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AVS2: Framework, Features & Effects

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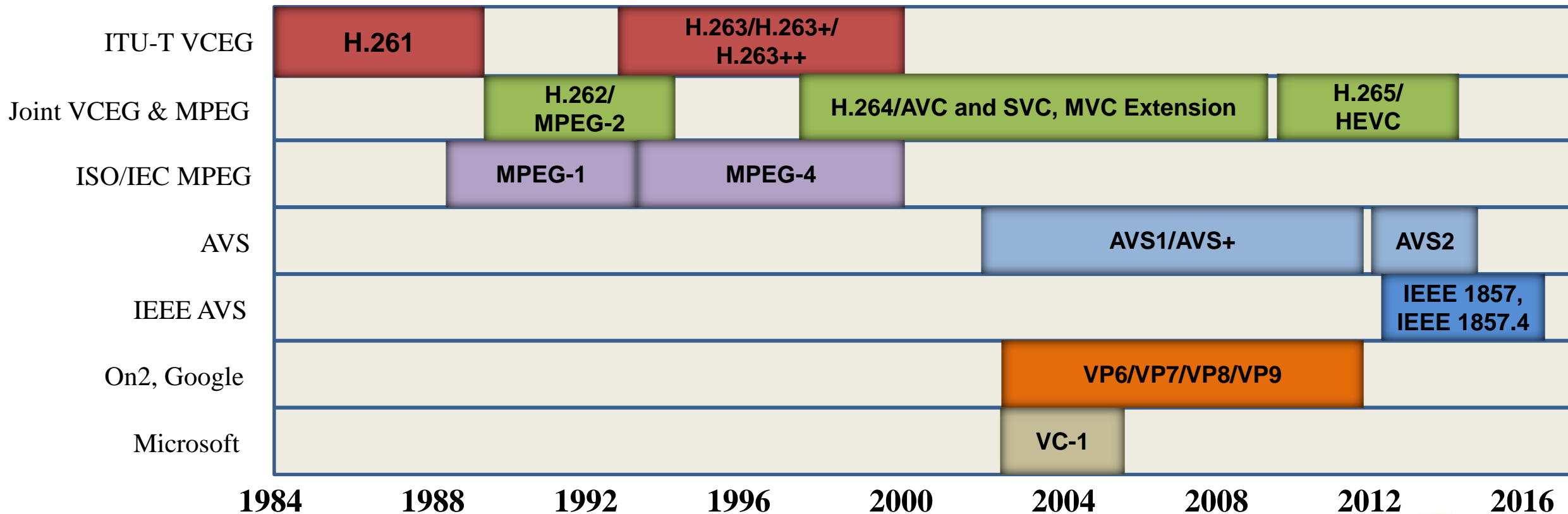
Introduction

AVS2 is the second generation of AVS video coding standard developed by Chinese AVS working group, which is designed to achieve significant coding efficiency improvements relative to the preceding AVC/H.264 and AVS1 standards.


ITU-T VCEG	H.261			H.263/H.263+/H.263++				
Joint VCEG & MPEG		H.262/MPEG-2		H.264/AVC and SVC, MVC Extension			H.265/HEVC	
ISO/IEC MPEG	MPEG-1	MPEG-4						
AVS					AVS1/AVS+		AVS2	
IEEE AVS							IEEE 1857, IEEE 1857.4	
On2, Google					VP6/VP7/VP8/VP9			
Microsoft				VC-1				

1984   1988   1992   1996   2000   2004   2008   2012   2016

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Introduction

The target applications of AVS2 include high quality broadcasting, low delay video communications, etc. Compared to AVS1, AVS2 achieves significant coding efficiency improvement, especially for scene videos, where the videos are usually captured from a scene for a long while and the background usually does not change often, e.g., video surveillance, video conference, etc.

