Summer school

"AI & Data for Science, Business and Society"

July 8-10, 2021

Hi! PARIS is pleased to propose its first summer school on July 8-10, 2021.

Hi! PARIS is the new Center on Data Analytics and Artificial Intelligence for Science, Business and Society created in the framework of the Institut Polytechnique de Paris (IP Paris) and HEC Paris Alliance.

The Hi! PARIS Summer School 2021 on AI & Data for Science, Business and Society covers a wide range of topics in Artificial Intelligence and Data Science from a variety of perspectives. This summer school offers courses that range from introduction to deep learning with Keras and Tensorflow to Machine Learning in Asset Management, Data Visualization, Stochastic Optimization and Federated Learning. These courses, initially **designed for our students** (PhD tracks, final year PhD students and doctoral students), should also be of **interest to academics and research engineers from HEC and IP PARIS** schools who want to expand their knowledge in the field of AI and data science

The Hi! PARIS Summer School will be an **hybrid event to be held at Telecom Paris, Palaiseau**.

Provisional program

Thursday, July 8

08:00 – 08:30 Welcome coffee

08:30 – 09:00 **Inauguration**

09:00 – 10:45 **Industry Panel: Opportunities and Challenges with AI and Data Science** with Hi! PARIS Corporate Donors representatives

10:45 – 11:00 Coffee Break

11:00 – 12:30 **Tutorial***

Tutorial 1A _ Part 1	Tutorial 1B _ Part 1
Machine Learning in Asset Management **Hugues Langlois** Associate Professor of Finances at HEC Paris	**Federated Learning** **Aurélien Bellet** Machine learning researcher at Inria Lille

12:30 – 13:30 Lunch Break

13:30 – 15:00 **Tutorial**

Tutorial 1A _ Part 2	Tutorial 1B _ Part 2
Machine Learning in Asset Management **Hugues Langlois**	**Federated Learning** **Aurélien Bellet**

15:00 – 15:30 Coffee Break

15:30 – 16:30 **Keynote**

Virtual and Augmented Reality: Advancing Research in Consumer Marketing

Michel Wedel, University of Maryland, Distinguished University Professor and PepsiCo Chair in Consumer Science

16:30 – 17:30 **Social time**

17:30 – 18:30 Closing Cocktail

* The tutorials are organized in two parallel tracks: Track A "Data Science for Business and Society" and Track B "Theory and methods of IA".

Friday, July 9

08:00 – 08:30 Welcome coffee

08:30 – 10:00 Tutorial

Tutorial 2A _ Part 1	Tutorial 2B _ Part 1
Image Recognition Using Deep-Learning: Implementation and Application **Mitali Banerjee** Professor of Strategy and Business Policy at HEC Paris	**Stochastic Optimization** **Aymeric Dieuleveut** Assistant Professor at Ecole Polytechnique

10:00 – 10:30 Coffee Break

10:30 – 12:00 Tutorial

Tutorial 2A _ Part 2	Tutorial 2B _ Part 2
Image Recognition Using Deep-Learning: Implementation and Application **Mitali Banerjee**	**Stochastic Optimization** **Aymeric Dieuleveut**

12:00 – 13:00 Lunch Break

13:00 – 14:30 Tutorial

Tutorial 3A _ Part 1	Tutorial 3B _ Part 1
How Humans Judge Machines **Cesar Hidalgo** Director, Center for Collective Learning, ANITI, University of Toulouse	**Deep learning with tensorflow** **Edouard Oyallon** Researcher at CNRS, LIP6

14:30 – 15:00 Coffee Break

15:00 – 16:30 Tutorial

Tutorial 3A _ Part 2	Tutorial 3B _ Part 2
How Humans Judge Machines **Cesar Hidalgo**	**Deep learning with tensorflow** **Michaël Allouche** PhD student in Applied Mathematics - Machine Learning at Ecole Polytechnique

16:30 – 17:30 Poster session (online)

