

Pierre Perrault

Machine Learning Researcher

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Research Interests

Deep Learning, Computer Vision
Reinforcement learning, Bandit Algorithms
Combinatorial Optimization

Work Experience

- 2020 - Now **Deep learning research engineer**, Idemia, Courbevoie
Team: Video analytics, object detection & tracking.
- 2019 **Research scientist intern**, Adobe, San Jose, California
Supervised by Jennifer Healey & Zheng Wen.
- 2017 **Research intern (master thesis)**, CMLA - ENS Paris-Saclay
Supervised by Vianney Perchet.
- 2015 **Research intern**, University of Warwick, Coventry, UK
Supervised by Vadim Lozin.
- 2014 **Research intern**, MAPMO, Orléans
Supervised by Romain Abraham.

Education

- 2017 - 2020 **PhD, applied mathematics**, INRIA Lille, SequeL team & ENS Paris-Saclay
Title: Efficient Learning in Stochastic Combinatorial Semi-Bandits.
Supervised by Michal Valko (DeepMind) & Vianney Perchet (Criteo AI Lab).
- 2016 - 2017 **MSc, MVA (mathematics, computer vision, machine learning)**, ENS Paris-Saclay
- 2015 - 2016 **Agrégation externe (rank: 37/300) & high-level teaching degree**, ENS Paris-Saclay
- 2015 - 2017 **Élève normalien**, ENS Paris-Saclay
- 2013 - 2014 **BSc & first year graduate study, fundamental mathematics**, ENS Rennes
- 2011 - 2013 **Classe préparatoire aux grandes écoles (CPGE), MPSI - MP**, Lycée Pothier d'Orléans

Publications

- 2023
 - Daniil Tiapkin, Denis Belomestny, Daniele Calandriello, Eric Moulines, Remi Munos, Alexey Naumov, **Pierre Perrault**, Michal Valko, Pierre Menard, *Model-free Posterior Sampling via Learning Rate Randomization*, submitted
 - Daniil Tiapkin, Denis Belomestny, Daniele Calandriello, Eric Moulines, Remi Munos, Alexey Naumov, **Pierre Perrault**, Yunhao Tang, Michal Valko, Pierre Menard, *Fast Rates for Maximum Entropy Exploration*, ICML 2023
- 2022
 - **Pierre Perrault**, *When Combinatorial Thompson Sampling meets Approximation Regret*, NeurIPS 2022
- 2021
 - Xavier Fontaine, **Pierre Perrault**, Vianney Perchet, Michal Valko, *Online A-Optimal Design and Active Linear Regression*, ICML 2021
 - **Pierre Perrault**, Jennifer Healey, Zheng Wen, Michal Valko, *On the Approximation Relationship between Optimizing Ratio of Submodular (RS) and Difference of Submodular (DS) Functions*, Preprint
- 2020
 - **Pierre Perrault**, Etienne Boursier, Vianney Perchet, Michal Valko, *Statistical Efficiency of Thompson Sampling for Combinatorial Semi-Bandits*, NeurIPS 2020
 - **Pierre Perrault**, Jennifer Healey, Zheng Wen, Michal Valko, *Budgeted Online Influence Maximization*, ICML 2020
 - **Pierre Perrault**, Vianney Perchet, Michal Valko, *Covariance-adapting algorithm for semi-bandits with application to sparse outcomes*, COLT 2020

- 2019 ○ **Pierre Perrault**, Vianney Perchet, Michal Valko, *Exploiting Structure of Uncertainty for Efficient Matroid Semi-Bandits*, ICML 2019
- **Pierre Perrault**, Vianney Perchet, Michal Valko, *Finding the Bandit in a Graph: Sequential Search-and-Stop*, AISTATS 2019

Service Activities

- 2018 - Now **Reviewer** NeurIPS, ICML, COLT, ALT, AISTATS
- 2023 Member of IDEMIA's Technical Expert Network
- 2023 **Organizing co-chair** Idemia AI workshop
- 2018 **Program committee** EWRL

