Ryan Koo

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Last Updated: 12/2024

Research Interest

I'm interested in developing new methods of modeling heterogeneous rewards through dense reward shaping or defining new, more grounded reward functions for language model tuning. Specifically, I'm invested in defining and developing a more informative reward space from sparse signals to better align AI systems to human behavior or preferences.

Education

University of Minnesota Minneapolis, MN

M.S./B.S in Computer Science and B.S. Statistics — GPA: 3.89 *Sept 2021 – May 2025*

Courses: *Discrete Mathematics, Data Structures and Algorithms, Linear Algebra and Differential Equations, Applied Linear Algebra (Theory), Multivariable Calculus and Vector Analysis, Introduction to Artificial Intelligence, Machine Architecture and Organization, Machine Learning Fundamentals, Machine Learning Analysis, Basic Theory of Probability and Statistics, Computer Vision, Introduction to Stochastic Processes, Introduction to Operating Systems, Regression and Correlated Data, Theory of Statistics II, Statistical Machine Learning I & II, Optimal Control & Reinforcement Learning, Intro to Nonlinear Optimization*

Publications

W: Workshop, C: Conference, P: Preprint, *: Equal contribution

[C3] **Dynamic Multi-Reward Weighting for Multi-Style Controllable Generation**
EMNLP 2024
Karin De Langis, Ryan Koo, Dongyeop Kang

[C2] **Benchmarking Cognitive Biases in Large Language Models as Evaluators**
ACL 2024 Findings
Ryan Koo, Minhwa Lee, Vipul Raheja, Jong Inn Park, Zae Myung Kim, Dongyeop Kang

[C1] **CoEdIT: Instruction tuning for Text Editing**
EMNLP 2023 Findings
Vipul Raheja, Dhruv Kumar, Ryan Koo, Dongyeop Kang

[W2] ***Meta-Crafting*: Improved Detection of OOD Texts via Crafting Metadata Space**
AAAI Conference on Artificial Intelligence 2024: Student Abstract
Ryan Koo, Yekyung Kim, Dongyeop Kang, Jaehyung Kim

[W1] **Decoding the End-to-end Writing Trajectory in Scholarly Manuscripts**
CHI Workshop 2023: Intelligent and Interactive Writing Assistants
Ryan Koo*, Anna Martin*, Linghe Wang, Dongyeop Kang

[P4] **Iridescence: Reflecting Rays of Opinions across Personas**
In progress

[P3] **Potential-based Dense Reward shaping via Bayesian Optimization**
In progress
Ryan Koo, Ian Yang, Kwang-Sung Jun, Mingyi Hong, Dongyeop Kang

[P2] **Speculative Skimming: Reducing Verification Model Compute with Early Exiting**
Under review 2024
James Mooney, Vipul Raheja, Vivek Kulkarni, Ryan Koo, Abhinav Sethy, Dongyeop Kang

[P1] **Under the Surface: Tracking the Artifactuality of LLM-Generated Data**
Under review 2024
MinnesotaNLP

[Poster] **Hierarchical Transport Multiple-Place Foraging with Dynamic Depots**

University of Minnesota Undergraduate Research Symposium 2022

Ryan Koo, Maria Gini

Academic Services

- Reviewer for Pluralistic Alignment @ NeurIPS 2024 Workshop

Teaching

Guest Lecturer

- Fall 2024 CSCI 5541 Natural Language Processing

  Instructor: Dongyeop Kang

  Topic: RL & Non-RL methods for Alignment

Research/Work Experience

MinnesotaNLP, Dongyeop Kang Sept 2021 – Present

Research Assistant *Minneapolis, MN*

- Published at multiple top-tier venues as first author and co-author (ACL, EMNLP, AAAI, CHI).
- Researched and developed a new state-of-the-art model for text revision tasks by instruction-tuning T5-based models to perform better than LLMs $\geq$60$\times$ larger. Reached over $\sim$**80k** total model downloads on HuggingFace.
- Helped organize and led discussions in lab reading group presenting recent papers from the NLP domain.

University of Minnesota, Maria Gini Lab Sep 2021 – June 2023

Research Assistant *Minneapolis, MN*

- Researched and compiled various literature surrounding robot foraging algorithms and random correlated walks with respect to swarm robotics.
- Investigated new perception variants to help model the average swarm state for more complex controllers such as DPO (Decaying Pheromone Objects).
- Proposed a new perspective in extension to Qi Lu's work on Transport and Dynamic Depots for Swarm Robotics, namely for foraging tasks.

Amazon (AWS) May 2023 – August 2024

2$\times$ Software Engineer Intern *Seattle, WA*

- Developed a new pipeline for internal associate tools with AWS Lambda, CDK, and S3 to access gates within Amazon Go stores using Just Walk Out technology.
- Owned a full-stack application for vending dynamic messages to users in IDE. Pushed features to two of Amazon's largest IDE plugins with over 500k users.

Wells Fargo June 2022 – August 2022

Software Engineer Intern *Minneapolis, MN*

Honors and Awards

- University of Minnesota $1500 research grant, Spring 2022
- University of Minnesota, College of Science and Engineering, Deans List: 2021/2022/2023
- Honorable Mention of the 2024 Computing Research Association's (CRA) Outstanding Undergraduate Researcher Award (URA)

References

Dongyeop Kang (dongyeop@umn.edu) University of Minnesota
Maria Gini (gini@umn.edu) University of Minnesota
Vipul Raheja (vipul.raheja@grammarly.com) Grammarly
Mingyi Hong (mhong@umn.edu) University of Minnesota