17:30 – 18:30 Closing Cocktail

Saturday, July 10

08:00 – 08:30 Welcome coffee

08:30 – 10:00 Tutorial

Tutorial 4A _ Part 1	Tutorial 4B _ Part 1
People Analytics : HR Management and Data **Federica De Stefano** Assistant Professor of Management and Human Resources at HEC Paris	**Sequential Learning** **Claire Vernade** Research Scientist at DeepMind in London, UK

10:00 – 10:30 Coffee Break

10:30 – 12:00 Tutorial

Tutorial 4A _ Part 2	Tutorial 4B _ Part 2
People Analytics : HR Management and Data **Federica De Stefano**	**Sequential Learning** **Claire Vernade**

12:00 – 13:00 Lunch Break

13:00 – 15:00 Academic Round Table: Human AI Interaction

15:00 – 15:30 Coffee Break

15:30 – 16:30 Social Time

16:30 – 17:30 Keynote

Climate Informatics: Machine Learning for the Study of Climate Change

Claire Monteleoni, Associate Professor, and the Associate Chair for Inclusive Excellence, in the Departement of Computer Science at the University of Colorado Boulder

17:30 – 17:45 Closing Session

Sessions description

For more details on the speakers: https://www.summerschool.hi-paris.fr/list-of-speakers/

Keynotes

Keynote 1 - Virtual and Augmented Reality: Advancing Research in Consumer Marketing

Speaker: Michel WEDEL
Abstract: In this presentation I review developments in VR/AR applications and research in the area of consumer marketing. I outline a conceptual framework for VR/AR research in consumer marketing that centers around consumer experiences provided by VR/AR applications along the customer journey and the effectiveness of such applications. I will discuss the key concepts and components of the framework and provide an overview of VR/AR applications in practice and extant research on VR/AR in consumer marketing. Based on this framework, I offer an outlook for future developments of VR/AR technologies and applications, discuss managerial implications, and prescribe directions for research on consumer marketing.

Keynote 2 - Climate Informatics: Machine Learning for the Study of Climate Change

Speaker: Clara MONTELEONI
Abstract: Despite the scientific consensus on climate change, drastic uncertainties remain. Crucial questions about regional climate trends, changes in extreme events, such as heat waves and mega-storms, and understanding how climate varied in the distant past, must be answered in order to improve predictions, assess impacts and vulnerability, and inform mitigation and sustainable adaptation strategies. Machine learning can help answer such questions and shed light on climate change. I will give an overview of our climate informatics research, focusing on challenges in learning from spatiotemporal data, along with semi- and unsupervised deep learning approaches to studying rare and extreme events, and precipitation and temperature downscaling.

Tutorials

The tutorials are organized in two parallel tracks:

- Track A “Data Science for Business and Society”
- Track B “Theory and methods of IA”.

Tutorial 1A - Machine Learning in Asset Management

Speaker: Hugues LANGLOIS
Abstract: Can machine learning algorithms be blindly applied to financial data? Which methods should be used to form an investment strategy? How does machine learning compare to financial econometrics? Can data be harvested to build profitable investment strategies? This course presents an overview of state-of-the-art techniques for financial applications, including forecasting expected investment returns, risk measures, and optimal portfolio allocations. The emphasis will be on methods that accommodate a large number of variables. We expose students to recent results in the fields of asset pricing, risk management, and portfolio choice with one specific objective: designing better-performing investment strategies.

Tutorial 1B - Introduction to Federated Learning

Speaker: Aurélien BELLET
Abstract: Federated learning (FL) is a machine learning paradigm where many clients (e.g. mobile devices or whole organizations) collaboratively train model while keeping their data decentralized. FL embodies the principals of focused data collection and minimization, and can mitigate many of the systematic privacy risks and costs resulting from traditional, centralized machine learning and data science approaches. In this talk, I will introduce various settings which fall under the umbrella of FL, review a few standard algorithms and discuss some recent work and open problems.

Tutorial 2A - Image Recognition Using Deep-Learning: Implementation and Application

Speaker: Mitali BANERJEE
Abstract: This 3-hour course will offer a brief hands-on introduction to deep-learning based image recognition tools. Participants will gain familiarity with preparing and importing images into software (python) and applying one of the foundational deep learning architectures to classify the images and create vector representations. We will discuss different applications of the output of deep learning tools to extract managerial and scientific insights. In particular, we will discuss applications of these tools to creating large-scale measures that have otherwise proven elusive or susceptible to bias.