Talks

- 2023 ○ *Leveraging GANs for Self-Supervised Pretraining*, Idemia AI workshop, Courbevoie
- *Detecting forbidden trajectories for road safety*, Idemia data challenge, Courbevoie
- 2022 ○ *When Combinatorial Thompson Sampling meets Approximation Regret*, NeurIPS
- *Few-Shot Learning for Computer Vision Applications*, Idemia AI workshop, Courbevoie
- 2021 ○ *Crowd counting and localization*, Idemia, Courbevoie
- *Self-supervised representation learning from videos*, Idemia AI workshop, Courbevoie
- 2020 ○ *Efficient Learning in Stochastic Combinatorial Semi-Bandits*, Thesis defense
- *Statistical Efficiency of Thompson Sampling for Combinatorial Semi-Bandits*, NeurIPS
- *Budgeted Online Influence Maximization*, ICML and Adobe, San José, USA
- *Covariance-adapting algorithm for semi-bandits with application to sparse outcomes*, COLT
- *Multivariate first-order stochastic dominance*, ENS Machine Learning seminar
- 2019 ○ *Sensor Based Recommendation Engine for Digital Signage*, Adobe, San José
- *Stochastic combinatorial bandits*, CMLA Machine Learning seminar, ENS Paris-Saclay
- *Exploiting Structure of Uncertainty for Efficient Matroid Semi-Bandits*, ICML
- 2018 ○ *Expanding searches on trees and MAB*, Sequel seminar, Inria Lille
- *Stochastic multi-arm bandit problem and some extensions*, Lambda seminar, Université de Bordeaux

Patents

- 2023 ○ Siwar Mhadhbi, **Pierre Perrault**, *Enhancing Instance Separation with Voronoï Diagram for Crowd Localization*, Idemia IDENTITY & SECURITY, submitted
- **Pierre Perrault**, Wassim Bouatay, Samuel Asserpe, *Tracking of high speed vehicles*, Idemia IDENTITY & SECURITY, filed 31/03/2023
- 2022 ○ **Pierre Perrault**, *Estimation of vehicle 3D bounding boxes*, Idemia IDENTITY & SECURITY, filed 14/04/2022
- **Pierre Perrault**, Dora Csillag, Stéphane Gentric, *Method for detecting interactions between several elements of interest*, Idemia IDENTITY & SECURITY, filed 07/02/2022
- 2021 ○ **Pierre Perrault**, *Method for determining 3D coordinates of a keypoint according to its image coordinates*, Idemia IDENTITY & SECURITY, filed 18/11/2021
- **Pierre Perrault**, *Method for determining the calibration parameters of a camera*, Idemia IDENTITY & SECURITY, filed 04/11/2021

Teaching

- 2020 - Now **External lecturer - MSc level**, Télécom Paris & UPMC
 - *Occlusions & synthetic data in scene understanding*.
 - *Deep learning for object detection and tracking*.
 - *Face recognition*.
- 2017 - 2020 **Teaching assistant**, ENS Paris-Saclay
 - *Graphs in machine learning (MSc MVA, reference: Michal Valko)*.
 - *Functional analysis, differential calculus, optimization, numerical analysis for differential equations (Agrégation level, reference: Frédéric Pascal)*.
 - *Fourier analysis (graduate level, reference: Arthur Leclaire)*.

- 2014 - 2016 **CPGE examiner**, Lycée Chaptal (Paris), Chateaubriand and Joliot-Curie (Rennes)
- o *Mathematics.*
 - o *Computer science.*

Students and mentoring

- 2023 **Haileleul Zeyede Haile**, Intern at Idemia, Student at Télécom Paris/Institut Polytechnique de Paris & M2 Data Science and Artificial Intelligence
End-to-end multi-object tracking.
- 2022 **Siwar Mhadhbi**, Intern at Idemia, Student at Télécom Paris & M2 MVA
Crowd counting & localization.
- 2021 - Now **Drazic Martin**, Apprentice at Idemia, Student at ECE
Synthetic data generation for road safety & public space scenes.
- 2022 - 2023 **Wenjie Guoduthoit, Peter Harfouche, Joffrey Ma**, Bachelor year-long project at Idemia, Students at Télécom Paris
Abandoned bag alerting with 3D keypoints.
- 2021 - 2022 **Anthony Kobanda, Guillaume Loranchet, Flavien Vidal**, Bachelor year-long project at Idemia, Students at École polytechnique
Video action recognition based on 3D keypoints.

Skills

- Machine Learning Deep Learning, computer vision, GANs, (3D) video analysis, face recognition, biometric quality, adversarial attacks, fairness, explainability, reinforcement learning, bandit algorithms, recommender systems, natural language processing, semi/self-supervised learning, sequential learning, combinatorial optimization, graph-based methods, approximation algorithms.
- Code Python (PyTorch, TensorFlow, Keras, Scikit-Learn, OpenCV, Pandas, ONNX), C++.
- Languages French (mothertongue), english (fluent).