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Coding Framework of AVS2
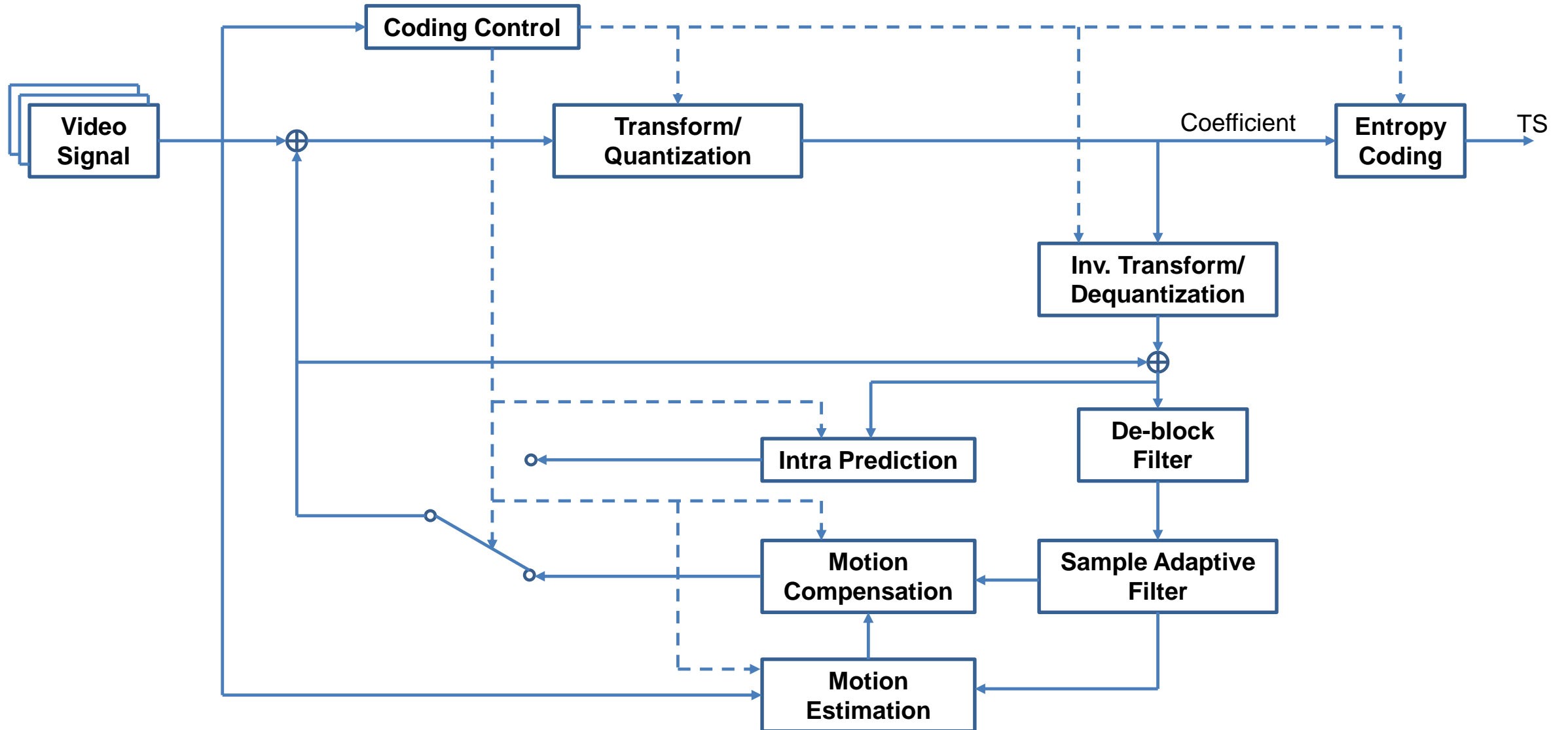
Features of AVS2

Similar to the preceding coding standards, AVS2 adopts the traditional prediction/transform hybrid coding framework, but more efficient coding tools are developed, which are adapted to satisfy the identified new requirements from the emerging applications. These high efficient coding tools include modified Intra Prediction, Inter Prediction, Motion Vector Prediction and Coding, Transform Coding, Entropy Coding and In-Loop Filtering.


图片来源：拍信 Paixin.com

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The most significant modification is the motion prediction structure. In AVS2, more flexible prediction block partitions are used to further improve prediction accuracy, e.g., square and non-square partitions, which are more adaptive to the image content especially in edge areas. The CU(coding unit), PU(prediction unit) and TU(transform unit)-based coding/ prediction/ transform structure is adopted to represent and organize the encoding data.

