Keynote I

Recent Research in Learning and Bargaining Based Video Coding Optimization

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Abstract
In the last decades, the problems of learning decision making strategy and optimizing the resource allocation process in video coding systems have received a lot of attention. However, these two problems are still challenging due to the limited theoretical analysis tools. Machine learning is a hotspot and widely applied in artificial intelligence, pattern recognition and signal processing, since it learns from lots of information which we probably could name it as big data in today’s terminology. With this property, researchers attempted to apply this machine learning techniques to solve the decision making problem in video coding system for better performances. Besides, bargaining game theory has been proved to be a powerful technique for addressing the limited resource allocation problem among multiple players in the collaborative systems. Resource allocation problem in video coding system can be modeled as a bargaining problem; we attempt to investigate the optimal resource allocation strategy based on bargaining game theory. In this talk, an overview of our recent research of learning and bargaining based video coding optimization will be presented. First, an overview on traditional video coding framework will be given and the fundamental optimization problems in video coding systems will also be discussed. Second, we will present the quad-tree coding unit (CU) depth decision process in High Efficiency Video Coding (HEVC) is modeled as a three-level of hierarchical binary decision problem. Then the flexible CU depth decision structure for each decision level are proposed to learnt about a model which will achieve better performances between the coding complexity and Rate Distortion (RD) performance. Third, we will talk about modeling the inner-layer bit allocation processes of spatial scalable video coding as bargaining problems. Then the bargaining game theoretic based approaches are proposed to solve the one-pass rate control optimization problems. Experiment results will be also presented to demonstrate the performance of our proposed approaches. Finally, we will discuss the potential optimization strategy for video coding system.
Abstract

In this big data era, large volume of data is being produced at unprecedented and explosive scale in a broad range of application areas. Analytics on such big data deliver amazing value and can drive nearly every aspect of our life. May real-world data are linked in various forms like social networks, mobile networks and Internet of Things, while big data comprised of rich and interesting information sources like sensing data, moving trajectory, social media and social relationship networks, has been formed at the same time. New opportunities arise through mining of such connected big data, which however pose many challenges, too. In this talk, I will describe some grand opportunities and key challenges therein. Some recent developments in different domains like mobile and social networks, healthcare, environmental sensing and e-commerce will be introduced first. Furthermore, some key challenging issues will be investigated in-depth through various aspects, covering data quality and veracity, key features discovery, learning methodologies, post processing and incorporation of domain knowledge. Finally, some emerging research topics and potential opportunities underlying this topic will be addressed accordingly.