Department of Computer Science
香港城市大學
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COMPUTER SCIENCE COLLOQUIUM

Towards Inclusive On-Device AI Through Fairness-Aware Design, Compression, and Personalization

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VENUE Room Y5-302, 5th Floor, Yeung Kin Man Academic Building, City University of Hong Kong, 83 Tat Chee Avenue, Kowloon Tong, Hong Kong

ABSTRACT

Deep learning models have been deployed in an increasing number of edge and mobile devices to provide healthcare in our life, from mobile dermatology assistant to comprehensive vital signs monitoring. The performance of many models relies on the visual assistance of the cameras that come with mobile devices and could lead to different levels of fairness concerns. Existing literature has pointed out the gender and skin-type bias in commercial AI systems for skin-related disease diagnosis. One of the main reasons that contribute to this disparity is that existing easily accessible datasets are inherently biased. Compounding contributing factors include a lack of medical professionals from marginalized communities, inadequate information about these communities, and socioeconomic barriers to participating in research. In the absence of a diverse and representative study population, potential safety or efficacy considerations could be missed. What is worse, with unbalanced data, AI algorithms could misdiagnose people, leading to increased health care disparities. The ideal solution, then, seems to ensure a more equitable demographic participation, and in the case of machine learning (ML), to save diverse data for the algorithms to "learn" from. However, our preliminary results show that the fairness issue still exists in ML models even on a balanced dataset; not to mention, creating a balanced dataset is intrinsically hard due to the compounding factors mentioned above. In this talk, I will share some of our recent efforts in automatically searching efficient and fair DNN models, fairness-aware model compression, and achieving fairness through learning and personalization when DNNs models are deployed on mobile devices.

BIOGRAPHY

Jingtong Hu is currently an Associate Professor in the Department of Electrical and Computer Engineering at University of Pittsburgh, Pittsburgh, PA, USA and a consultant for nonprofit organization One Heart Health (1HH). Before that, he was an Assistant Professor at Oklahoma State University from 2013 to 2017. He received his Ph.D. in Computer Science from University of Texas at Dallas in 2013 and his B.E. in Computer Science and Technology from Shandong University, China in 2007. His research interests include embedded systems, on-device AI, digital health, with a focus on achieving independent, personalized, and inclusive AI-powered healthcare systems through hardware/software co-design. His works have received 2 best paper awards, including the Donald O. Pederson Best Paper Award from IEEE Transactions on Computer-Aided Design of Circuits and Systems and 5 best paper nominations from DAC, ASP-DAC, and ESWEEK, etc. He is also the recipient of University of Pittsburgh William Kepler Whiteford Faculty Fellowship, Employer Diversity Recognition Award, Oklahoma State University Outstanding New Faculty Award, President's Cup of Promoting Creative Inter-disciplinarity Competition, Air Force Summer Faculty Fellowship, and ACM SIGDA Meritorious Service Award. He has served on the technical program committee of many international conferences such as DAC, DATE, ASP-DAC, ESWEEK, CPS-IoT Week, MLsys, AAAI, etc. He served as a guest editor for Sensors, IEEE Transactions on Computers, ACM Transactions on Cyber-Physical Systems, ACM Transactions on Embedded Systems, and is currently serving as an executive committee member and education chair for ACM SIGDA, associate editor for IEEE Embedded Systems Letters, the Journal of Systems Architecture: Embedded Software Design, and ACM Transactions on Cyber-Physical Systems. His research has been sponsored by NSF, NIH, ARL, AFRL, NSA/LPS, Meta, Amazon, Microchip, Altera, Singular Medical, etc.

All are welcome!

In case of questions, please contact Professor Jason Xue at jasonxue@cityu.edu.hk, or visit the CS Departmental Seminar Web at https://www.cs.cityu.edu.hk/events/cs-seminars/recent-cs-colloquiums.