LCU

Original Picture

| LCU | LCU | ••• |

LCU

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•
•

Quad-tree Partition Structure

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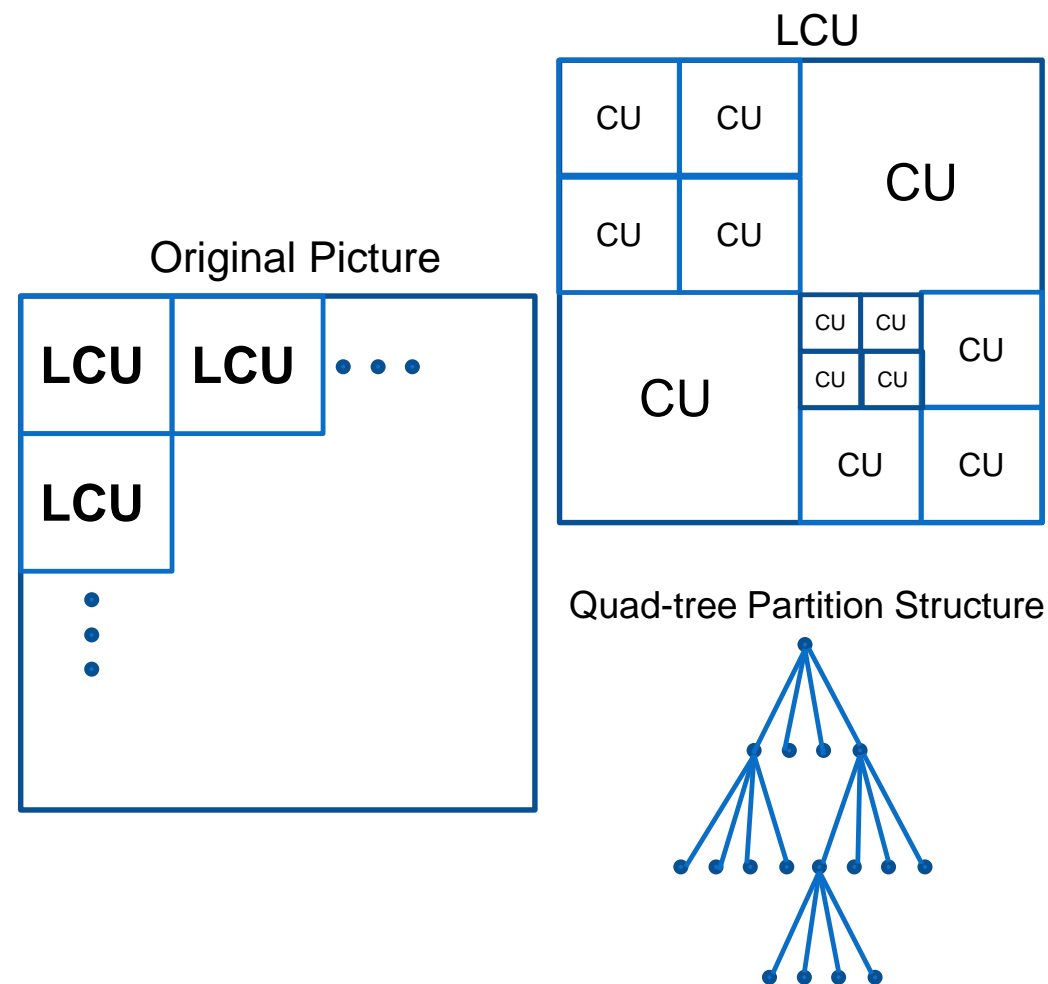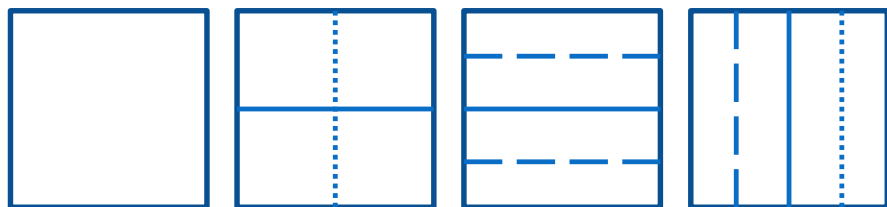
Partition of Intra-Prediction
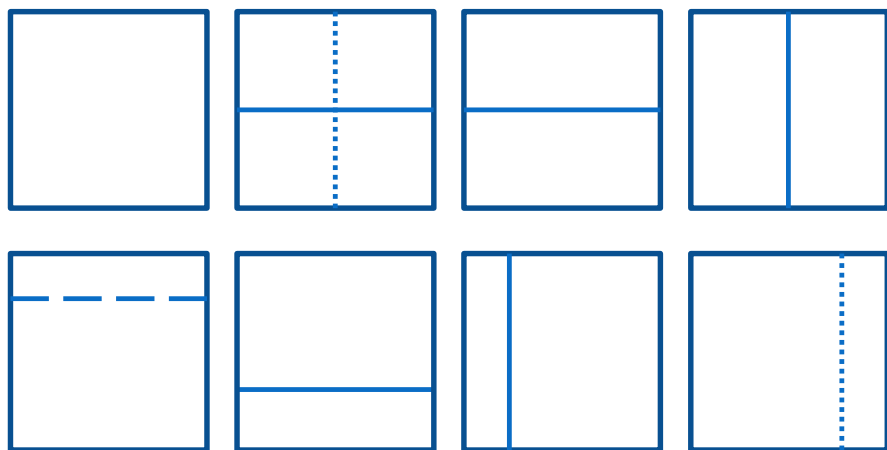
Partition of Inter-Prediction

PU is the basic unit for the motion prediction and specifies all the CU's prediction modes. The motion prediction includes Intra-prediction and the Inter-prediction.

