学术报告会

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Shallow-to-Deep Non-IID learning: Beyond Statistical Non-IID Thinking

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摘要:

Statistical IID and non-IID assumptions have played a pivotal role in advancing simplified representations, statistics, analytics, learning, computing, and informatics. However, real-world systems and organizations, spanning physical, social, economic, virtual, human-made, and hidden domains, inherently go beyond these assumptions. They exhibit diverse complexities such as intricate interactions, coupling relationships, heterogeneities, and uncertainties, giving rise to sophisticated non-IIDnesses. Amidst various complexities in systems, data, and behaviors, such non-IIDnesses stand out as notably overwhelming, fundamental, intricate, and difficult to comprehend, quantify, and compute. Non-IIDnesses transcend principles of traditional statistical and learning theories, posing challenges to both shallow and deep learning paradigms, causing learning deficits like vulnerability and hallucination. Over the past 15 years, we have been exploring non-IIDnesses and non-IID learning within and beyond statistical principles. This talk delineates a comprehensive non-IID framework, elucidates challenges inherent in existing quantitative and computing paradigms, and presents examples of shallow-to-deep non-IID learning across various domains, including metrics, vision, conversation, behavior, decision, downstream tasks, and LMMs-enabled humanoid learning. We deliberate how embracing 'beyond statistical non-IID thinking' could transcend boundaries of the existing thinking, methodologies, frameworks, and perspectives in statistics, AI, data science, machine/deep learning, and robot learning etc.

简介:

Longbing Cao holds a PhD in Pattern Recognition and Intelligent Systems, and a PhD in Computing Sciences. He holds the position of Distinguished Chair in AI and is an Australian Research Council Future Fellow (Professorial level) at Macquarie University, Australia. As the founding director of the Advanced Analytics Institute at the University of Technology Sydney (UTS), he exemplified integrative research, education, and industry development. His extensive research interests encompass AI, intelligent systems, data science, machine/deep learning, and behavior informatics. He pioneered the concepts of non-IID learning, behavior informatics, actionable knowledge discovery, and agent mining, alongside addressing common concerns in broad fields, represented by over a hundred of sole/first-authored publications. His enterprise innovation traversed over 10 business domains from public to private sectors, such as government services, capital markets, banking, and insurance. His data science initiatives since 2005 include the IEEE International Conference on Data Science and Advanced Analytics (DSAA), and Springer-Nature's Journal of Data Science and Analytics, in addition to leadership like general, program and track chairs of top-tier events and chair of steering committees of PAKDD and DSAA. He was awarded an individual Eureka Prize, often referred to as Australia's 'Oscars' of science, for his significant contribution and impact in data science.