Ali Montazeralghaem

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EDUCATION

Computer Science PhD student at
University of Massachusetts Amherst,
Thesis Title: Deep reinforcement learning for interactive conversational search and recommendation
Supervisor: Professor James Allan, 2017-present GPA: 4/4

M.Sc. of Computer Engineering
University of Tehran
Thesis Title: Theoretical analysis of information retrieval
Supervisor: Professor Azadeh Shakery
2014–2017 GPA: 4/4

B.Sc. of Computer Engineering
Shahid Beheshti University,
2009–2014 GPA: 3.56/4

CURRENT STATUS

U.S. Permanent Resident, Citizen of Iran.

RESEARCH INTERESTS

My research interests span the areas of information retrieval (IR), Recommender Systems, machine learning methods, especially deep learning and reinforcement learning (RL), and Natural Language Processing (NLP). Specifically, I have been working on these subtopics:

- Personalized Large Language Models
- Query expansion, reformulating a given query to improve retrieval performance in information retrieval
- Extracting relevant information from users' queries
- Conversational search and recommendation
- Ranking documents based on semantic similarity between queries and documents
- Understanding and optimization of user feedback for information retrieval
- Modeling of information relevance, both within search contexts (such as user relevance) and without (such as topic relevance)
- Modeling of user interactions in conversational assistants
- Cross-lingual information retrieval
- Handling verbose queries in information retrieval
- Diversification of results in information retrieval
- Fairness in ranking

RESEARCH EXPERIENCES

Internship at Microsoft Research (MSR),
Manager: Jennifer Neville, Microsoft, USA June-September 2023
Research Area: Working on personalized Large Language Models (LLMs) and learning user profiles from chat logs.
Paper: Chirag Shah, Ryen W White, Reid Andersen, Georg Buscher, Scott Counts, Sarkar Snigdha Sarathi Das, **Ali Montazeralghaem**, Sathish Manivannan, Jennifer Neville, Xiaochuan Ni, Nagu Rangan, Tara Safavi, Siddharth Suri, Mengting Wan, Leijie Wang, Longqi Yang. "**Using Large Language Models to Generate, Validate, and Apply User Intent Taxonomies**" arXiv preprint arXiv:2309.13063.

Internship at Microsoft Research (MSR),
Managers: Nick Craswell, Ryen W. White, Ahmed H. Awadallah, and Byungki Byun,
Microsoft, USA May-August 2022
Research Area: When information retrieval systems return a ranked list of results in response to a query, they may be choosing from a large set of candidate results that are equally useful and relevant. This means we might be able to identify a difference between rankers A and B, where ranker A systematically prefers a certain type of relevant results. Ranker A may have this systematic difference (different "vibe") without having systematically better or worse results according to standard information retrieval metrics. We first show that a vibe difference can exist, comparing two publicly available rankers, where the one that is trained on health-related queries will systematically prefer health-related results, even for non-health queries. We define a vibe metric that lets us see the words that a ranker prefers. We investigate the vibe of search engine clicks vs. human labels. We perform an initial study into correcting for vibe differences to make ranker A more like ranker B via changes in negative sampling during training.
Paper: **Montazeralghaem, A.**, Nick Craswell, Ryen W. White, Ahmed H. Awadallah and Byungki Byun. "**Algorithmic Vibe in Information Retrieval**", **WWW '23**: Proceedings of the ACM Web Conference 2023 April 2023 Pages 3278–3287.

Research Assistant at Center for Intelligent Information Retrieval,
Research Area: We first introduce a model based on an Actor-Critic algorithm to jointly learn the dialogue policy and recommendation model at the same time. To overcome the problem of finding items from a massive collection of possibilities, we introduce a tree-structured Actor for this task. In each round of the conversation, the proposed model can have simultaneous recommendations if modality and screen real estate permit. Secondly, we study the problem of generating relevant questions for conversational product search by maximizing any desired metrics (i.e., the ultimate goal of the conversation), objectives, or even an arbitrary user satisfaction signal. We argue that the true values of questions in a conversation are unknown. Therefore, we estimate the true value of questions by their answers. Finally, we study the problem of extracting relevant information from the user's utterances in a conversation.
University of Massachusetts Amherst (UMass), USA 2017-present

Research Assistant at Intelligent Information Systems Lab,
Research Area: Axiomatic (Theoretical) Analysis for Information Retrieval and Deep Neural Networks for Information Retrieval
University of Tehran, Iran 2014-2017

