

Distinguished Scholars Seminar Series 2023



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Biography

Prof. Sam Kwong is a highly accomplished researcher and professor at Lingnan University, Hong Kong. He has made significant contributions to the fields of computer science, multimedia, and smart cities. Prof. Kwong is recognized as a pioneer in the field of genetic algorithms (GA) and has made breakthroughs in solving fundamental GA challenges to multi-objective optimization problems. He has developed innovative algorithms for compression, rate control, deblocking, intra prediction, and motion estimation in video coding, which have been widely adopted in video coding standards and industrial services. His research has also focused on developing machine learning-based perceptual video coding technologies and advanced video data analytics techniques for smart cities.

Prof. Kwong has published extensively in top-tier journals and conferences and has received numerous awards for his research. His monograph on "Genetic Algorithms: Design and Concepts" received a Best Seller Award in 2000, demonstrating the widespread recognition of his work as the pioneer of GA. His research has had a profound impact on various real-world applications, improving the efficiency, quality, and safety of multimedia services and smart city operations.

ABSTRACT

Deep Learning-Based Video Coding and its Applications

In 2016, Cisco released the White paper, VNI Forecast and Methodology 2015-2020, which predicted that by 2020, 82 percent of Internet traffic would come from video applications such as video surveillance and content delivery networks. The report also revealed that in 2015, Internet video surveillance traffic nearly doubled, virtual reality traffic quadrupled, TV grew by 50 percent, and other applications similarly saw significant increases. The report estimated that the annual global traffic would first time exceed the zettabyte (ZB; 1000 exabytes [EB]) threshold in 2016 and will reach 2.3 ZB by 2020, with 1.886 ZB attributed to video data.

Today, AI and machine learning are increasingly being used in video processing to improve video quality, reduce bandwidth requirements, and enhance user experience. For instance, AI algorithms can optimize video encoding parameters based on the content of the video, reducing the bitrate required for a given level of video quality. AI can also be used for video content analysis, enabling automated scene detection, object recognition, and event detection. This has significant applications in video surveillance, where AI algorithms can be used to identify and track individuals or objects of interest in real-time.

Overall, the use of AI in video is a rapidly growing field with immense potential for improving the efficiency and quality of multimedia services. In this talk, I will present the latest research results on machine learning and deep neural network-based video coding, and their applications to the real world, such as saliency detection and underwater imaging.