PhD in applied mathematics and/or economics:

"Multi-agent simulations of climate negotiations"

Workplace: Centre d'Économie de la Sorbonne, Maison des Sciences Économiques, Boulevard de l'Hôpital, PARIS
Type of Contract: PhD Student contract
Contract Period: 36 months
Start date of the thesis: 1 October 2024
Proportion of work: Full time
Remuneration: 2 135,00 € gross monthly

Description of the thesis topic

The PhD project will be part of IA-CollDecisions project, funded by MITI-CNRS. The thesis topic is "Multi-agent simulations of climate negotiations" and should focus on developing numerical models of multi-level climate negotiations and deliberation. The PhD candidate can decide to explore and study some of the following paths: (1) develop multi-level agent based models to understand how country-level and global negotiations and opinion dynamics interact; (2) couple an Agent-Based Model of climate negotiation and an Integrated-Assessment Model of the climate and the economy (for instance in the context of the Challenge AI for Global Climate Cooperation *https://www.ai4climatecoop.org/)*; (3) better calibrate and ground empirically those models using AI tools to analyze the dynamics of negotiations and/or opinions in the context of climate change.

References

[1] Balint, T., Lamperti, F., Mandel, A., Napoletano, M., Roventini, A., Sapio, A. (2017) Complexity and the Economics of Climate Change: A Survey and a Look Forward. *Ecological Economics* 138

[2] AI4ClimateCooperation: https://www.ai4climatecoop.org/

[3] He S., Kilgour D.M., Hipel K.W. (2017) A general hierarchical graph model for conflict resolution with application to greenhouse gas emission disputes between USA and China. European Journal of Operational Research 257(3): 919-932

[4] Zhang, Tianyu and Williams, Andrew and Phade, Soham and Srinivasa, Sunil and Zhang, Yang and Gupta, Prateek and Bengio, Yoshua and Zheng, Stephan, AI for Global Climate Cooperation: Modeling Global Climate Negotiations, Agreements, and Long-Term Cooperation in RICE-N (August 14, 2022). Available at SSRN: https://ssrn.com/abstract=4189735

[5] Nordhaus, W. (2018) Evolution of Modeling of the Economics of Global Warming: Changes in the DICE Model, 1992–2017. *Climatic Change* 148(4): 623–640

[6] Putnam, Robert D. (1988) Diplomacy and Domestic Politics: The Logic of Two-Level Games. *International Organization* 42(3): 427–60, http://www.jstor.org/stable/2706785.

[7] David C. Earnest (2008) Coordination in Large Numbers: An Agent-Based Model of International Negotiations. *International Studies Quarterly* 52(2): 363–382

[8] Smead, R., Sandler, R.L., Forber, P., Basl, J. (2014) A Bargaining Game Analysis of International Climate Negotiations. *Nat. Clim. Change* 4 (6): 442–445

Work Context

The PhD project is funded by "Mission pour les Initiatives Transverses et Interdisciplinaires" (MITI, https://miti.cnrs.fr/). The objective is to foster interaction between computer sciences and economics. Specifically, this project will be hosted by Centre d'Économie de la Sorbonne (https://centredeconomiesorbonne.cnrs.fr/en/home/), in a research group working on economic theory, social choice and networks, but the thesis will be jointly supervised by members of LIP6 (https://www.lip6.fr/?LANG=en), in a group working on multi-agent systems and learning. The PhD may be in Economics or Applied Mathematics in the doctoral school "Economie Panthéon-Sorbonne" (ED465, https://ed-economie.pantheonsorbonne.fr/) of Université Paris 1 Panthéon Sorbonne, but skills in Computer Science would be welcome. Hence, we accept candidates with relevant background in Economics, Applied Mathematics or Computer Science.

Application

We ask the candidate to write a short application document in which they lay down a research project related to the aim described above (2 pages) and indicate their motivation to apply to this project (1 page). A CV, transcripts and 2 letters of recommendation will be asked.

Inquiry can be sent to Stéphane Zuber, who will be the main PhD advisor, at Stephane.Zuber@univ-paris1.fr. Candidate interested in the position should send a email by June 19 2024 so that we can explain the next steps for the application.