JCTVC-B085
TE 3: Simplified Geometry Block Partitioning

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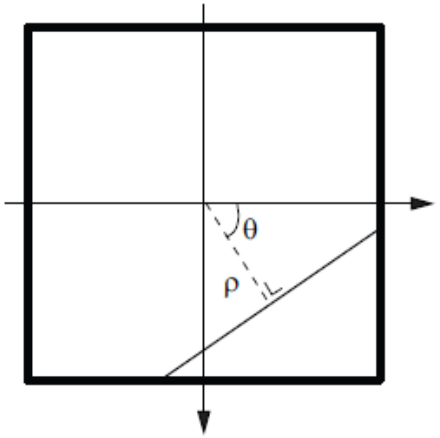
GEO: Introduction

Geometry-adaptive block partition (GEO)



- Capture geometry structure of moving objects
- Simple line model for 2 partitions
- Significant coding gain for low-medium resolution video
- High complexity due to the large number of GEO partitions
  - GEO16×16 has 256 possible partitions (in JCTVC-A121)
  - GEO32×32 has 512 possible partitions
  - GEO64×64 has 1024 possible partitions

Simplified GEO: tradeoff between complexity & coding efficiency

- Identifying ‘Most Valuable Partitions’ (MVP) based on statistical analysis
- Reducing complexity at both encoder and decoder
  - For GEO16, 26 modes instead of 256
  - For GEO32, 26 modes instead of 512
  - For GEO64, only AMP (Asymmetric Partitions) are enabled

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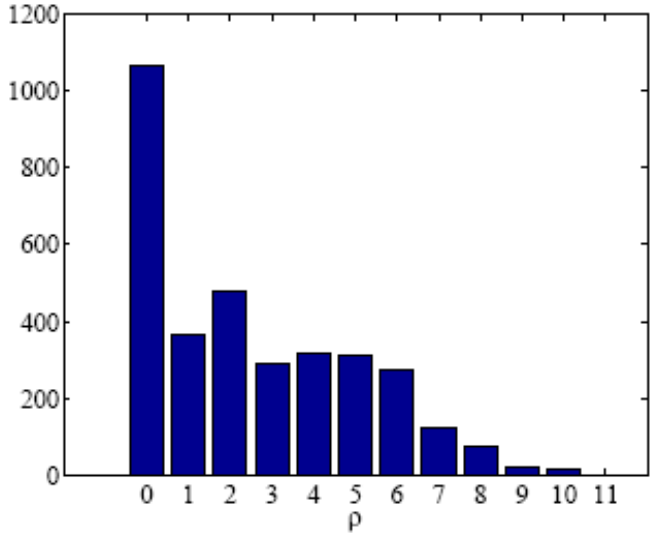
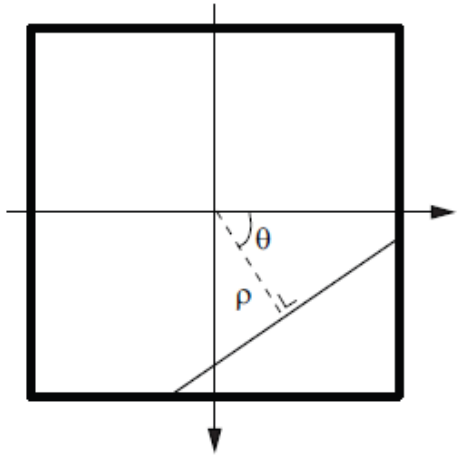
GEO: Most valuable partitions (MVP)

MVP distribution with ρ (case 16x16)

- For ρ, balanced partitions (small ρ) are mostly chosen





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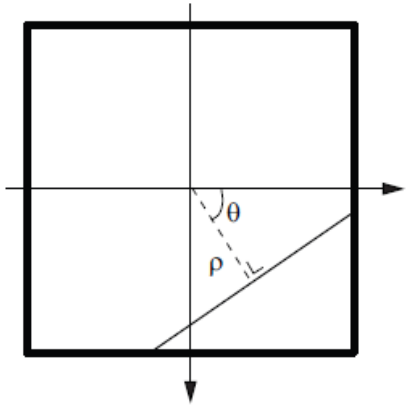
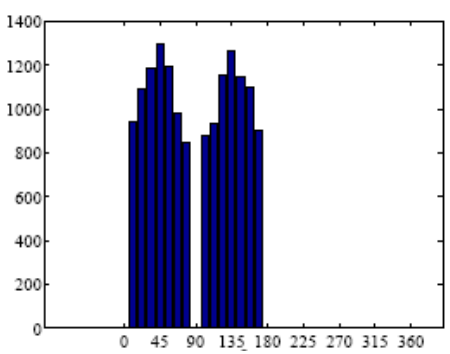
GEO: Most valuable partitions (MVP)

MVP distribution with ρ (case 16x16)

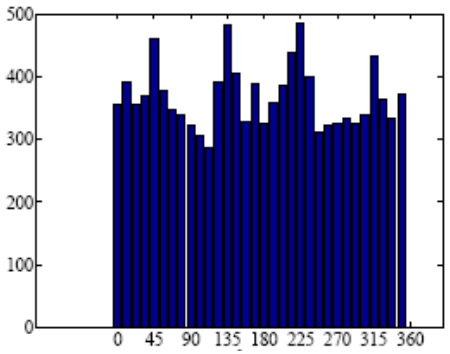
- For θ, (L=16 for 16x16 blocks)
  - (a) **Diagonal more important** | Vertic/Horiz compete with 8x16 /16x8
  - (b) **Diagonal more important** | Vertic/Horiz compete with 8x16 /16x8
  - (c) **Vertic/Horiz more important**: give more balanced partitions
  - (d) **Only Diagonal exist** as θ is very large





