

Zhivar Sourati

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Education

Ph.D. Computer Science | University of Southern California, CA, US | 2022 – Present (expected: May 2027)

Reasoning in Language Models, Analogical-, Prototype-based Reasoning, Natural Language Processing (NLP), Retrieval-augmented generation (RAG), Mechanistic Interpretability, Computational Social Sciences, and Large Language Models (LLMs) (GPA: 4.0 / 4.0)

M.Sc. Computer Science | University of Southern California, CA, US | 2022 – 2024

Focus on Artificial Intelligence, Machine Learning, and Natural Language Processing (GPA: 4.0 / 4.0)

B.Sc. Computer Engineering | University of Tehran, Tehran, Iran | 2017 - 2021

Thesis: Comparison of the Performance of Permutation and Randomization Tests on Graphs (GPA: 4.0 / 4.0)

Research & Work Experience

Research Assistant | USC / ISI | 2022 – Present

- Understand, evaluate, and improve LMs' reasoning through cognitively inspired and explainable methods like analogical, prototype-based reasoning, and mechanistic interpretability methods, e.g., utilizing case-based and analogical reasoning for logical fallacy detection, creation of an analogical reasoning benchmark on narratives, improving LMs' robustness using prototype-based reasoning, personalization of LLMs, using alignment techniques like DPO to make more efficient and contextualized LLMs with system 1 & 2 thinking, and using mechanistic interpretability to decipher analogical reasoning in LMs
- Study the effects of LLMs on linguistic and cognitive diversity, including how these models influence personality markers, sociolinguistic variation, and the homogenization of human expression

GenAI PhD Research Intern | Oracle / Oracle Cloud Infrastructure (OCI) | 2025

- Worked on Retrieval-augmented generation (RAG) for multimodal visually-rich document understanding with Large Vision Language models (LVLMs) with an agentic neuro-symbolic framework over documents knowledge graph

Research Intern | Genentech | 2024

- Worked as a knowledge graph and large language models intern on KG-aware biomedical representations

NLP Research Assistant | Zurich University of Applied Sciences | 2021 – 2022

- Researched automatic extractive and abstractive summarization techniques using Transformers and knowledge graphs on dialogues and their transcripts
- Conducted hate speech analysis and prediction on Twitter timelines

Research Assistant | University of Tehran | 2020 – 2021

- Examined machine learning techniques in social network analysis and non-parametric (i.e., permutation) tests on complex networks (e.g., global trade network) using models like Exponential Random Graph Models (ERGMs)
- Investigated the propagation and prevalence of COVID-related topics on social media (e.g., Twitter) both from a graph and NLP perspective
- Studied different models and concepts in reinforcement learning, such as n-armed bandits, On-/Off-policy methods, and investigated their practical use cases, e.g., analyzing the monetary value of time using Prospect Theory

NLP Research Intern | TelAS | 2020

- Studied SOTA and common models, datasets, and tasks in NLP, such as [NER](#) and [QA chatbots](#)
- Compiled the [Datasets for Farsi \(Persian\) Natural Language Processing](#)

