SINGAPORE NATIONAL ACADEMY OF SCIENCE YOUNG SCIENTIST AWARDS 2021

PHYSICAL, INFORMATION & ENGINEERING SCIENCES CATEGORY

Dr Zhang Hanwang

Assistant Professor, School of Computer Science and Engineering,
Nanyang Technological University

"For his pioneering and fundamental contributions to applied causality in AI"

Dr Zhang uses group theory, the fundamental rule that abstracts changes, to build a general causal framework describing what AI learns, how AI learns, and where to transfer the AI's learning. With this framework, he can pinpoint challenges in AI, such as data efficiency, data ambiguity, and machine imagination. Compared to the prevalent approach of passive data feeding, Dr Zhang's AI can actively intervene in the environment, collect data on demand, and generate unseen data.

While AI uses big data to imitate human thinking processes, it is still unable to generate more complex or subtle human traits such as common sense, sympathy, or explainability. Dr Zhang's research would build up next-generation AI that reduces the reliance on big data sample sizes. This would limit the collection of user data and reduce the energy cost of model training without sacrificing significant performance.

Dr Zhang and his team have developed and been recognised for a number of causality-based algorithms for robust AI models. They were the 2019 winner of the Visual Dialog Challenge, a task that requires an AI agent to hold meaningful dialogue with humans in natural, conversational language about visual content. Dr Zhang's team also won the Alibaba Innovation award 2020 for their unbiased visual solutions such as video surveillance, fire control monitoring, and recommendation system, which were widely adopted in the Alibaba City Brain system. Dr Zhang is also recognised as one of the Institute of Electrical and Electronics Engineers (IEEE) AI's 10 to Watch 2020 for his development, and improvement, of a new causal perspective for a wide spectrum of prevalent machine learning techniques.

Dr Zhang believes that his team's theory and practice will be able to serve as an infrastructure in various AI applications such as online education, fintech, and healthcare for Singapore.

Dr Zhang also recruits and nurtures outstanding local research staff and PhD students. He works closely with the NTU-Alibaba Joint Research Institute, where he hosts Singapore

Economic Development Board Industrial Postgraduate Programme (EDB-IPP) research students focusing on cutting-edge AI R&D to benefit industry.

Dr Zhang has published over 100 papers in top-tier conferences and journals in the field of AI, that have 46 h-index and over 10,000 citations. He is the recipient of numerous academic paper awards such as the IEEE TMM Best Paper Prize 2020, ACM TOMM Nicolas D. Georganas Best Paper Award 2018, ACM SIGIR Best Paper Mention 2016, and ACM MM Best Student Paper 2013.