Besides the square Intra-prediction block in AVS1, the non-square ones have been added in AVS2. With the Inter-prediction, four kinds of non-symmetric partition have been adopted by AVS2.

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The testing report(No. 20491501212989) issued by the Calibrating and Testing Center of Chinese SARFT shows: Compared with the original video, the percentage of the quality reduction by AVS2 is 2.9% and that by HEVC is 3.0%. The comparison test is conducted under the same bite-rate of the 4K UHD video.
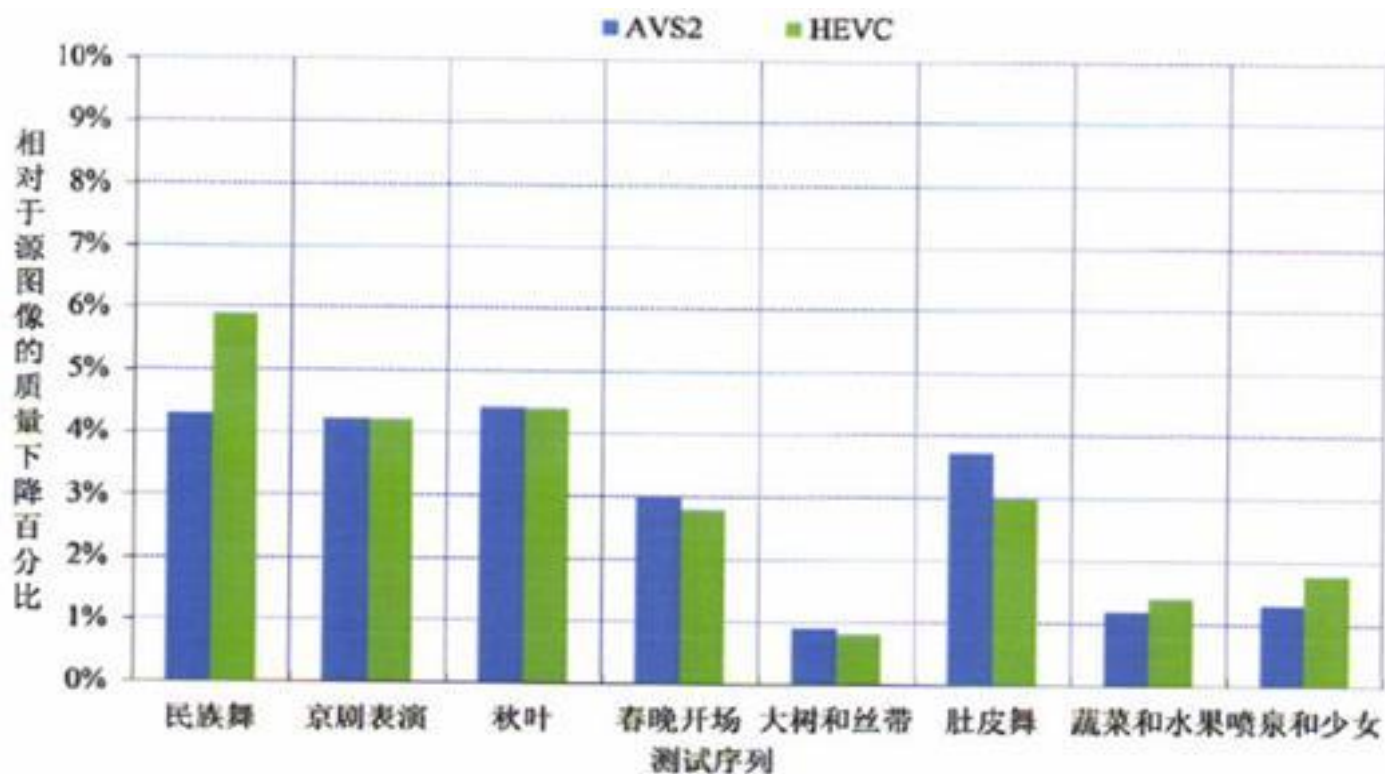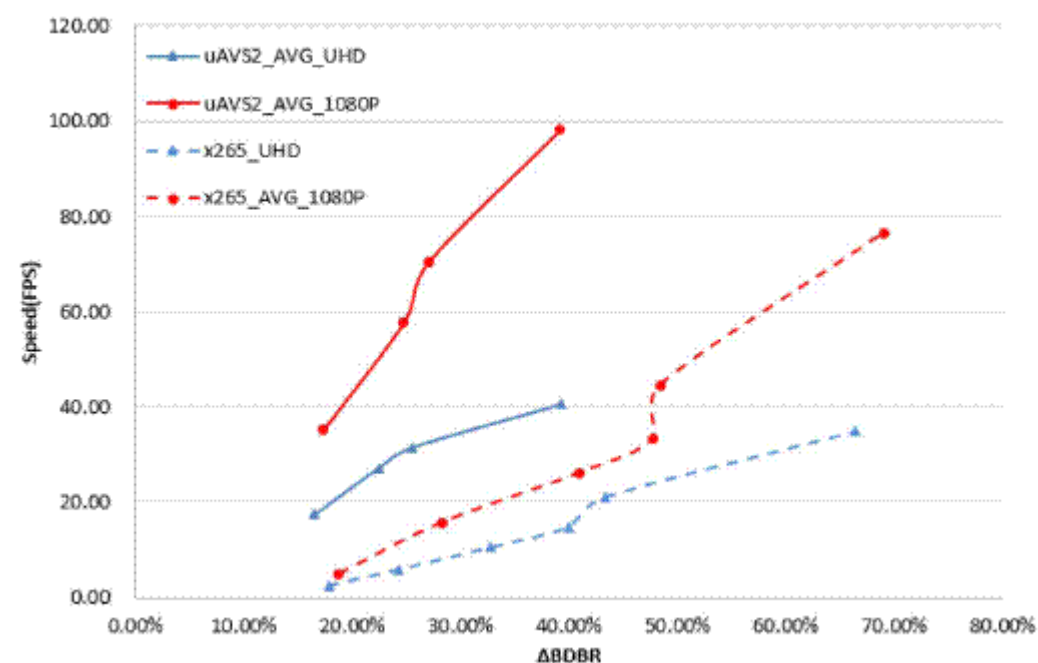
You can notice that the bite-rates for AVS2 are less than that for H.265 at the same FPS(Frame per Second) in both the single-threaded and the multi-threaded encoding speed conditions.
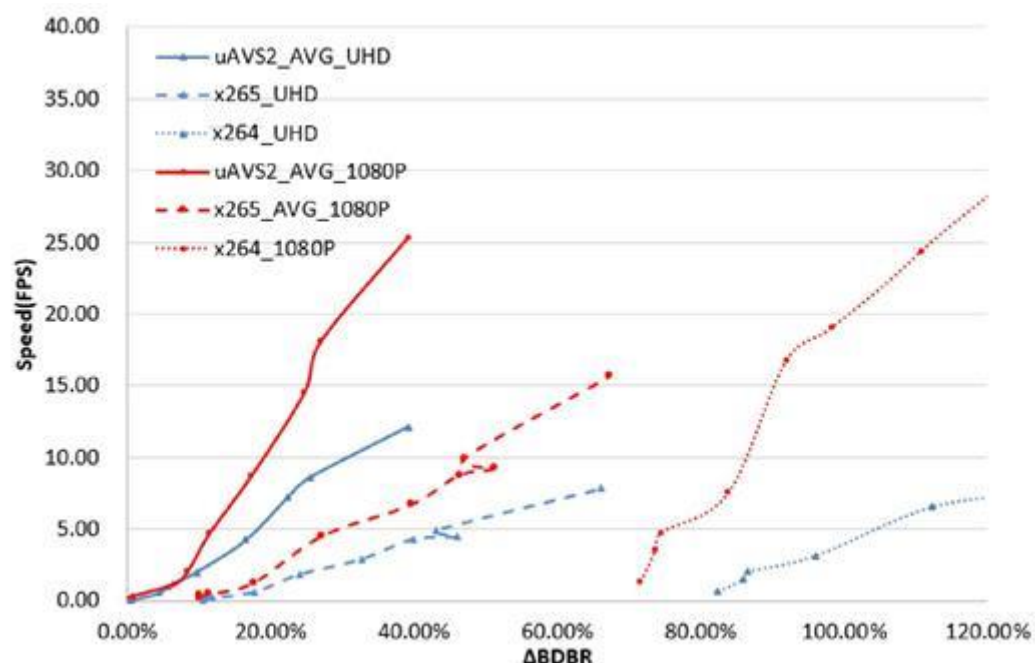
Comparison result for single-threaded encoding speed

Comparison result for multi-threaded encoding speed

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Open, Sincerity, Cooperation, Win-Win

Thank you！