Convolutional Neural Network-based Split Prediction for VVC Intra Speedup

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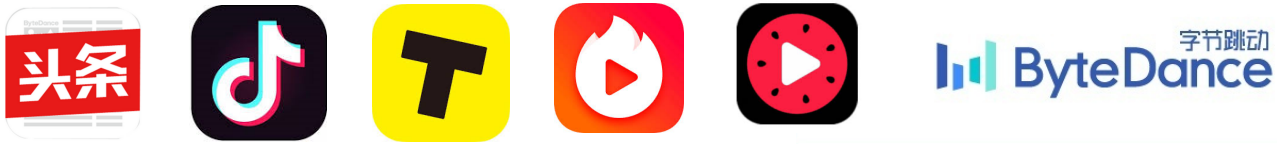

Algorithm

- Versatile Video Coding (VVC) achieves promising compression performances compared with High Efficiency Video Coding (HEVC) while sacrificing the encoding speed
- This paper focuses on predicting the partitioning structures with convolutional neural networks to speedup the VVC encoder.
- We formulate the partitioning prediction problem into two alternatives
  - *Implicit partitioning prediction based on the split type of subblock boundaries*
  - *Explicit partitioning prediction from the ensemble partitioning space.*
- We address both formulations using convolutional neural networks.

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Experimental Results

- The trained CNN models are plugged into the VTM-7.0 for evaluation. We compare the proposed method with a recently published work and present the results in Table 1. We can find that the proposed schemes bring much less BD-BR loss while delivering much higher complexity reduction compared with the method in [1].

Class	Tissier *et al.* [1] VTM-6.1, β=20		Tissier *et al.* [1] VTM-6.1, β=30		Proposed (I) VTM-7.0		Proposed (E) VTM-7.0	
	BD-BR	ΔET	BD-BR	ΔET	BD-BR	ΔET	BD-BR	ΔET
Class A1	0.87%	56.3%	1.55%	62.9%	0.59%	58.6%	0.23%	37.0%
Class A2	0.83%	52.6%	1.47%	60.0%	0.51%	53.8%	0.25%	37.9%
Class B	0.75%	51.5%	1.41%	61.1%	0.51%	58.2%	0.32%	42.9%
Class C	0.56%	26.4%	1.20%	37.9%	0.35%	43.9%	0.37%	39.6%
Class D	0.33%	22.7%	0.83%	32.5%	0.26%	43.4%	0.19%	36.3%
Class E	1.18%	43.8%	2.29%	54.4%	0.62%	54.7%	0.31%	41.4%
Average	0.75%	42.2%	1.45%	51.5%	0.46%	52.3%	0.28%	39.5%

[1] A. Tissier, W. Hamidouche, J. Vanney, F. Galpinz, and D. Menard, “CNN oriented complexity reduction of VVC intra encoder,” in 2020 IEEE International Conference on Image Processing (ICIP). IEEE, 2020, pp. 3139–3143.

Thanks for your attention!

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