Zhaolin Gao

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About I'm an undergraduate student at the University of Toronto. My research includes collaborative filtering, representation learning, natural language processing, and graph neural network. My research has been published at top conferences including WWW, SIGIR, and CVPR.

Education

University of Toronto Sep. 2018 ∼ *Present*
- B.A.Sc., Computer Engineering, Minor in Artificial Intelligence
- Overall GPA: 3.95/4.00 (92.5/100); Technical Course GPA: 4.00/4.00 (94/100); Rank 3

Research Experience

Research Assistant, University of Toronto Nov. 2021 ∼ *Present*
- Data-Driven Decision Making Lab (D3M), advised by Prof. Scott Sanner.
- Topics: Variational Autoencoder & Recommendation System
  - Proposed TD-VAE-CF, a novel methodology that diversifies recommendations in the targeted dimension while preserving relevance across orthogonal dimensions. Experiments show that TD-VAE-CF better preserves relevance of content to user preferences across a range of diversification levels while being more efficient in comparison to Maximum Marginal Relevance.

Machine Learning Intern, Layer 6 AI May 2021 ∼ *Present*
- NLP and RecSys Team, advised by Dr. Maksims Volkovs.
- Topics: Collaborative Filtering & Natural Language Processing
  - Proposed Mixed-Centric Loss, a novel loss for collaborative filtering (CF) which first leverages mining to select the most informative pairs, followed by a weighing process to allocate more weight to harder examples. Experiments show that the loss can be applied to different types of CF models, leading to significant gains with each type. We achieve the new state-of-the-art results by applying our loss to the graph convolutional architecture.
  - Participated in RecSys Challenge 2022. More details in the Competition section.

Research Assistant, University of Toronto May 2019 ∼ Sep. 2019
- iQua Group, advised by Prof. Baochun Li.
- Topics: Graph Neural Networks & Few-Shot Learning
  - Developed Shoestring, a novel framework that incorporates metric learning into the paradigm of graph-based semi-supervised learning to solve the problem of few-shot learning. The model performs classification by clustering the unlabeled samples according to the learned semantic space constructed from a metric learning network. It achieves state-of-the-art performance for node classification and image classification in the low-data regime.
  - Developed Guardian, an end-to-end framework that learns latent factors in social trust with graph convolutional neural networks (GCNs). Guardian is designed to incorporate social network structures and trust relationships to estimate social trust between any two users. The model can speedup trust evaluation by up to 2,827 times with comparable accuracy, as compared to the state-of-the-art in the literature.

Pulications

Y. Lu, **Z. Gao***, Z. Cheng*, J. Sun*, B. Brown, G. Yu, A. Wong, F. Pérez and M. Volkovs, *Session-based Recommendation with Transformer,* in Proceedings of the Recommender Systems Challenge 2022 (RecSys 2022), Seattle, USA, Sep. 18-23, 2022.

Z. Gao, T. Shen, Z. Mai, M. R. Bouadjenek, I. Waller, A. Anderson, R. Bodkin and S. Sanner, *Mitigating the Filter Bubble while Maintaining Relevance: Targeted Diversification with VAE-based Recommender Systems,* in Proceedings of the 45th International ACM SIGIR Conference on Research and Development in Information Retrieval (SIGIR 2022), Madrid, Spain, July 11-15, 2022.

Z. Gao*, Z. Cheng*, F. Pérez, J. Sun and M. Volkovs, *MCL: Mixed-Centric Loss for Collaborative Filtering,* in the Proceedings of the ACM Web Conference 2022 (WWW 2022), April 25-29, 2022.

W. Lin, **Z. Gao** and B. Li, *Shoestring: Graph-Based Semi-Supervised Classification With Severely Limited Labeled Data,* in the Proceedings of the 2020 IEEE Conference on Computer Vision and Pattern Recognition (CVPR 2020), pp. 4174-4182, Seattle, Washington, June 16-18, 2020.

W. Lin, **Z. Gao** and B. Li, *Guardian: Evaluating Trust in Online Social Networks with Graph Convolutional Networks,* in the Proceedings of IEEE INFOCOM, pp. 914-923, Virtual Conference, July 6-9, 2020.

Competition

2nd place (56 teams) **RecSys Challenge 2022** Mar. 2022 ∼ July 2022

- Developed a session-based recommender that is able to make recommendations with only the current session of the user. The model demonstrates strong performance on the dataset provided by Dressipi.

1st place (10 teams) **2022 SAE Autodrive Challenge II** Aug. 2021 ∼ May 2022

- Developed ground place removal algorithm for 3d point cloud. The algorithm is implemented on the autonomous vehicle that is tested by completing tasks such as recognizing and obeying stop signs or arriving at a sequence of pre-determined address points.

3rd place (80 teams) **Travelling Salesman Contest** Jan. 2020 ∼ Apr. 2020

- Developed an efficient path searching algorithm with multiple destinations by utilizing 2-opt, 3-opt, dynamic programming, A*, and simulated annealing. The algorithm demonstrates strong performance in terms of traveling time of the generated path.

2nd place (55 teams) **MakeUofT 2019** Apr. 2019

- Built a device that can capture hand motion and execute corresponding commands based on the motion with Oculus Rift, Leap Motion and Arduino.

Honors and Awards

Dean's Honour List **2019, 2020, 2021**

ECE Top Student Award **2019, 2020**

The Wallberg Undergraduate Scholarship **2019, 2020**

First Year Research Fellowship **2019**