

COLLEGE OF ENGINEERING AND COMPUTER SCIENCE

Distinguished Speaker

DEEP LEARNING FOR BIG DATA AND BIOINFORMATICS APPLICATIONS

Feb. 20th, 2017 — 1:30-3:00PM — HEC 450

Deep learning is a very hot area in machine learning research with many remarkable recent successes in computer vision, automatic speech recognition, natural language processing, audio recognition, and medical imaging processing. AlphaGo, the first Computer Go program to beat a professional human Go player, uses a deep learning method. Although various deep learning architectures such as deep neural networks, convolutional deep neural networks, deep belief networks and recurrent neural networks have been applied to many big data applications, using deep learning to solve bioinformatics problems is still in its infancy. In this talk, I will outline the challenges and problems in existing deep learning methods when applying it to big data in general and bioinformatics in particular. I will describe a few novel architectures and algorithms recently proposed by us to improve the accuracies and learning speeds of the existing deep learning technologies. These new deep learning architectures and algorithms will be applied to several big data applications including image processing, DNA sequence annotation, long intergenic non-coding RNA detection, and gene structure prediction. The data encoding schemes, the choice of architectures and methods used will be described in details. Performance comparisons with other machine learning and existing deep learning methods will be reported. The experimental results show that deep learning is very promising for many bioinformatics applications, but requires selection of suitable models and a lot of tuning to be effective. Future research directions in this exciting area will also be outlined.



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Yi Pan is a Regents' Professor of Computer Science and an associate dean and a chair at Georgia State University, USA. He is also a visiting Changjiang Chair and 1000 People Chair Professor at Central South University, China. Dr. Pan received his B.Eng. and M.Eng. degrees in computer engineering from Tsinghua University, China, in 1982 and 1984, respectively, and his Ph.D. degree in computer science from the University of Pittsburgh, USA, in 1991. His profile has been featured as a distinguished alumnus in both Tsinghua Alumni Newsletter and University of Pittsburgh CS Alumni Newsletter. Dr. Pan's research interests include parallel and cloud computing, wireless networks, and bioinformatics. Dr. Pan has published more than 180 journal papers with over 60 papers published in various IEEE journals. In addition, he has published over 150 papers in refereed conferences. He has also co-authored/co-edited 40 books. His work has been cited more than 8000 times. Dr. Pan has served as an editor-in-chief or editorial board member for 15 journals including 7 IEEE Transactions. He is the recipient of many awards including IEEE Transactions Best Paper Award, IBM Faculty Award, JSPS Senior Invitation Fellowship, IEEE BIBE Outstanding Achievement Award, NSF Research Opportunity Award, and AFOSR Summer Faculty Research Fellowship. He has organized many international conferences and delivered keynote speeches at over 60 international conferences around the world.



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