

Paper Title: Rate Distortion Optimization in Video Coding: from Local to Global

Abstract –

The task of video coding is to maximize rate-distortion performance, i.e., to minimize the coding distortion subject to a rate constraint, by means of rate-distortion optimization (RDO). When coding a video sequence by performing the sequential coding procedure on a great number of partitioned coding units of strong spatial or temporal dependency (due to the extensive use of spatial/temporal prediction and context-based coding/processing), a globally optimal solution is extremely hard to be obtained in an operational way, as such dependency poses a great challenge to perform a global or dependent RDO in such a sequential coding procedure. In practice, RDO has to be performed for each coding unit independently, and a locally suboptimal solution is obtained instead which is far from optimal one as it ignores the strong spatial or temporal dependency among the coding blocks or frames. For decades, the global or dependent RDO problem has been challenging, especially for a one-pass coding.

This talk intends to discuss the RDO fundamentals, state-of-the-art techniques, and the challenges of performing dependent RDO. In particular, recent operational dependent RDO schemes are to be elaborated to stimulate more significant work on the development of dependent RDO. Our most recent work on top of the Versatile Video Coding (VVC) standard will also be presented.