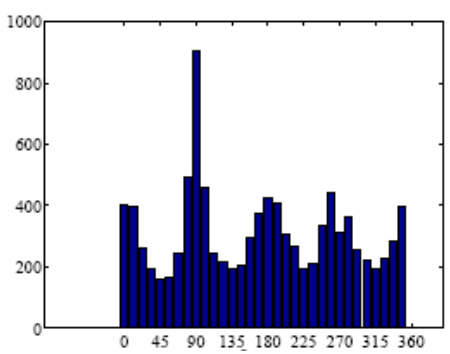
$(a)\ \rho < L/8$

very low ρ



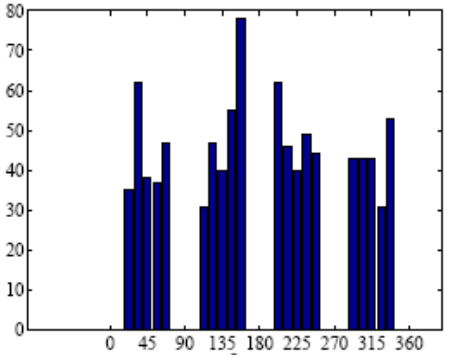
$(b)\ 0 < \rho \le L/8$

low ρ



$(c)\ L/8 < \rho < L/2$

medium ρ



$(d)\ \rho \ge L/2$

high low ρ

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GEO: Simplification

Non-uniform sampling of distance parameters (ρ)

- Dense sampling when distance is small, Sparse sampling when distance is large

Sampling of angle parameters (θ)

- Only sampling Horizontal, Vertical and Diagonal partitions

Tested partitions

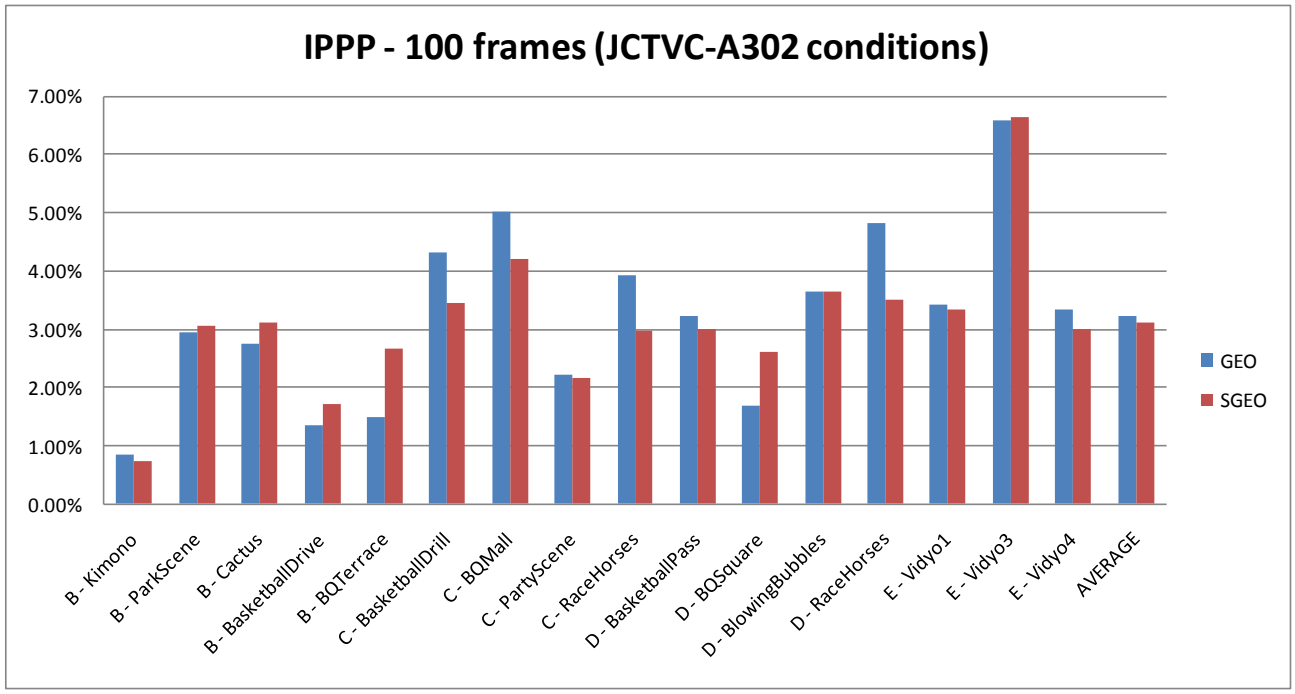
- GEO16: $\Delta\rho=2$, $\rho_{max}=6$
- GEO32: $\Delta\rho=4$, $\rho_{max}=12$
- GEO64: AMP (64x16, 64x48, 16x64, 48x64)

Results of Simplified GEO (SGEO)

SGEO tested on Qualcomm CfP software (JCTVC-A121-r1)

- Test conditions: JCTVC-A302, IPPP coding structure

			GEO16	GEO32	GEO64	Bitrate Saving
IPPP 49 frames	AMP	4NxN +Nx4N	4	4	4	1.23%
	SGEO1	H/V only	12	12	4	1.64%
	SGEO2	H/V + 45 diagonal	26	26	4	2.76%



SGEO2 vs GEO
-0.10% loss avg

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Conclusions

SGEO2 is thought to be sweet point

- GEO16×16 : 256 → 26
- GEO32×32 : 512 → 26
- GEO64×64 : only AMP (Asymmetric Partitions)

Propose to continue the core experiment using the TMuC software