

Taylor Olson

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Research Interests

Exploring philosophical moral theories, deontic logics, and machine learning techniques in hopes to instill AI systems with social and moral competence.

Education

Northwestern University, Evanston, IL

PhD Computer Science, Anticipated end of 2024

Thesis Title: *A Formal Theory of Norms*

Advisor: Professor Ken Forbus

Honors: IBM PhD Fellowship, 2023-24; Northwestern Cognitive Science Fellowship, 2018-19

Cognitive Science Certificate, 2023

University of Northern Iowa, Cedar Falls, IA

B.S., Computer Science, 2018

B.A., Mathematics, 2018

Minor in Philosophy

Kirkwood Community College, Cedar Rapids, IA

Mechanical Engineering Transfer Program, 2014

Research Experience

Thesis Research, Computer Science, Northwestern University, Evanston, IL, 2018-Present

Advisor: Professor Ken Forbus

Project: *A Formal Theory of Norms*

- Investigating the theoretical possibility of creating an artificial moral agent
- Developing predicate calculus knowledge representation and reasoning schemes for norms
- Developing machine learning models of norm learning and grounding them in reasoning
- Exploring defeasible logics for resolving normative conflicts

Research Assistant (with Prof. Ken Forbus), Computer Science, Qualitative Reasoning Group, Northwestern University, Evanston, IL, 2018-Present

Project: *Social Reasoning for AI Systems*

- Implementing normative reasoning into a cognitive architecture to govern its behavior
- Extending semantic parsing to handle norm learning via natural language

Undergraduate Research Intern, School of Engineering and Applied Sciences, Harvard University, Cambridge, MA, Summer 2017

Advisors: Professor Dustin Tingley, Dr. Margot Levine

Project: *Clustering and Recommending Course Offerings from Syllabi*

- Built and tested an academic course recommender model using a dataset of natural language syllabi
- Developed a pipeline and interface for rapid development of ensemble machine learning models including LSA, LDA, K-nearest neighbors, and Doc2Vec/Word2Vec

Research Assistant, Computer Science, University of Northern Iowa, Cedar Falls, IA, 2016-17

Advisor: Professor Aleksandar Poleksić

Project: *Prediction of Adverse Drug Reactions via Unified Medical Language System (UMLS)*

- Automated the translation of compound IDs to their standard IDs
- Analyzed coverage of compound IDs and their adverse reactions for prediction

Publications

- Olson, T., & Forbus, K. D. (Forthcoming 2024). Normative Testimony and Belief Functions: A Formal Theory of Norm Learning. In *Proceedings of the 33rd International Joint Conference on Artificial Intelligence*. Jeju, South Korea.
- Olson, T. (2024). Towards Unifying the Descriptive and Prescriptive for Machine Ethics. In P. Wu, M. Salpukas, H. Wu, S. Ellsworth (Eds.), *Trolley Crash: Approaching Key Metrics for Ethical AI Practitioners, Researchers, and Policy Makers*, (Chapter 5). Cambridge: Academic Press.
- Olson, T., & Forbus, K. D. (2023). Mitigating Adversarial Norm Training with Moral Axioms. In *Proceedings of the AAAI Conference on Artificial Intelligence* (Vol. 37, No. 10, pp. 11882-11889).
- Olson, T. (2022). Towards Unifying the Descriptive and Prescriptive for Machine Ethics. In *Proceedings of the AAAI 2022 Spring Symposium on "Approaches to Ethical Computing Metrics for Measuring AI's Proficiency and Competency for Ethical Reasoning"*.
- Olson, T. & Forbus, K. (2021). Learning Norms via Natural Language Teachings. In *Proceedings of the 9th Annual Conference on Advances in Cognitive Systems 2021*.
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Invited Talks

