
Ulysseus Research Workshop on Mathematics in Machine Learning

Virtual Event

5th December 2024

11:00 – 14:00 (CET)



BACKGROUND

Novel conceptual approaches in Machine Learning (ML) and Big Data Analytics require increasingly demanding and diverse mathematical apparatus. Statistics and optimization are two mathematical fields that provided theoretical framework for ML from its beginnings. Previous decades witnessed a growing significance of various mathematical theories that have previously been almost invisible in ML. These include Riemannian geometry, Lie group theory, game theory, control theory, information theory and others.

Recent trends emphasize the necessity for systematic and theoretically sound approaches based on mathematical rigor and imagination. Creating the synergy between various research groups working in mathematics and computer science is one of the primary challenges.

WORKSHOP AIMS

The workshop on mathematics in ML is primarily a networking event to gather relevant Ulysseus researchers, present their current research and discuss potential further steps for collaboration.

The main goals may be substantiated in the following three points:

- **Widening horizons of researchers** through the exchange of information.
- **Identification of potential for collaborations** within the network and with non-academic sector.
- **Examining potential for joint applications** and exchange of master and PhD students and creation of a Ulysseus research group.

MEETING VENUE

Date: 5th of December 2024
Time: 11:00 (CET)

Zoom platform

<https://us06web.zoom.us/j/86127722213?pwd=TgU6wqg2tznh3yrTraDnUBx6l3Dgif.1>

Meeting ID: 861 2772 2213
Passcode: 5te5G6

PROGRAMME

Thursday, 5th of December 2024

11:00 – 11:10 | Welcome and Introduction

- *Opening remarks and welcome by the workshop initiator, prof. dr. Vladimir Jaćimović, University of Montenegro*
- *Brief overview of the agenda and goals of the workshop*
- *Introduction to the speakers and their topics*

11:10 – 11:30 | Speaker 1: PhD Cesare Molinari, Postdoc researcher, University of Genova

- ***Topic:** Optimization for machine learning*

11:30 – 11:50 | Speaker 2: PhD Samuel Vaiter, Research Scientist, Université Côte d'Azur

- ***Topic:** Successes and pitfalls of bilevel optimization in machine learning*

11:50 – 12:10 | Speaker 3: Hendrik Kleikamp, PhD student, University of Münster

- ***Topic:** Certified machine learning for model order reduction of parametrized problems*

12:10 – 12:30 | Speaker 4: prof. dr. Vladimir Jaćimović

- ***Topic:** Non-Euclidean data and geometric machine learning*

12:30 – 13:15 | Round Table Discussion

- *Facilitated discussion with all speakers and presenters*
- *Open floor for participant questions and shared insights*

13:15 – 13.30 | Katarína Valentová, Ulysseus research deputy coordinator, Technical University of Košice

- ***Topic:** Presentation on the formation of reserach groups within Ulysseus and other forms of research collaboration*

13:30 – 13.45 | Branka Žižić, project manager,
University of Montenegro

- *Topic: Presentation on mobility and project collaborations within Ulysseus*

13:45 – 14:00 | **Closing Remarks**

- *Summary of key points from the workshop*
- *Next steps and upcoming events*
- *Thank you and farewell*



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