On the 2nd AI Wave: Toward Interpretable, Reliable, and Sustainable AI

C.-C. Jay Kuo

University of Southern California

Rapid advances in artificial intelligence (AI) in the last decade have been primarily attributed to the wide applications of deep learning (DL) technologies. I view these advances as the first AI wave. There are concerns with the first AI wave. DL solutions are a black box (i.e., not interpretable) and vulnerable to adversarial attacks (i.e., unreliable). Besides, the high carbon footprint yielded by large DL networks is a threat to our environment (i.e., not sustainable). Many researchers are looking for an alternative solution that is interpretable, reliable, and sustainable. This is expected to be the second AI wave. To this end, I have conducted research on green learning (GL) since 2015. GL was inspired by DL. Low carbon footprints, small model sizes, low computational complexity, and mathematical transparency characterize GL. It offers energy-effective solutions in cloud centers and mobile/edge devices. It has three main modules: 1) unsupervised representation learning, 2) supervised feature learning, and 3) decision learning. GL has been successfully applied to a few applications. I will use deepfake video detection and blind image/video quality assessment as two examples to demonstrate the effectiveness and efficiency of the GL solutions.

Speaker's Biography

Dr. C.-C. Jay Kuo received his Ph.D. from the Massachusetts Institute of Technology in 1987. He is now with the University of Southern California (USC) as William M. Hogue Professor, Distinguished Professor of Electrical and Computer Engineering and Computer Science, and Director of the Media Communications Laboratory. His research interests are in visual computing and communication. He is a Fellow of AAAS, ACM, IEEE, NAI, and SPIE and an Academician of Academia Sinica.

Dr. Kuo has received a few awards for his research contributions, including the 2010 Electronic Imaging Scientist of the Year Award, the 2010-11 Fulbright-Nokia Distinguished Chair in Information and Communications Technologies, the 2019 IEEE Computer Society Edward J. McCluskey Technical Achievement Award, the 2019 IEEE Signal Processing Society Claude Shannon-Harry Nyquist Technical Achievement Award, the 72nd annual Technology and Engineering Emmy Award (2020), and the 2021 IEEE Circuits and Systems Society Charles A. Desoer Technical Achievement Award. Dr. Kuo was Editor-in-Chief for the IEEE Transactions on Information Forensics and Security (2012-2014) and the Journal of Visual Communication and Image Representation (1997-2011). He is currently the Editor-in-Chief for the APSIPA Trans. on Signal and Information Processing (2022-2023). He has guided 168 students to their Ph.D. degrees and supervised 31 postdoctoral research fellows.