

Multi-scale and Bi-path Algorithm based on Image Entropy and CNN for Fast CU Partition in VVC Intra Coding

翟一帆 池永研究室 修士課程修了

Background

Application

- Video Transmission
- Video storage
- ...

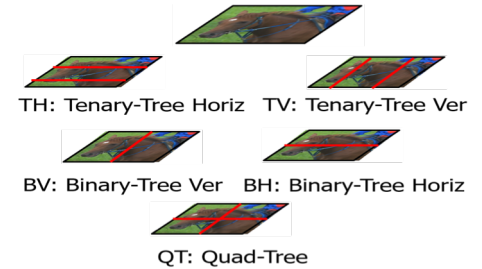


Target

- Speed up CU partition process in VVC standard

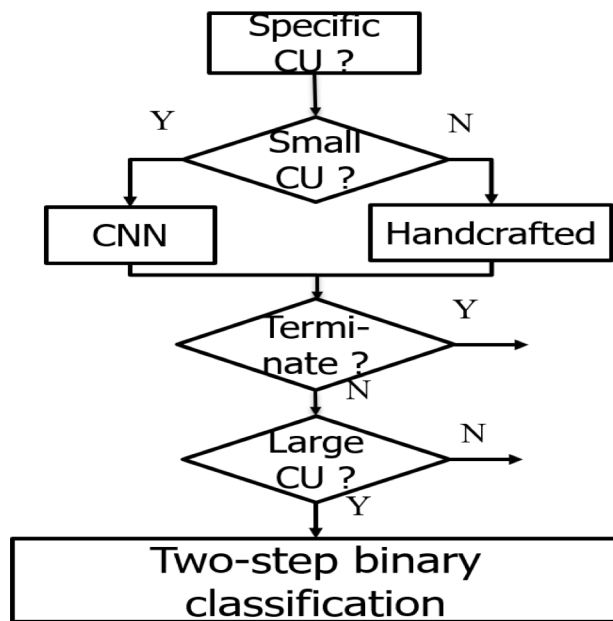
Challenges

- Complex CU partition
- ...

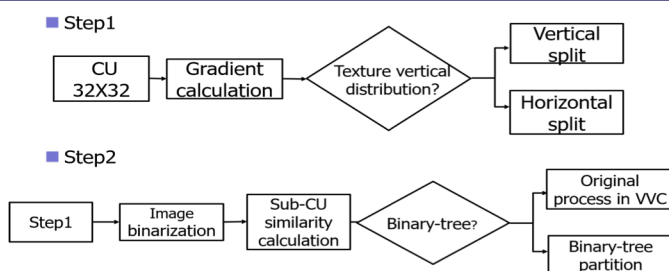


Proposed method

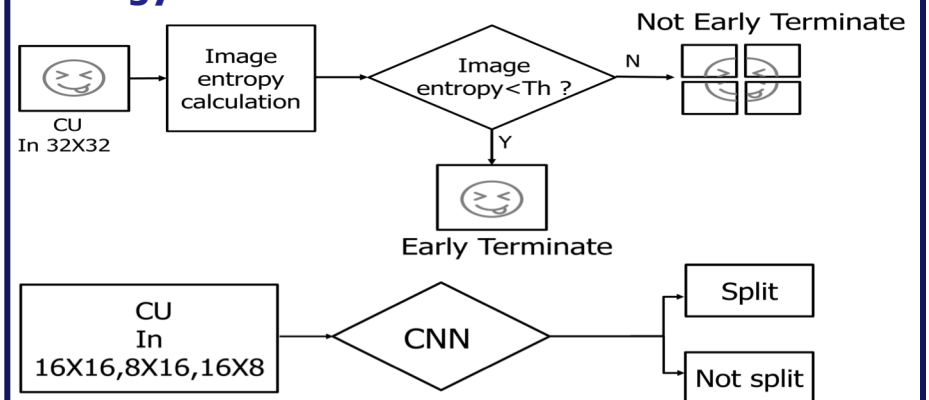
Overall framework



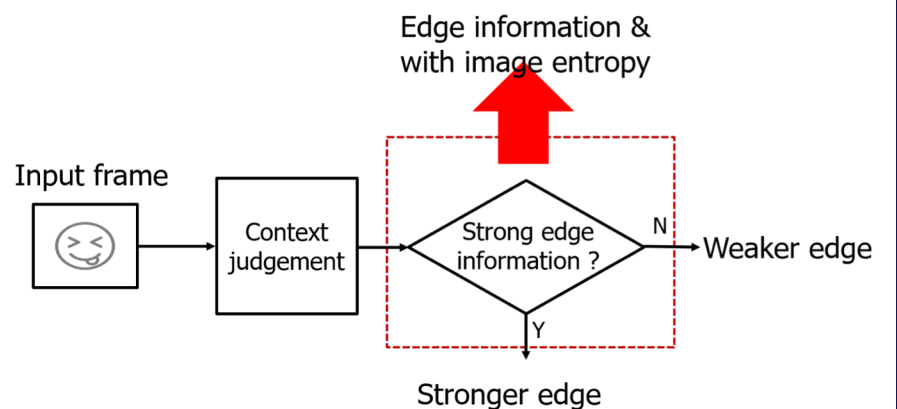
P2: Two-step binary-classification aiming at large CU



P1: Multi-scale Bi-path early termination strategy



P1.3: Context-based threshold decision



Experiments Result

	Conventional work1		Conventional work2		Proposed	
Sequence	BD-rate(%)	TS(%)	BD-rate(%)	TS(%)	BD-rate(%)	TS(%)
Traffic	5.75	41.5	/	/	2.29	50.0
SteamLocomotiveTrain	5.08	56.5	/	/	3.28	56.53
Cactus	1.84	52.44	/	/	1.92	50.33
BasketballDrive	3.28	59.35	/	/	1.28	27.3
BQ Terrace	1.08	45.30	0.95	34.5	2.06	43.23
BasketballDrill	1.82	48.48	1.30	33.3	2.12	79.25
BQ Mall	1.87	52.47	0.68	30.7	2.60	62.23
Party scene	0.26	38.62	0.55	31.1	1.47	72.7
BasketballPass	1.95	47.7	0.95	34.5	1.84	48.5
BQ Square	0.88	31.95	1.30	33.3	0.54	71.5
RaceHorse	0.54	41.69	/	/	1.89	69.4
Johnny	3.22	22.2	1.61	34.8	2.69	60.43
FourPeople	5.08	56.5	/	/	2.3	60.70
Average	2.32	45.83	0.99	33.4	2.008	57.85

Conclusion

Target:

- Speed up CU partition process in VVC standard

Proposals:

- P1: Multi-scale Bi-path early termination strategy
 - P1.1: CNN path aiming at small CU
 - P1.2: Handcrafted path aiming at large CU
 - P1.3: Context-based threshold decision (After Mid)

- P2: Two-step binary-classification framework aiming at large CU

Current result:

- Speed up 57.85% at the cost of 2.008% BDBR

- With the proposed method, we speed up 57.85% at the cost of 2.008% BDBR

