

人工智慧對於電腦科學發展的啟發

Enlightenment of Artificial Intelligence over Computer Sciences

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With advanced system design concepts and rapid development in hardware technology and algorithms, traditional Von Neumann-based architectures face tremendous challenges. Potential solutions to resolve I/O bottlenecks are emerging over the horizon. People begin to question whether traditional program execution models really can fit the needs of many new algorithms, such as many deep learning ones, and survive with the high energy consumption of various forms of computing in practice. This talk will first explain Von Neumann-based architectures and the idea of complexity to let the audience understand why the advance in hardware power bring new opportunities to various research fields, such as life science and medicine, and the potential limitation. I will then come to the second part on what is coming in computer sciences after we enjoy decades of exciting science and engineering advances based on information technology. In particular, I will present several ideas with one unified memory for the main memory and storage to shift or break the memory boundaries to data movements in big data analytics and to own a huge main memory with ultra low cost and energy consumption. The study on how to jointly consider computing behaviors and memory characteristics might lay out a foundation to seek breakthroughs over the Von Neumann architectures and go toward neuromorphic computing. The talk will concludes with some study on memory usage consideration with respect to deep learning. We shall point out that emerging memory technology has also shown strong influence on how to support advance computing, such as deep learning.