

Fixed Probability coding for Intra Mode Coding

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Motivation

- ✓ To reduce complexity for intra mode parsing process
- ✓ To consider fixed probability coding in addition to bypass coding

Current design of HEVC

- ✓ Dependency of neighbouring data is in current intra mode parsing
(e.g., NumCand MPM >1 or not should be known before the parsing)
 - ✓ Single context is used for all bins of intra mode
→ it may not so good for probability learning system.
 - ✓ Fixed probability coding is only allowed with even probability
- The complexity reduction could be done
by Fixed probability or bypass coding of intra mode

Proposed Solution for 1st part

Current HM/WD

Value of rem_intra_luma_pred_mode	Bin string
less than 32	FL, cMax = cNumBins
32	111110
33	111111

If NumMPM Cand >1, max number of rem_intra_luma_pred_mode is „32“ instead of „33“ since the max number is driven by „intra_luma_pred_mode - NumMPM Cand“

Same issue is raised by HKUST (JCTVC-F190)

Proposed (1) Removing that redundant bin

Value of rem_intra_luma_pred_mode	Bin string
less than 32 or equal to 32 (with NumMPM Cand>1)	FL, cMax = cNumBins
32	111110
33	111111

Proposed Solution for 2nd part Fixed Probability

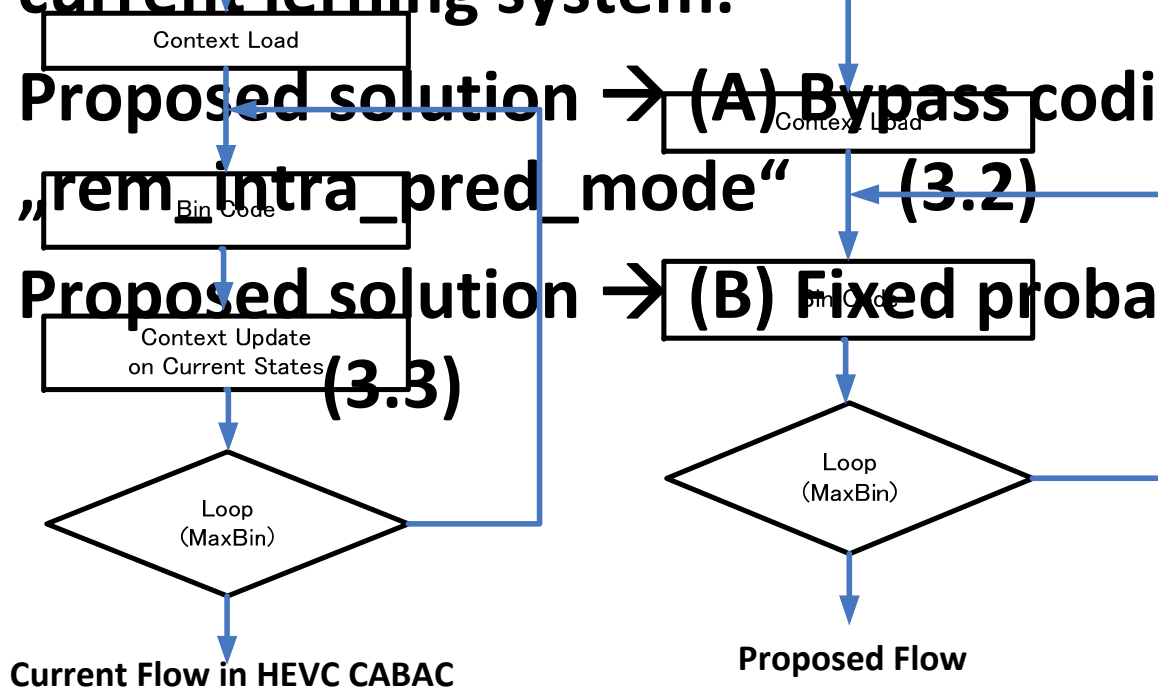
Current HM/WD

rem_intra_luma_pred_mode : One context is used for all bins continuously.

The probability of the symbol is not so efficient for current learning system.

Proposed solution → (A) Bypass coding for „rem_intra_pred_mode“ (3.2)

Proposed solution → (B) Fixed probability coding for that (3.3)



Advantage of proposed solution

- ✓ To remove redundant bin situation from current binarization
- ✓ To increase throughput for parsing process

Simulation Results

	remove redundant bin			bypass			Fixed Probability		
	All Intra HE			All Intra HE			All Intra HE		
	Y	U	V	Y	U	V	Y	U	V
Overall	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	0.0
Enc Time[%]	100%			99%			100%		
Dec Time[%]	100%			98%			100%		

	remove redundant bin			bypass			Fixed Probability		
	Random Access HE			Random Access HE			Random Access HE		
	Y	U	V	Y	U	V	Y	U	V
Overall	0.0	0.0	-0.1	0.0	-0.1	-0.2	-0.1	-0.1	-0.2
Enc Time[%]	100%			100%			100%		
Dec Time[%]	102%			101%			102%		

NOTE: Current initial context values is used for Fixed Probability

**By our proposal,
no context updating for intra mode coding
is realized without any performance drop.**

**Context updating delay is proposed by JCTVC-E225, F552.
(inifinite delay is equal to fixed probability)**

Fixed probability of I-slice coefficient level coding show
small gain (0.2% for All Intra HE) compared to F552
by cross-verification of F552 (JCTVC-F654)

Recommendation

To be adopted simple intra mode coding in HM/WD.

**To be considered fixed probability coding with not even probability
in CE/AHG.**