BRIGHAM AND WOMEN'S HOSPITAL
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Channing Methods Meeting

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Neural-Symbolic Reasoning on Knowledge Graphs

Abstract: Knowledge graph inference has been studied extensively due to its wide applications. It has been addressed by two lines of research, i.e., the more traditional logical rule reasoning and the more recent knowledge graph embedding (KGE). In this talk, we will introduce two recent developments in our group to combine these two worlds. First, we propose to leverage logical rules to bring in high-order dependency among entities and relations for KGE. By limiting the logical rules to be the definite Horn clauses, we are able to fully exploit the knowledge in logical rules and enable the mutual enhancement of logical rule-based reasoning and KGE in an extremely efficient way. Second, we propose to handle logical queries by representing fuzzy sets as specially designed vectors and retrieving answers via dense vector computation. In particular, we provide embedding-based logical operators that strictly follow the axioms required in fuzzy logic, which can be trained by self-supervised knowledge completion tasks. With additional query-answer pairs, the performance can be further enhanced. With these evidence, we believe combining logic with representation learning provides a promising direction for knowledge reasoning.

Bio: Yizhou Sun is an associate professor at the Department of computer science of UCLA. She received her Ph.D. in Computer Science from the University of Illinois at Urbana-Champaign in 2012. Her principal research interest is on mining graphs/networks, and more generally in data mining, machine learning, and network science, with a focus on modeling novel problems and proposing scalable algorithms for large-scale, real-world applications. She is a pioneer researcher in mining heterogeneous information network, with a recent focus on deep learning on graphs/networks. Yizhou has over 180 publications in books, journals, and major conferences. Tutorials of her research have been given in many premier conferences. She is a recipient of multiple best paper awards, ACM SIGKDD Doctoral Dissertation Award, Yahoo ACE (Academic Career Enhancement) Award, NSF CAREER Award, CS@ILLINOIS Distinguished Educator Award, Amazon Research Awards (twice), Okawa Foundation Research Award, VLDB Test of Time Award, ACM Distinguished Member, IEEE AI 10-to-Watch Award, and SDM/IBM Faculty Award.

Hosted by Yang-Yu Liu