COURSES

PhD
Machine Learning (A), Information Theory (A), Information Assurance (A), Neural Networks (A), Introduction to Simulation (A), Advanced Algorithm (A)

Master
Intelligence Information Retrieval (A), Data Mining (A), Natural Language Processing (A), Pattern Recognition (A), Advanced Algorithm (A)

TEACHING EXPERIENCES

Instructor
Course: Search Engines Spring 2023
University of Massachusetts Amherst

Course: Search Engines Fall 2023
University of Massachusetts Amherst

Course: Introduction to Numerical Computing with Python Fall 2023
University of Massachusetts Amherst

Course: Introduction to Numerical Computing with Python — Fall 2022
University of Massachusetts Amherst

Head Teaching Assistant
Course: Information Retrieval (Prof. Azadeh Shakery) — 2016
Responsibilities: Designing homeworks and projects, Assigning Teaching Assistants to each part of the course, and finalizing grades

Teaching Assistant
Courses: Information Retrieval (Prof. Azadeh Shakery), Advanced Algorithms (Prof. Heshaam Faili), Natural Language Processing (Prof. Heshaam Faili), Introduction to Problem Solving with Computers using Java (Prof. Neena Thota), Data Mining (Prof. Azadeh Shakery), Data Structures (Prof. Heshaam Faili), Formal Languages and Automata Theory (Prof. Hakimeh Fadaei) — 2015-2018

ACADEMIC SERVICES

Reviewer
EMNLP 2023, **CIKM** 2023, **KDD** 2023, **ACL** 2023, **ECIR** 2023, **SIGIR** 2021, **SIGKDD** 2022, **CIKM** 2022, **CIKM** 2021, **AAAI** 2021, 2022, **ECIR** 2022, **EMNLP** 2022, **Information Processing and Management (IP&M)** 2022, **The Journal of Information Science (JIS)** 2020

AWARDS and HONORS

Received the Dissertation Writing Fellowship Award in Computer Science
University of Massachusetts Amherst — 2023

Received the Donald F. Towsley Graduate Scholarship in Computer Science
University of Massachusetts Amherst — 2022

Ranked 1st among all Computer Engineering Master Students
University of Tehran — 2017

Ranked 60th among 32000 in "Master of Computer Engineering"
Nationwide Entrance Exam, Iran — 2014

Student Travel Grants
ECIR 2016, SIGIR 2016 2017 2018 2020, ICTIR 2019, KDD 2022

COMPUTER SKILLS

Programming Languages: C/C++, Python, and Java
Web Development: HTML, CSS, JavaScript (basic knowledge).
Software as tool: PySpark, PyTorch, Tensorflow, Scikit-learn, Lemure (IR), MatchZoo (IR), Galago, MATLAB, Android Development

PUBLICATIONS

- Chirag Shah, Ryen W White, Reid Andersen, Georg Buscher, Scott Counts, Sarkar Snigdha Sarathi Das, **Ali Montazeralghaem**, Sathish Manivannan, Jennifer Neville, Xiaochuan Ni, Nagu Rangan, Tara Safavi, Siddharth Suri, Mengting Wan, Leijie Wang, Longqi Yang. "**Using Large Language Models to Generate, Validate, and Apply User Intent Taxonomies**" arXiv preprint arXiv:2309.13063.
- **Montazeralghaem, A.**, Nick Craswell, Ryen W. White, Ahmed H. Awadallah and Byungki Byun. "**Algorithmic Vibe in Information Retrieval**", **WWW '23**: Proceedings of the ACM Web Conference 2023 April 2023 Pages 3278–3287.
- **Montazeralghaem, A.**, & Allan, J. "**Extracting Relevant Information from User's Utterances in Conversational Search and Recommendation**" In Proceedings of the 28th ACM **KDD'22** Conference on Knowledge Discovery and Data Mining (pp. 1275-1283).

