AI for Sustainability

Friday 01 October 2021, 15:50 to 18:00.

This third webinar will focus on illustrations of ongoing research at Hi! PARIS related to the development of AI solutions for sustainability. These solutions aim at accelerating global efforts to protect the environment, reduce energy consumption, make optimal inventory decisions and avoid massive waste. Philippe Drobinski (Ecole Polytechnique) will discuss models and data to understand and predict climate change. Peter Tankov (ENSAE) will describe a game theoretical model for the industry dynamics in the electricity market. Then Julien Grand-Clément (HEC) will highlight the use of Markovian decision processes to learn triage and reassessment guidelines for ventilator allocations to patients affected by Sars-Cov-2.

Following their presentations, our researchers will be joined by experts in AI and machine learning to answer questions and spell out challenges related to the use of AI for sustainability. Hervé Dumas (sustainable AI director at L'OREAL group) will highlight L'OREAL initiatives toward sustainability. Charles Ollion (Surfrider Foundation Europe & Ecole Polytechnique) will set the focus on Plastic Origins, a new program based on computer vision to monitor inland plastic pollution. Finally, Paul Benoît (CEO at Qarnot) will discuss how green cloud computing services can help provide sustainable AI solutions.

15.50-17.00 – ILLUSTRATIONS OF RESEARCH AT Hi! PARIS

15.50-15.55 — Fresh Hi! PARIS news.

15.55-16.15 — Illustration 1:
Philippe Drobinski - Ecole Polytechnique
CNRS Senior scientist & Director of Energy4Climate

Title: Weather and climate: data to describe, understand and predict

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16.15-16.35 — Illustration 2:
Julien Grand-Clément - HEC
Assistant Professor in the Informations System and Operations Management department

Title: Interpretable Machine Learning: Application To Triage And Reassessment Guidelines For Ventilator Rationing

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16.35-16.55 — Illustration 3:
Peter Tankov - ENSAE
Professor, scientific director of the Green and Sustainable Finance Research Program (Louis Bachelier Institute)

Title: Game theoretical models for energy transition

17:00 – 18:00 – PANEL DISCUSSION

Questions from attendees will be asked to all speakers and several expert panelists:

- **Paul Benoît**
  CEO @ Qarnot
- **Hervé Dumas**
  Sustainable IT director @ L'OREAL Group
- **Charles Ollion**
  Plastic pollution expert @ Surfrider Foundation Europe

ABSTRACTS OF RESEARCH ILLUSTRATIONS

Title: Game theoretical models for energy transition

Presenter: Peter Tankov

We develop a game theoretical model for the industry dynamics in the electricity market in the context of energy transition. In our model, there are several types of agents generating electricity from conventional and renewable sources. The renewable producers choose the optimal moment to build new renewable plants, while the conventional producers choose the optimal moment to close down the plant and exit the market. The agents interact through the market price, determined by matching the aggregate supply of the two types of producers with an exogenous demand function. Using the theory of mean-field games, that is, symmetric games with a large number of agents, we prove the existence of a Nash equilibrium and the uniqueness of the equilibrium price process. An empirical example, inspired by the UK electricity market is presented.

Title: Interpretable Machine Learning: Application To Triage And Reassessment Guidelines For Ventilator Rationing

Presenter: Julien Grand-Clément

Algorithms for sequential decision-making in healthcare often suffer from a lack of interpretability. Decision trees have gained interest in recent years, due to their performances and their interpretability. We focus on computing Markovian policies that have a tree structure, called tree policies. We characterize the properties of optimal tree policies in the case of finite-horizon Markov model and show that optimal policies may be history-dependent but can be chosen deterministic. We introduce an algorithm to compute a Markovian tree policy. We apply our model to learn triage and reassessment guidelines for ventilator allocations to patients affected by Sars-Cov-2. Our tree policies improve upon First-Come-First-Served guidelines and New York State guidelines by reducing the number of excess deaths associated with various hypothetical levels of ventilator shortage.

Title: Weather and climate: data to describe, understand and predict

Presenter: Philippe Drobinski

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