Artificial Intelligence Initiative (Aii)

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Invited Speaker

Dr. Yiwei Wang, University of California, Los Angeles

"Graph Based Machine Learning: Enhancing Artificial Intelligence to Better Understand Relations of Concepts"

Tuesday, November 28, 2023 • 11:00AM • HEC 101A • Zoom



Abstract:
When students learn knowledge in a curriculum, understanding the relations of different concepts helps students to remember and utilize the knowledge. The structured data, that describe the relations, help to build humans' intelligence. This raises a natural question: can we also enable Artificial Intelligence to learn from some data to understand the relations of concepts? Artificial intelligence needs to understand the relations of concepts in order to make correct predictions in many applications, such as QA & Semantic Search, E-Commerce, and Computational Biomedicine. Graph data is ubiquitous in many practical settings, e.g., social networks, financial systems, transportation planning, online shopping recommendation, etc., to describe relations of concepts. In this seminar, I introduce the efforts that I made in graph based machine learning to enhance artificial intelligence to better understand relations of concepts.

Typically, a graph machine learning model has to experience the following stages until being applied to a task: graph data preparation, model design, model training, and model deployments. To enhance the effectiveness of graph machine learning, we need to achieve different desiderata in different stages of a graph learning model's lifecycle. In my research, I completed multiple research works that contribute to more effective graph machine learning in different stages as a whole.

In this seminar, I mainly introduce three parts of my research works in detail. The first one is graph data augmentation. I will introduce the first Mixup data augmentation method for graphs and the first data augmentation method for temporal graphs. These works provide the essential solutions for the effective graph learning especially when the labeled data is scarce. The second part is focused on the graph model design, which proposes a detached architecture to explicitly encode the graph topology and node features separately to efficiently conduct graph learning while maintaining the privacy security. The third part is graph construction with trustworthy relation extraction. Graph construction is the most fundamental step for graph based machine learning. My research in this part helps artificial intelligence to correctly understand the relations of concepts in popular unstructured data. The trustworthiness of relation extraction determines the quality of graphs. My work utilizes a causal graph view of large language models and debiasing the large language models to improve the graph construction.

Finally, I will introduce some future work on graph based machine learning, including Graphical Knowledge Editing for Large Language Models and Question Answering on Graphs with Large Language Models.

Bio:
Yiwei Wang is currently a Postdoc at the UCLA NLP group. Prior to joining UCLA, he was an Applied Scientist at Amazon Inc. He received his Ph.D. in Computer Science at National University of Singapore, where he was fortunate to be advised by Prof. Bryan Hooi. Prior to this, he obtained the Master of Philosophy (MPhil) degree from The Hong Kong University of Science and Technology and Bachelor degree from Southeast University. His research interests include graph machine learning, natural language processing, computer vision, and data mining. His recent research is focused on trustworthy natural language processing and graph machine learning.