- Mitigating Adversarial Norm Training with Moral Axioms*, Second International Workshop on Computational Machine Ethics, 20th International Conference on Principles of Knowledge Representation and Reasoning (KR2023), 2023. (Virtual).
- Mitigating Adversarial Norm Training with Moral Axioms*, AAAI-23, 2023.
- Towards Unifying the Prescriptive and Descriptive for Machine Ethics*, AAAI-22 Spring Symposium on "Approaches to Ethical Computing Metrics for Measuring AI's Proficiency and Competency for Ethical Reasoning", Spring 2022.
- Learning Norms via Natural Language Teachings*, The Ninth Advances in Cognitive Systems (ACS) Conference, 2021.
- Artificial Intelligence in Curriculum Design*, National Conference for McNair Scholars and Undergraduate Research, University of Maryland, March 2018
- Artificial Intelligence and Recommender Systems*, McNair Seminar Series, University of Northern Iowa, September 2017.
- Recommendation System Developer*, Joint Research Experience for Undergraduates Summer Symposium, Harvard University, August 2017.
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Honors & Awards

- IBM PhD Fellowship, Northwestern University, 2023-2024
- Cognitive Science Travel Grant, Northwestern University, 2023
- Cognitive Science Fellowship, Northwestern University, 2018-2019
- 4th Place, Midwest Instruction and Computing Symposium Programming Contest, 2017
- 1st Place at site, ACM Programming Contest, 2016
- Ronald E. McNair Postbaccalaureate Achievement Program, 2016
- Student of the Month, Kirkwood Community College, 2014
- NSF Engineering Scholarship, Kirkwood Community College, 2012-2014
- Engineering project featured in local newspaper, 2012
- All-Region Basketball, Kirkwood Community College, 2012-2014

Teaching	<p>Guest lecturer, <i>Deontic Logic</i>, Knowledge Representation and Reasoning (KRR), Northwestern University, Winter 2024</p> <p>TA, Introduction to Cognitive Modeling, Northwestern University, Fall 2020 – 2023</p> <p>Guest lecturer, <i>Knowledge Representation</i>, Introduction to Cognitive Modeling, Northwestern University, Fall 2023</p> <p>Guest lecturer, <i>Intelligent Tutoring Systems</i>, Introduction to Cognitive Modeling, Northwestern University, Fall 2022</p> <p>Guest lecturer, <i>Deontic Logic</i>, Knowledge Representation and Reasoning (KRR), Northwestern University, Winter 2022</p> <p>Guest lecturer, <i>Intelligent Tutoring Systems</i>, Introduction to Cognitive Modeling, Northwestern University, Fall 2021</p> <p>Guest lecturer, <i>Philosophy and KRR - Deontic Logic</i>, Knowledge Representation and Reasoning (KRR), Northwestern University, Winter 2021</p> <p>Guest lecturer, <i>Statistical Modeling - Introduction to Neural Networks</i>, Introduction to Cognitive Modeling, Northwestern University, Fall 2020</p> <p>TA, AI and Experimental Narrative, Northwestern University, Spring 2020</p> <p>Guest lecturer, <i>Philosophy and KRR</i>, Knowledge Representation and Reasoning (KRR), Northwestern University, Winter 2020</p> <p>Guest lecturer, <i>Philosophy and KRR</i>, Knowledge Representation and Reasoning (KRR), Northwestern University, Winter 2019</p> <p>URM Stem Tutor, University of Northern Iowa, 2016-2018</p>
Service & Outreach	<p>Mentor, Machine Ethics Undergraduate Independent Student, Northwestern University, 2022</p> <p>Grad Cohort for URMD, CRA-WP, Austin, TX, 2020</p> <p>STEM Mentor, Morning Mentors, Nichols Middle School, Evanston, IL, 2019-2020</p> <p>Reading Mentor, America Reads, Lincoln Elementary School, Cedar Falls, IA, 2016-2018</p>
Software	<p>Norms Reasoner</p> <p>https://github.com/TeeOhh/Norms-Reasoner</p> <p>An application and web interface for running our model of Moral Intuition and Construction on the Moral Conventional Transgression (MCT) Task experiment.</p> <p>tRECS</p> <p>https://github.com/TeeOhh/tRECS</p> <p>Python NLP package and graphical interface capable of cleaning text data, building various statistical and vector space models, and creating recommender systems. With Janie Neal, Christiana Prater-Lee, and Eshita Nandini.</p> <p>UMLS-Similarity-Viewer</p> <p>Python package for graphical user interface to UMLS-Similarity, a similarity querying package built on top of the UMLS database of medicines, chemical compounds, and adverse drug reactions.</p>