

Multi-level Weight Backwards Pre-analysis and Flexible QP Mapping based Intra-frame Rate-distortion optimization for Screen Content Coding

趙子彦 池永研究室 修士課程修了

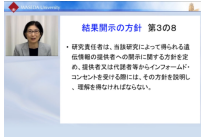
Background

Screen Content Coding

Encode videos generated by computer



Remote desktop



Online teaching



Need targeted quality optimization

Problem

Unique features need targeted quality optimization

- ① Multi-level block reference
- ② Large CU independency
- ③ Quality loss in edge block

Solution

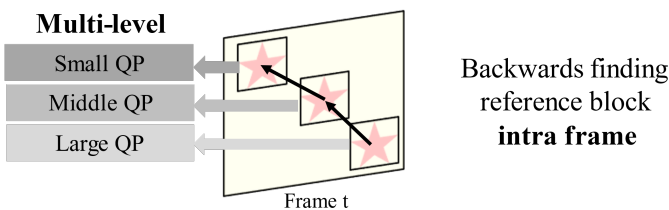
Pre-analyze block importance and flexibly optimize quality

- Proposal 1: Multi-level analyze
- Proposal 2: Flexible quality adjust
- Proposal 3: Use weighted quality

Proposals

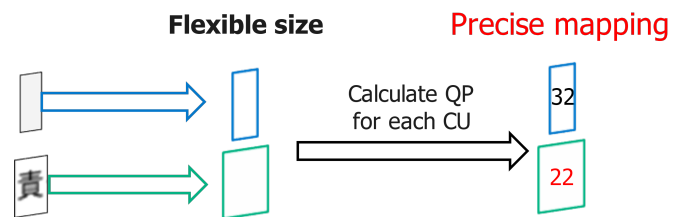
1. Multi-level intra-frame backwards pre-analysis

- Different level reference blocks are assigned with different quality



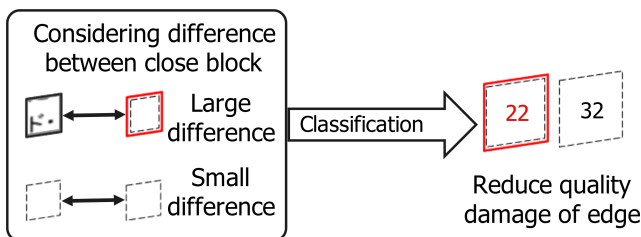
2: Flexible CU-level QP mapping

- Block quality is adjust in CU-level and not influence each other



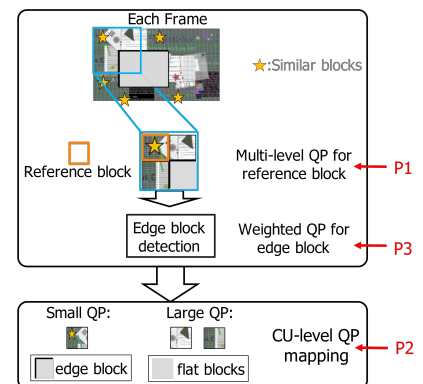
3. Weighted QP generation for edge block in flat area

- Apply weighted QP for blocks in flat area to reduce quality damage



Basic framework:

Before compression



Experiment result

		P1		P1+P2		P1+P2+P3	
		BD-rate	Coding time	BD-rate	Coding time	BD-rate	Coding time
Typical Screen Content	Sequence	-0.39%	+7.20%	-0.858%	+6.94%	-1.122%	+5.98%
	Console	-0.39%	+7.20%	-0.858%	+6.94%	-1.122%	+5.98%
	Desktop	-0.321%	+5.30%	-0.612%	+5.71%	-0.812%	+5.88%
	Programming	-0.37%	+4.30%	-0.584%	+6.02%	-0.811%	+6.10%
	wordEditing	-0.28%	+4.80%	-0.552%	+4.78%	-0.582%	+5.92%
	web_browsing	-0.29%	+6.90%	-0.578%	+5.12%	-0.661%	+5.43%
	SlideShow	-0.22%	+4.40%	-0.553%	+3.85%	-0.697%	+4.78%
Mixed content	flyingGraphics	-0.31%	+4.30%	-0.537%	+3.27%	-0.744%	+3.84%
	Basketball_screen	-0.37%	+4.93%	-0.526%	+5.33%	-0.584%	+5.40%
	MissionControlClip3	-0.32%	+5.20%	-0.529%	+5.48%	-0.598%	+5.53%
Natural-like content	MissionControlClip2	-0.35%	+4.60%	-0.518%	+4.23%	-0.554%	+4.56%
	map	-0.25%	+5.30%	-0.296%	+6.03%	-0.455%	+5.48%
	robot	-0.24%	+1.20%	-0.386%	+2.02%	-0.387%	+2.20%
Average		-0.314%	+4.87%	-0.550%	+4.90%	-0.670%	+5.09%

Conclusion

Proposed methods achieve 0.67% BD-rate reduction compared with VVC standard test Model with only 5% coding time increasing.

This work explores the potentiality of rate-distortion optimization for SCC, and will make contribution to new generation SCC standard.

