Razan Baltaji

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Education

3.83/4.0 **Ph.D. Electrical and Computer Engineering**, *University of Illinois Urbana-Champaign* | Champaign, IL *2020-Present*

Courses: ML for Software Engineering | Dependable AI Systems | Deep Learning | Pattern Recognition | Mathematical Models of Language
Awards: Recipient of the Best Physics Thesis Award'19 | Tripoli Municipality Excellence Scholarship'11
Programming: Python | Pytorch | Numpy | Matlab | Git | Scripting (Bash) | LaTeX

Research Experience

COORDINATED SCIENCE LAB, *Graduated Research Assistant* | Champaign, IL *Aug 2021 - Present*

Multi-Agent LLM Systems

- Designed and evaluated multi-agent deliberation frameworks showing that **collective moral reasoning** among LLMs leads to more utilitarian decision-making compared to individual responses.
- Conducted empirical studies on moral reasoning and **emergent behaviors** in multi-agent LLM collaboration, providing insights into how group interactions influence AI-driven social simulations.
- Investigated challenges to **persona consistency** in multi-agent LLM systems, uncovering tendencies toward conformity, confabulation, and impersonation that affect **collaborative reasoning** and group dynamics.
- Explored factors contributing to instability in **cultural personas** and opinions within **multi-agent LLM collaboration** systems, with a focus on understanding the influence of opinion diversity on group outcomes and identifying challenges in fostering **cultural diversity**.

Geometric Deep Learning

- Introduced two efficient model-agnostic multi-group **equivariant networks** designed for neural networks with multiple inputs subject to independent group actions as well as single inputs with applied large product groups.
- Evaluated the suggested models across three applications: **language compositionality**, robust zero-shot image classification, and **fairness in natural language generation** observing competitive results of our design to equivariant baseline models while being computationally more efficient.

IBM, *Research Intern* | Yorktown-Heights, NY *May 2023 - Aug 2023, May 2022 - Aug 2022*

Multilingual Code Understanding & Translation

- Evaluated pairwise **cross-lingual transfer** over up to 41 programming languages across several tasks for **source code understanding** by characterizing various linguistic, syntactic, model and dataset specific features.
- Developed a pipeline for translating and testing functional correctness of **low-resource programming languages** (i.e. COBOL) to Java using large **language models**.
- Introduced numeracy and logic probes for evaluating pre-trained **language models** for **source code** and conducted a thorough analysis, taking into account model architecture and input features for three state-of-the-art models.

Publications & Preprints

[1] **Razan Baltaji**, et al. *"Many LLMs are More Utilitarian than One."* Advances in Neural Information Processing Systems (2025).
[2] **Razan Baltaji**, et al. *"Cross-lingual Transfer in Programming Languages: An extensive Empirical Study."* Transactions on Machine Learning Research, 2025.
[3] **Razan Baltaji**, Sourya Basu, and Lav R. Varshney. *"Efficient Model-Agnostic Multi-group Equivariant Networks."* Transactions on Machine Learning Research, 2024.
[4] **Razan Baltaji**, Babak Hemmatian, and Lav R. Varshney. *"Conformity, Confabulation, and Impersonation: Cultural Persona Inconstancy in Multi-Agent LLM Collaboration"*. In Proceedings of the 2nd Workshop on Cross-Cultural Considerations in NLP. ACL, 2024.
[5] **Razan Baltaji** and Parth Thakkar. *"Probing Numeracy and Logic of Language Models of Code."* 2023 IEEE/ACM International Workshop on Interpretability and Robustness in Neural Software Engineering (InteNSE). IEEE, 2023.

Broader Impact

Fatima Fellowship, *Co-Founder* | Global *Feb 2021 – Present*
Co-founded Fatima Fellowship as an international, human-centered initiative aimed at globalizing machine learning research.

United Nations Economic & Social Commission for Western Asia, *Research Intern* | Beirut, Lebanon *May 2019 – July 2019*
Contributed to the development of AI policy guidelines for ESCWA member countries.

Issam Fares Institute for Public Policy and International Affairs, *Research Intern* | Beirut, Lebanon *Jan 2019 – Mar 2019*
Investigated the feasibility of employing smart grids to address the electricity crisis in Lebanon.