Publications & Presentations

- Golazizian, P., Rahmati, E., Trager, J., **Sourati, Z.**, ... & Dehghani, M. (2026). The subjectivity of respect in police traffic stops: Modeling community perspectives in body-worn camera footage (Under review)
- Karimi-Malekabadi, F., Abdurahman, S., **Sourati, Z.**, Trager, J., & Dehghani, M. (2026). Theory Trace Card: Theory-Driven Socio-Cognitive Evaluation of LLMs. arXiv preprint arXiv:2601.01878. (Under review)
- Daryani, Y., **Sourati, Z.**, & Dehghani, M. (2025). The Homogenizing Engine: AI's Role in Standardizing Culture and the Path to Policy. *Policy Insights from the Behavioral and Brain Sciences*, 23727322251406591.
- **Sourati, Z.**, Wang, Z., Liu, M. M., Hu, Y., Guo, M., Bharadwaj, S., ... & Roth, D. (2025). LAD-RAG: Layout-aware Dynamic RAG for Visually-Rich Document Understanding. arXiv preprint arXiv:2510.07233. (Under review)
- **Sourati, Z.**, Ziabari, A. S., & Dehghani, M. (2025). The Homogenizing Effect of Large Language Models on Human Expression and Thought. arXiv preprint arXiv:2508.01491. (Under review)
- **Sourati, Z.**, Karimi-Malekabadi, F., Ozcan, M., McDaniel, C., Ziabari, A., Trager, J., ... & Dehghani, M. (2025). The Shrinking Landscape of Linguistic Diversity in the Age of Large Language Models. arXiv preprint arXiv:2502.11266. (Under review)
- Ziabari, A. S., Ghazizadeh, N., **Sourati, Z.**, Karimi-Malekabadi, F., Piray, P., & Dehghani, M. (2025). Reasoning on a Spectrum: Aligning LLMs to System 1 and System 2 Thinking. arXiv preprint arXiv:2502.12470. (Under review)
- **Sourati, Z.** (2025, March 8–9). LLMs and the erosion of human variance [Paper presentation]. Program on Negotiation AI Summit, Samberg Conference Center, Massachusetts Institute of Technology, Cambridge, MA, United States. <https://www.pon.harvard.edu/teaching-materials-publications/program-on-negotiation-ai-summit/>
- Ahrabian, K., **Sourati, Z.**, Sun, K., Zhang, J., Jiang, Y., Morstatter, F., & Pujara, J. (2024). The curious case of nonverbal abstract reasoning with multi-modal large language models. In Proceedings of the First Conference on Language Modeling (COLM 2024), Philadelphia, PA, USA.
- Jiang, Y., Zhang, J., Sun, K., **Sourati, Z.**, Ahrabian, K., Ma, K., ... & Pujara, J. (2024). Marvel: Multidimensional abstraction and reasoning through visual evaluation and learning. *Advances in Neural Information Processing Systems*, 37, 46567-46592.
- **Sourati, Z.**, Ilievski, F., Sommerauer, P., & Jiang, Y. (2024). ARN: Analogical Reasoning on Narratives. *Transactions of the Association for Computational Linguistics*, 12, 1063-1086.
- Deshpande, D., **Sourati, Z.**, Ilievski, F., & Morstatter, F. (2024). Contextualizing Argument Quality Assessment with Relevant Knowledge. In Proceedings of the 2024 Conference of the North American Chapter of the Association for Computational Linguistics: Human Language Technologies (Volume 2: Short Papers) (pp. 316-326).
- **Sourati, Z.**, Deshpande, D., Ilievski, F., Gashtevski, K., & Saralajew, S. (2024). Robust Text Classification: Analyzing Prototype-Based Networks. In Findings of the Association for Computational Linguistics: EMNLP 2024 (pp. 12736-12757).
- Jiang, Y., Ilievski, F., Ma, K., & **Sourati, Z.** (2023). BRAINTEASER: Lateral Thinking Puzzles for Large Language Models. In Proceedings of the 2023 Conference on Empirical Methods in Natural Language Processing (pp. 14317-14332).
- Thakur, A. K., Ilievski, F., Sandlin, H. Å., **Sourati, Z.**, Luceri, L., Tommasini, R., & Mermoud, A. (2023). Explainable Classification of Internet Memes. In 17th International Workshop on Neural-Symbolic Learning and Reasoning, NeSy 2023.
- **Sourati, Z.**, Ilievski, F., Sandlin, H. Å., & Mermoud, A. (2023). Case-based reasoning with language models for classification of logical fallacies. In Proceedings of the Thirty-Second International Joint Conference on Artificial Intelligence (pp. 5188-5196).

- **Sourati, Z.**, Venkatesh, V. P. P., Deshpande, D., Rawlani, H., Ilievski, F., Sandlin, H. Å., & Mermoud, A. (2023). Robust and explainable identification of logical fallacies in natural language arguments. *Knowledge-Based Systems*, 266, 110418.
- Thakur, A., Ilievski, F., Sandlin, H., Mermoud, A., **Sourati, Z.**, Luceri, L., & Tommasini, R. (2023). Multimodal and Explainable Internet Meme Classification. In AI for Social Good (AI4SG) at AAAI-23. Retrieved from <https://amulyayadav.github.io/AI4SG2023/>.
- ShabaniMirzaei, T., Chamani, H., Abaskohi, A., **Sourati, Z.**, & Bahrak, B. (2023). A large-scale analysis of Persian tweets regarding covid-19 vaccination. *Social Network Analysis and Mining*, 13(1), 148.
- **Sourati, Z.**, Sabri, N., Chamani, H., & Bahrak, B. (2022). Quantitative analysis of fanfictions' popularity. *Social Network Analysis and Mining*, 12(1), 42.
- Setayesh, A., **Sourati, Z.**, & Bahrak, B. (2022). Analysis of the global trade network using exponential random graph models. *Applied Network Science*, 7(1), 38.
- **Sourati, Z.**, von Däniken, P., Cieliebak, M. (2022). Ukraine-Russia - First insights into recent Twitter posts about this conflict. SwissText Conference; June 2022; Lugano, Switzerland. (Poster presentation)
- Von Däniken, P., **Sourati, Z.**, Tuggener, D. (2022). Hateful Social Media Users - Can we predict their behavior? SwissText Conference; June 2022; Lugano, Switzerland. (Poster presentation)
- Chamani, H., **Sourati, Z.**, & Bahrak, B. (2021, October). An Overview of Regression Methods in Early Prediction of Movie Ratings. In *2021 11th International Conference on Computer Engineering and Knowledge (ICCKE)* (pp. 1-6). IEEE.

Coursework

- Advanced Natural Language Processing
- Advanced Analysis of Algorithms
- The Science of Large Language Models
- Machine Learning
- Text as Data
- Neural Networks
- Seminar in Computer Science Research
- Affective Computing
- Oral Communication Skills for Engineering PhD Students

Skills

- Python, R, C, C++, SQL, Java, Typescript, SPARQL
- PyTorch, Hugging Face, Weights & Biases, Keras, Stata, Linux, Spring, Angular, Git, MongoDB, Node js., MySQL, Neo4j