Tutorial 2B - Stochastic Optimization

Speaker: Aymeric DIEULEVEUT
Abstract: The purpose of this course is to give an introduction to stochastic convex optimization and its applications in statistical learning. In the first part, we will recall the importance of convex optimization in statistical learning. On this occasion, we will briefly introduce some useful results on convex analysis. We will then analyze the gradient algorithms for strongly convex and then convex smooth functions. We will take this opportunity to establish some results of complexity lower bound for such problems. We will see on this occasion that the gradient algorithm does not reach the optimal speed and show a strategy for accelerating the gradient algorithms to get optimal speeds. In the second part, we will look at stochastic versions of these algorithms, providing convergence rates and proofs, and also describe variance reduced algorithms. **Requirements:** A good knowledge of the fundamental tools of calculus and linear algebra, as well as the probabilistic tools (random variables, conditional expectation, σ-algebra).

Tutorial 3A - How Humans Judge Machines

Speaker: Cesar HIDALGO
Abstract: How would you feel about losing your job to a machine? How about a tsunami alert system that fails? Would you react differently to acts of discrimination performed by a machine or a human? How about public surveillance? How Humans Judge Machines compares people's reactions to actions performed by humans and machines. Using data collected in dozens of experiments, this book reveals the biases that permeate human machine interactions. Are there conditions in which we judge machines unfairly? Is our judgment of machines affected by the moral dimensions of a scenario? Is our judgment of machines correlated with demographic factors, such as education or gender? Hidalgo and colleagues use hard science to take on these pressing technological questions. Using randomized experiments, they create revealing counterfactuals and build statistical models to explain how people judge A.I., and whether we do it fairly or not. Through original research, they bring us one step closer to understanding the ethical consequences of artificial intelligence.
The book "How Humans Judge Machines" can be read for free at https://www.judgingmachines.com/ (in print with MIT Press).

Tutorial 3B - Deep learning with tensorflow

Speaker: Edouard OYALLON and Michaël ALLOUCHE
Abstract: Since 2012, deep neural networks have led to outstanding results in various applications, literally exceeding any previously existing methods, in texts, images, sounds, videos, graphs... They consist of a cascade of parametrized linear and non-linear operators whose parameters are optimized to achieve a fixed task. This tutorial will first propose a brief introduction to the solved problems and how to design such neural networks. In a second step, notebooks will be proposed in tensorflow/keras.

Tutorial 4A - People Analytics: HR Management and Data

Speaker: Frederica DE STEFANO
Abstract: This tutorial examines how to use data analytics to manage people inside organizations. While people represent a strategic resource for organizations evaluations are often based on intuition, stereotypes, and internal politics, rather than informed by data. In the past decade “people analytics”, which is the use of data to understand people behaviors inside organizations, has been revolutionizing HR management around the world and promoting evidence-based HR practices. In this tutorial, we will analyze this new approach to people management and focus on how people analytics can support decisions.

Tutorial 4B - Sequential Learning

Speaker: Claire VERNADE
Abstract: Sequential learning addresses the problem of allocating resources under cost constraints, and sometimes lack of information. This class of problems is ubiquitous for instance in machine learning, operations research or econometrics. In particular, it is at the heart of Reinforcement Learning (RL), a learning paradigm where the agent learns via trial-and-error. In fact, a key difficulty for the learner is to decide how to explore the space of actions while trying to maximize a certain reward metric, thus facing an exploration-versus-exploitation trade-off.

Social Time

Social time is an opportunity for participants in the summer school to interact with others. For the participants who are attending the event physically can chat with others over a real cup of coffee. Virtual attendees can interact with other participants and professors in the "Hi! PARIS Summer School Space in Gather Town", which offers space for attendees to move around in our virtual premises, chat on private tables or view posters being presented in the summer school. Attendees can even fix up a prior meeting appointment and meet up in the Gather Town to discuss research ideas !