 2019.



Morning Tutorials

- ✓ Different ways to follow them:
 - Just as a presentation
 - Doing the tutorial exercises online
 - *Rely on hotel wifi & free hosting services working*
 - Following the tutorials in your computer offline.
 - *Jupyter notebooks + Python installed*

Supervised and Unsupervised Machine Learning



Alfredo Canziani

Alfredo Canziani is a Post-Doctoral Deep Learning Research Scientist and Lecturer at NYU Courant Institute of Mathematical Sciences, under the supervision of professors KyungHyun Cho and Yann LeCun. His research mainly focusses on Machine Learning for Autonomous Driving. Alfredo obtained both his Bachelor (2009) and Master (2011) degrees in Electrical Engineering cum laude at Trieste University, his MSc (2012) at Cranfield University (UK), and his PhD (2017) at Purdue University (USA).

Reinforcement Learning



Gianluca Valentino

Dr. Gianluca Valentino is a lecturer with the Department of Communications and Computer Engineering at the University of Malta, where he teaches in machine learning and pattern recognition. He is involved in several research projects which involve the application of these techniques in various domains, from particle accelerators to earth observation, aerospace and financial data. He spent six years with the Beams department at CERN, first as a PhD student working to automate the collimator beam-based alignment procedure, and then as a postdoctoral fellow. He is currently a Visiting Scientist at CERN.

attender

Definitions of attender

1.

n a person who is present and participates in a meeting

"he was a regular attender at department meetings"

Synonyms: [attendant](#), [attende](#), [meeter](#)

Types: [conventioneer](#)
someone who attends a convention

[partygoer](#)
someone who is attending a party

[symposiast](#)
someone who participates in a symposium

Type of: [participant](#)
someone who takes part in an activity

n someone who listens attentively

Synonyms: [auditor](#), [hearer](#), [listener](#)

Types: [eavesdropper](#)
a secret listener to private conversations

[phone tapper](#), [tapper](#), [wiretapper](#)
someone who wiretaps a telephone or telegraph wire

Type of: [beholder](#), [observer](#), [perceiver](#), [percipient](#)
a person who becomes aware (of things or events) through the senses



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