

## 2 PORTFOLIO INTRODUCTION : DATA SCIENCE TEAM

The portfolio of the Data Science team is composed of 4 papers, at least one per project to demonstrate the quality of our research work, and a serie of *Ex-Machina* podcasts:

- The paper entitled *Online certification of preference-based fairness for personalized recommender systems* received the Outstanding Paper Award in AAAI 2022. Online platforms are facing an increased public scrutiny and stronger regulations on how recommendations are delivered to different users. This paper introduces a new framework for user-side fairness in recommender systems based on the envy-freeness and proposes a new auditing algorithm which is sample efficient and with theoretical guarantee.
- The interaction between Machine Learning and Physics constitutes a new and important research trend with promising perspectives. As an illustration, the paper [?] entitled *A Dynamical System Perspective for Lipschitz Neural Networks* published at ICML 2022 build upon the analogy between Dynamical Systems and the inference in Deep Neural Networks. The idea is to design a stable architecture for Deep Network by drawing inspiration from continuous dynamical systems and their discretization schemes.
- The paper entitled *Witness generation for json schema* [64] published at VLDB 2022 presents an original sound and complete algorithm for checking the satisfiability of an input schema, generating a witness when the schema is satisfiable. While the problem was proven to be EXPTIME-complete, this work is the first to explicitly describe an algorithm that has the potential to work in reasonable time over schemas of realistic size.
- The paper entitled *Discovering and Analyzing Contextual Behavioral Patterns From Event Logs* [65] published in TKDE 2022 presents an original approach to discover contextual behavior patterns and to analyse causal relations between context information and the patterns. The work has been done in the context of a PhD thesis and in collaboration with Humboldt University of Berlin.
- Four members of the team were involved in the podcast *Ex-Machina* created by *Dauphine Numérique*. This podcast develops a scientific discussion between researchers from Dauphine Université about the impact of AI and algorithm on our lives, the society and the future. After a first season with more than 10 000 listeners, the awarded podcast has started a second season. We participated to the following programs:
  - Ethics and algorithm: How to keep the control on AI systems (Éthique des algorithmes : comment garder la main sur les IA ? janvier 2023);
  - AI and History (L'IA, quelle Histoire! novembre 2022);
  - Art & AI : Robots, "draw me a sheep" (Art & IA : Robot, dessine-moi un mouton octobre 2022);
  - Algorithms get the power, what is the impact of the democracy ? with a member of the Decision Aiding team (Les algorithmes au pouvoir - Numérique, information et démocratie décembre 2021);
  - AI : the humans workers behind the machines ? (IA : qui sont les humains derrière la machine ? octobre 2021)