Missing the Topic

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Abstract

This research develops a hybrid framework to model labour market dynamics by combining utility maximization with multi-agent reinforcement learning (MARL). The model simulates interactions between heterogeneous agents—job seekers and firms—within a decentralized and adaptive labour market setting. Job seekers evaluate employment opportunities based on a utility function that incorporates wages, commute costs, and job characteristics. Firms, in turn, adjust job offers and wages in response to labor availability and hiring outcomes, aiming to optimize productivity while managing costs. The framework captures both structured decision-making and dynamic learning, enabling agents to adjust their strategies over time based on market feedback and past experiences. This allows for the emergence of complex labour market phenomena, such as job mismatch, wage dispersion, and persistent unemployment, which are often difficult to represent using traditional equilibrium-based models. By incorporating adaptive behavior and bounded rationality, the model offers a more realistic lens through which to study the functioning of labour markets and evaluate the impact of policy interventions. Outputs include job applications, employment matches, and wage evolution across time, reflecting how individual decisions and local interactions shape macro-level outcomes. This approach contributes to the field by offering a flexible and behaviorally-informed simulation environment capable of exploring disequilibrium dynamics. Future extensions will consider firm entry and exit, as well as centralized policy mechanisms, to better understand the broader implications of structural changes and policy designs in labour markets.

Biography

Lina Waqfi is a PhD researcher in Civil Engineering at Toronto Metropolitan University. She holds a Master's degree in Urban Planning and a Bachelor's degree in Civil Engineering. Her background spans urban planning, project management, and infrastructure development across both public and private sectors. With an interdisciplinary foundation, Lina is interested in sustainable urban systems, strategic planning, and data-informed decision-making. Her work bridges technical and planning perspectives to explore the dynamics of urban markets, with a focus on the behaviors and decisions of immigrants in uncertain environments.