Introduction

- **Current significance map coding**
  - 4x4 & 8x8 TU: position dependent contexts
  - 16x16 & 32x32 TU: neighborhood dependent contexts

- **Proposed significance map coding**
  - Combine neighborhood and position information for LTU

Contexts for Significance map in HM3.0

- **4x4 TU**
  - 15 contexts (luma)
 - 15 contexts (chroma)
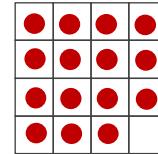
- **8x8 TU**
  - 16 contexts (luma)
  - 16 contexts (chroma)
  - Group every 4 pixels
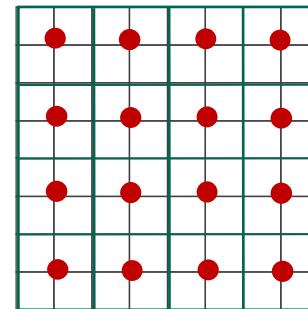
- **16x16 & 32x32 TU**
  - 4 contexts (luma_32x32)
  - 4 contexts (luma_16x16)
  - 15 contexts (luma_16x16 & 32x32)
  - 15 contexts (chorma_16x16)

Motivation

- Only neighborhood dependency is exploited in current LTU sigmap coding
- Coefficient distribution of large transform still depends on positions
- To separate different coefficient distributions, should use different type of context

concentrated   widely distributed   directional   sparse
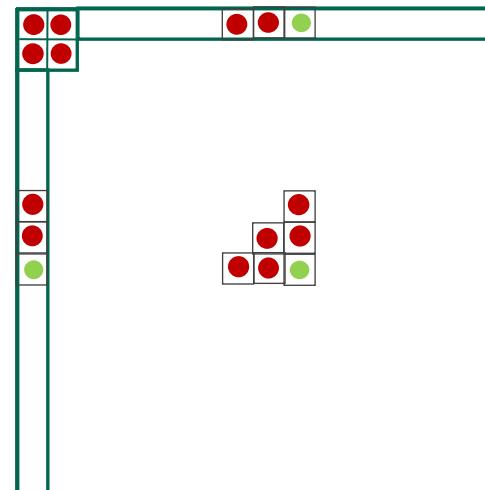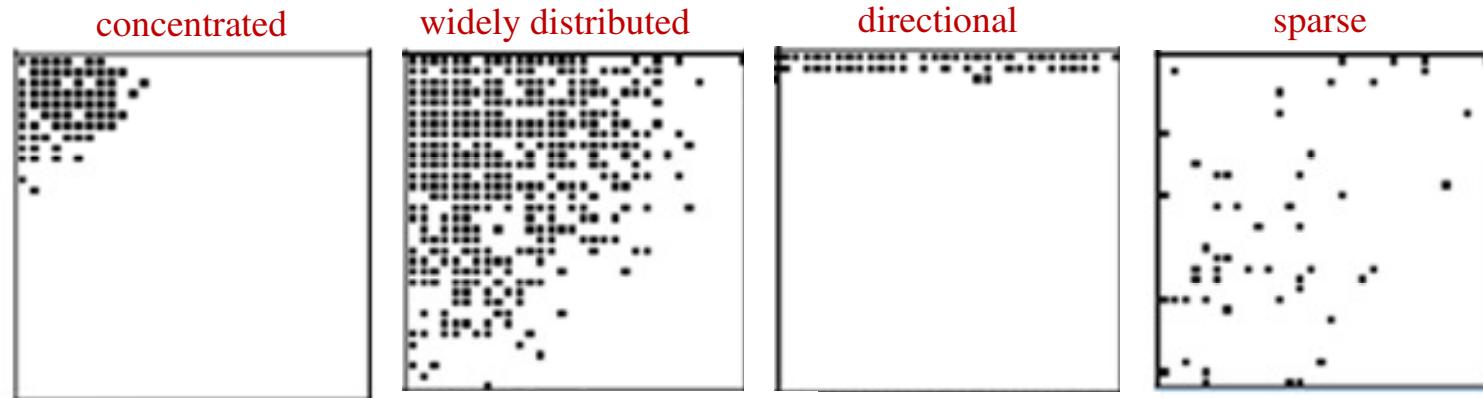
Proposed adaptive significance map coding

- **Two context types**
  - Neighborhood dependent contexts
  - Position dependent contexts

