UCLouvain
Institute of Information and Communication Technologies, Electronics and Applied Mathematics

icteam

Call for postdoctoral researchers

We are looking for two excellent postdoctoral researchers to join us at the department of Mathematical Engineering, UCLouvain (Belgium) in the ongoing project

"Learning from Pairwise Comparisons"
(https://sites.uclouvain.be/learning_from_pairwise_comparisons/).

The positions can be filled immediately, and the project ends at the end of 2022 (subsequent opportunities to be discussed).

Project: The ***Learning from Pairwise Comparisons*** project focuses on learning problems in which a set of values have to be learned based on noisy information about pairs of these values (e.g. their ratio, product), a framework that applies to large classes of problems including for example

- Recovering weights from comparison results in a Bradley-Terry-Luce model, with applications as diverse as modelling customer preferences, online advertisement, ranking quality of sport teams or evaluating patient reaction to medications
- Determining experts' abilities without knowing the ground truth of their actions
- General rank-1 matrix completion with perturbed data.

The project involves a collaboration with teams at Boston University and is funded by the Fund for Scientific Research (FRS-FNRS).

Objective and approach: We aim at developing ***generic ultra-rapid (near-linear) algorithms with minimax optimality guarantees*** for these learning problems. The project builds on preliminary works in which we re-formulated these problems as weighted least-square systems that are linear in the estimates but highly non-linear in the data (these works were published in ICML and AISTATS [1,2,3]). The data can be represented by a weighted graph in which two variables are connected when information on that pair is available, and this graph plays a major role both in the analysis of the algorithm and in the development of minimax lower bounds.
Possible objectives include

- The development of online versions of these methods continuously incorporating new data,
- The optimized selection of data to be queried, either a priori or in an online fashion, which is expected to be related to the graph properties,
- The incorporation of prior information while keeping the algorithm efficiency.

Candidates: Ideal candidates have an expertise in at least one of the following fields: Machine Learning, Graphs and Networks, Probabilities, Online Learning, Optimization, Information Theory, and should be curious of new techniques.

Timing: The position can be filled immediately. The project ends on Dec 31st 2022. (subsequent opportunities to be discussed)

Conditions: Stipend of 2550-2727€/month free of tax. Benefits include free public transportation for the commute and coverage by the Belgian Healthcare System. Funding is available for conferences and travels in the context of collaborations.

Environment: UCLouvain is one of the oldest universities in Europe, with its main campus is located in Louvain-la-Neuve, close to Brussels, Belgium.
The Institute of Information and Communication Technologies, Electronics and Applied Mathematics (ICTEAM), hosts more than 40 professors and 200 researchers, and carries out both basic and applied research in key fields of information and communication technologies, electronics, computer science and applied mathematics. Its members teach in the Ecole Polytechnique de Louvain.
You will be joining a team of currently 8 researchers, including one postdoc working on the project.

How to apply: Send an email with title "[Postdoc Pairwise]" to Julien Hendrickx (julien.hendrickx@uclouvain.be), containing a CV, list of publications, and the name of at least two referees.

If you have any question, please contact us at julien.hendrickx@uclouvain.be.

Links
PI: Julien Hendrickx: https://perso.uclouvain.be/julien.hendrickx/
Project: https://sites.uclouvain.be/learning_from_pairwise_comparisons/
ICTEAM/INMA: https://uclouvain.be/en/research-institutes/icteam/inma
Ecole Polytechnique de Louvain (EPL) : https://uclouvain.be/en/faculties/epl
UCLouvain: https://uclouvain.be/fr/index.html
F.R.S-FNRS (fund for scientific research): https://www.frs-fnrs.be
Louvain-la-Neuve : https://en.tourisme-olln.be/

References
1. Julien Hendrickx and Alex Olshevsky: "Minimax rank-1 matrix factorization", In Proceedings of AISTATS, the International Conference on Artificial Intelligence and Statistics (AISTATS2020), 2020.
2. Julien Hendrickx, Alex Olshevsky, and Venkatesh Saligrama: "Graph resistance and learning from pairwise comparisons", In Thirty-sixth International Conference on Machine Learning (ICML2019), 2019.
3. Julien Hendrickx, Alex Olshevsky, and Venkatesh Saligrama: "Minimax rate for learning from pairwise comparisons in the BTL model", In Thirty-seventh International Conference on Machine Learning (ICML2020), 2020.