Sophia Hager

scholar | LinkedIn | sophia-hager.github.io | shager2@jh.edu

Overview

I work on natural language processing at the Center for Language and Speech Processing at Johns Hopkins University. In particular, I am currently interested in practical uses of uncertainty estimation in large language models, investigating whether we can use confidence to improve reliability in reasoning chains and agentic systems. I also have experience with controllable generation tasks, such as style-controlled text generation or music generation.

Education

PhD Student Fall 2022 - Present

Johns Hopkins University — CLSP affiliated — Advised by Nicholas Andrews and Kevin Duh

MSE Computer Science Fall 2022 - Fall 2024

Johns Hopkins University — CLSP affiliated — Advised by Nicholas Andrews and Kevin Duh

BA Computer Science Fall 2018 - Spring 2022

Smith College — Advised by Joseph O'Rourke, thesis advised by Katherine M. Kinnaird

- Summa Cum Laude with Highest Honors in Computer Science
- Bert Mendelson Prize for Excellence in the Computer Science Major

Papers

1. Hager, S., Khan, A., Wang, A. & Andrews, N. "Learning Extrapolative Sequence Transformations from Markov Chains". in *Forty-second International Conference on Machine Learning* (2025).
2. Hager, S., Mueller, D., Duh, K. & Andrews, N. *Uncertainty Distillation: Teaching Language Models to Express Semantic Confidence*. 2025. arXiv: 2503.14749 [cs.CL].
3. Wang, A., Hager, S., Asija, A., Khashabi, D. & Andrews, N. "Hell or High Water: Evaluating Agentic Recovery from External Failures". in *Second Conference on Language Modeling* (2025).
4. Hager, S. & Andrews, N. "Learning to Generate Verbalized Confidences". in *Workshop on Statistical Frontiers in LLMs and Foundation Models at NeurIPS* (2024).
5. Hager, S., Hablutzel, K. & Kinnaird, K. M. *Generating Music with Structure Using Self-Similarity as Attention*. 2024. arXiv: 2406.15647 [cs.SD].
6. Khan, A., Wang, A., Hager, S. & Andrews, N. *Learning to Generate Text in Arbitrary Writing Styles*. 2024. arXiv: 2312.17242 [cs.CL].

Experience

Applied Scientist Intern @ Amazon Web Services May 2025 - August 2025

Uncertainty quantification and agentic workflows for the Security Insights team

Teaching and Mentoring

AI Ethics and Social Impact, Johns Hopkins University 2024

Teaching assistant for Prof. Anjalie Field. Duties included helping to design the syllabus, grading student work, as well as occasionally designing and conducting classes. Received an average evaluation of 4.61/5.

Introduction to Computer Science through Programming, Smith College 2022

Teaching assistant for Prof. Alicia Grubb. Duties included answering student questions, grading assignments, and providing informative feedback on student work.

Service

JHU CLSP Application Support Mentor 2022-present

Providing feedback on PhD applicants' materials.

CLSP Social Committee 2023-present

Planning and assisting in community and social events involving graduate students in the Center for Language and Speech Processing.

CLSP Student Recruitment Committee 2022

Organized and assisted with the spring recruiting weekend for prospective students.