Type 0: CtxIdx=[0~14]   Type 1: CtxIdx=[16~31]
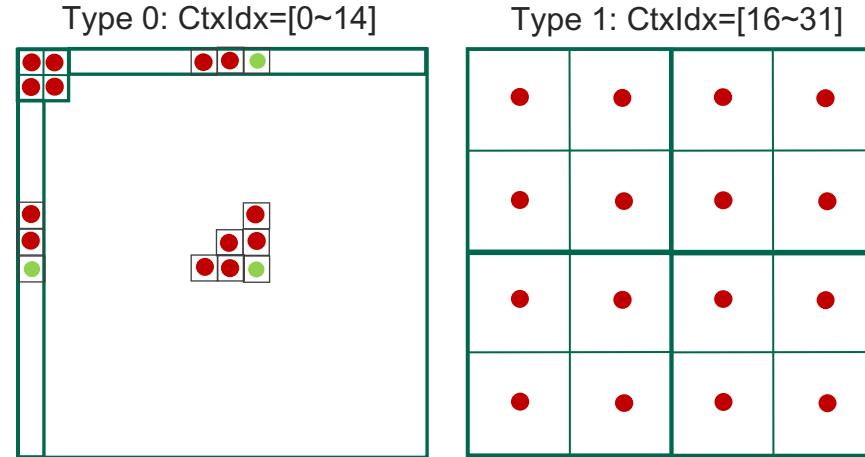
- **New syntax element SigConxtType**
  - If TU_size > 8
  - If eTType ==TEXT_Luma
  - If LastCoeffPos > threshold

LastSigPos
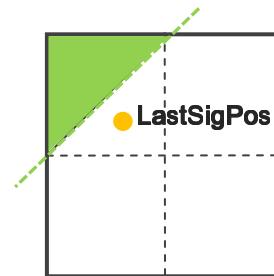
Experimental results

- Test condition
  - HE configuration

	All Intra HE			Random Access HE			Low delay B HE		
	Y	U	V	Y	U	V	Y	U	V
Class A	-0.6	-0.5	-0.5	-0.2	-0.4	-0.8			
Class B	-0.3	-0.2	-0.2	-0.1	-0.1	0.0	0.0	0.5	0.0
Class C	-0.1	-0.2	-0.2	0.0	0.0	-0.2	0.1	0.1	0.1
Class D	-0.1	-0.2	-0.2	0.0	-0.1	-0.3	0.1	0.6	1.2
Class E	-0.1	-0.1	0.0				0.1	1.8	0.4
Overall	**-0.3**	**-0.2**	**-0.2**	**-0.1**	**-0.1**	**-0.3**	**0.1**	**0.7**	**0.4**
Enc Time[%]	106%			101%			101%		
Dec Time[%]	100%			99%			100%		

● **Hit ratio of Class A & B**

Class A	QP	Type 0 (%)	Tyep 1 (%)	Class B	QP	Type 0 (%)	Tyep 1 (%)
Traffic	22	73.8	26.2	Kimono	22	82.1	17.9
	27	81.6	17.4		27	89.2	10.8
	32	89.2	10.8		32	95.0	5.0
	37	94.7	5.3		37	99.0	1.0
PeopleOnStreet	22	49.4	50.6	ParkScene	22	63.3	36.7
	27	73.1	26.9		27	68.8	31.2
	32	89.8	10.2		32	77.2	22.8
	37	94.9	5.1		37	91.9	8.1
Nebuta	22	19.4	80.6	Cactus	22	73.4	26.6
	27	18.6	81.4		27	82.2	17.8
	32	23.0	77.0		32	89.3	10.7
	37	70.2	29.8		37	97.1	2.9
SteamLocomotive	22	69.1	30.9	BasketballDrive	22	89.8	10.2
	27	84.4	15.6		27	97.4	2.6
	32	88.1	11.9		32	99.3	0.7
	37	90.8	9.2		37	99.7	0.3
				BQTerrace	22	93.8	6.2
					27	86.0	14.0
					32	90.6	9.4
					37	95.1	4.9

Conclusion

- Neighborhood dependent contexts combined with position information show potential to further improve sigmap coding
- Position dependent contexts is more appropriate for widely distributed residuals

- **We recommend this tool to be furthered study in the context of CE**

HM3.0 vs HM3.0_SIMPLE_CONTEX_SIG off

	All Intra HE			Random Access HE			Low delay B HE		
	Y	U	V	Y	U	V	Y	U	V
Class A	0.0	-0.1	0.0	0.0	0.2	-0.1			
Class B	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.2	0.1
Class C	0.0	-0.1	0.0	0.0	0.1	0.0	0.0	0.2	0.1
Class D	0.0	-0.1	-0.2	0.1	0.1	0.0	0.1	0.3	0.9
Class E	0.0	0.0	0.0				0.1	0.8	0.2
Overall	**0.0**	**0.0**	**0.0**	**0.0**	**0.1**	**0.0**	**0.1**	**0.3**	**0.3**
Enc Time[%]	99%			99%			99%		
Dec Time[%]	100%			100%			99%		