

Title: Control and Management of Complex Systems: From Intelligent Control to Parallel Control

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Abstract:

As modern industrial and manufacturing systems get more and more complex, it becomes difficult to model and analyze them. On one hand, existing methods are not efficient enough in handling complexity at such a scale. On the other hand, vast amount of data are being produced everyday by industrial processes. It is desired to have methods that can handle complex systems and the vast amount of data. In this presentation, we will introduce a new mechanism for intelligent control of real-world large scale and complex problems using the concept of parallel control and management based on the ACP approach, that is, artificial systems as models, computational experiments for analysis, and parallel execution for control and management of complex systems. Neural networks, fuzzy logic and other methods in computational intelligence are critical to the implementation of parallel control and management. Particularly, we will discuss the use of adaptive dynamic programming (ADP), agent-based control (ABC), data-based decision-making and machine learning in ACP-based methods as well as some examples of their real-world applications.