Title: A Data-Driven Approach to Perceptual Video Coding

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ABSTRACT

There has been a significant progress in image/video coding in the last 50 years, and many visual coding standards have been established, including JPEG, MPEG-1, MPEG-2, H.264/AVC and H.265, in the last three decades. The visual coding research field has reached a mature stage, and the question “is there anything left for image/video coding?” arises in recent years. One emerging R&D topic is “perceptual coding”. That is, we may leverage the characteristics of the human visual system (HVS) to achieve a higher coding gain. For example, we may change the traditional quality/distortion measure (i.e., PSNR/MSE) to a new perceptual quality/distortion measure and take visual saliency and spatial-temporal masking effects into account. One famous example is the SSIM (Structural Similarity) index. However, “is it sufficient to keep visual coding research vibrant and prosperous for another decade with such a modification?” The answer is probably no. In this talk, I will present a new data-driven approach to perceptual image/video coding that is dramatically different from the past. This approach is centered on two key concepts – the stair quality function (SQF) and the Just-Noticeable-Differences (JND) – which take the HVS into account implicitly. This new approach is expected to lead to numerous new R&D opportunities and revolutionize coding research with modern machine learning tools.