- **Montazeralghaem, A.**, & Allan, J. "**Learning Relevant Questions for Conversational Product Search using Deep Reinforcement Learning**" In Proceedings of the Fifteenth ACM International Conference on Web Search and Data Mining **WSDM'22**, pp. 746-754. 2022. .
- **Montazeralghaem, A.**, Allan, J., & Thomas, P. S. "**Large-scale Interactive Conversational Recommendation System using Actor-Critic Framework**" In Fifteenth ACM Conference on Recommender Systems **RecSys'21** (pp. 220-229).
- Vikraman, L., **Montazeralghaem, A.**, Hashemi, H., Croft, W. B., & Allan, J. (2021, July). "**Passage Similarity and Diversification in Non-factoid Question Answering**" In Proceedings of the 2021 ACM SIGIR International Conference on Theory of Information Retrieval **ICTIR'21** (pp. 271-280).
- **A. Montazeralghaem**, H. Zamani, J. Allan "**A Reinforcement Learning Framework for Relevance Feedback**", In Proceedings of **SIGIR'20**: The 43rd International ACM SIGIR Conference on Research and Development in Information Retrieval, pp. 59-68.
- **A. Montazeralghaem**, R. Rahimi, J. Allan "**Relevance Ranking Based on Query-Aware Context Analysis**", In Proceedings of **ECIR'20**: The 42th European Conference on Information Retrieval, pp. 446-460.
- Sheikh Muhammad Sarwar, Raghavendra Addanki, **Ali Montazeralghaem**, Soumyabrata Pal and James Allan "**Search Result Diversification with Guarantee of Topic Proportionality**", In **ICTIR'20**: The Proceedings of the 2020 ACM SIGIR International Conference on Theory of Information Retrieval (pp. 53-60).
- R. Rahimi, **A. Montazeralghaem**, A. Shakery, 2020. **An Axiomatic Approach to Corpus-based Cross-language Information Retrieval.** Information Retrieval Journal (**IRJ**), pp.1-25.
- **A. Montazeralghaem**, R. Rahimi, J. Allan "**Term Discrimination Value for Cross-Language Information Retrieval**", In **ICTIR'19**: In Proceedings of the 2019 ACM SIGIR International Conference on Theory of Information Retrieval (pp. 137-140). ACM.
- A. Imani, A. Tahami, **A. Montazeralghaem**, A. Shakery "**An Axiomatic Study of Query Terms Order in Ad-hoc Retrieval**", In **ECIR'19**: The 41th European Conference on Information Retrieval
- A. Imani, A. Tahami, **A. Montazeralghaem**, A. Shakery "**Deep Neural Networks for Query Expansion using Word Embeddings**", In **ECIR'19**: The 41th European Conference on Information Retrieval
- R. Rahimi, **A. Montazeralghaem**, J. Allan "**Listwise Neural Ranking Models**", In **ICTIR'19**: In Proceedings of the 2019 ACM SIGIR International Conference on Theory of Information Retrieval (pp. 101-104). ACM.
- **A. Montazeralghaem**, H. Zamani, A. Shakery "**Theoretical Analysis of Interdependent Constraints in Pseudo-Relevance Feedback**", In The 41st International ACM **SIGIR'18** Conference on Research and Development in Information Retrieval, pp. 1249-1252. 2018
- **A. Montazeralghaem**, H. Zamani, A. Shakery "**Term Proximity Constraints for Pseudo-Relevance Feedback**", In **SIGIR'17**: The 40th Annual International ACM SIGIR Conference on Research and Development in Information Retrieval, 2017, Tokyo, Japan.
- M. Ariannezhad, **A. Montazeralghaem**, H. Zamani, A. Shakery "**Improving Retrieval Performance for Verbose Queries via Axiomatic Analysis of Term Discrimination Heuristic**", In **SIGIR'17**: The 40th Annual International ACM SIGIR Conference on Research and Development in Information Retrieval, 2017, Tokyo, Japan.

- M. Ariannezhad, **A. Montazeralghaem**, H. Zamani, A. Shakery "**Iterative Estimation of Document Relevance Score for Pseudo-Relevance Feedback**", In **ECIR'17**: The 39th European Conference on Information Retrieval, 2017, Aberdeen, Scotland UK, 676-683
- **A. Montazeralghaem**, H. Zamani, A. Shakery "**Axiomatic Analysis for Improving the Log-Logistic Feedback Model**", In **SIGIR'16**: The 39th Annual International ACM SIGIR Conference on Research and Development in Information Retrieval, 2016, Pisa, Italy, 765-768
- **A. Montazeralghaem**, H. Zamani, A. Shakery "**Coss Domain User Engagement Evaluation**", In **ECIR'16**: The 38th European Conference on Information Retrieval, 2016, Padua, Italy, 754-760