Alternative performance measurement of MDDT and ROT in TMuC

Robert Cohen
Anthony Vetro
Huifang Sun

JCTVC-C036/m18057

October 2010

Overview

- Purpose: Evaluate ROT/MDDT performance independently of TE12

- Reference is TMuC 0.7 (0.7.1) with ROT=0, MDDT=0

- Test ROT, MDDT, and then both enabled

- Notes: No other changes made to TMuC, so we can compare with TE12 experiments:
    - If ROT=0, MDDT=0, conventional transform used
    - If ROT=0, MDDT=1, MDDT 4x4 & 8x8, conventional for others
    - If ROT=1, MDDT=0, ROT available for all block sizes
    - If ROT=1, MDDT=1, MDDT 4x4 & 8x8, ROT available for others

ROT & MDDT BD-Rate Change, Reference: ROT=0, MDDT=0

Intra High Efficiency

	ROT alone	MDDT alone	ROT & MDDT	Average for each resolution ROT alone	MDDT alone	ROT & MDDT
Traffic	-2.5	-1.9	-2.5	-2.2	-2.0	-2.4
PeopleOnStreet	-2.0	-2.0	-2.4			
Kimono	-1.9	-0.5	-1.7	-1.9	-1.2	-1.8
ParkScene	-1.5	-1.5	-1.8			
Cactus	-2.0	-1.5	-1.9			
BasketballDrive	-2.4	-1.5	-2.3			
BQTerrace:	-1.7	-1.0	-1.2			
BasketballDrill	-3.0	-2.2	-2.5	-2.3	-1.7	-1.9
BQMall	-2.2	-2.0	-2.2			
PartyScene	-1.8	-1.6	-1.6			
RaceHorsesC	-2.1	-1.0	-1.3			
BasketballPass	-2.2	-1.7	-2.1	-2.1	-1.6	-1.8
BQSquare	-2.1	-1.6	-1.7			
BlowingBubbles	-2.0	-1.8	-1.9			
RaceHorsesD	-2.2	-1.4	-1.6			
Vidyo1	-2.6	-2.1	-2.6	-2.4	-2.1	-2.6
Vidyo3	-2.2	-2.1	-2.6			
Vidyo4	-2.4	-2.1	-2.7			
Average	-2.1	-1.6	-2.0			

Random Access High Efficiency

	ROT alone	MDDT alone	ROT & MDDT	Average for each resolution ROT alone	MDDT alone	ROT & MDDT
Traffic	-1.3	-1.0	-1.3	-0.9	-0.8	-1.0
PeopleOnStreet	-0.5	-0.7	-0.8			
Kimono	-0.7	-0.2	-0.6	-0.9	-0.6	-0.8
ParkScene	-0.7	-0.8	-0.9			
Cactus	-1.2	-0.7	-0.9			
BasketballDrive	-1.0	-0.8	-1.1			
BQTerrace:	-0.7	-0.6	-0.7			
BasketballDrill	-1.2	-1.1	-1.1	-1.0	-0.7	-0.8
BQMall	-1.0	-0.6	-0.7			
PartyScene	-1.0	-0.7	-0.7			
RaceHorsesC	-0.8	-0.5	-0.5			
BasketballPass	-0.7	-0.8	-0.9	-0.8	-0.6	-0.7
BQSquare	-0.9	-0.5	-0.6			
BlowingBubbles	-0.7	-0.7	-0.7			
RaceHorsesD	-0.8	-0.5	-0.6			
Average	-0.9	-0.7	-0.8			

Encoding time ratios

	ROT+MDDT	ROT	MDDT
Intra	181%	241%	110%
Random access	104%	104%	101%

Decoding time ratios

	ROT+MDDT	ROT	MDDT
Intra	227%	102%	227%
Random access	304%	101%	302%

# ROT & MDDT Performance, Reference: ROT=0, MDDT=0

Intra High Efficiency
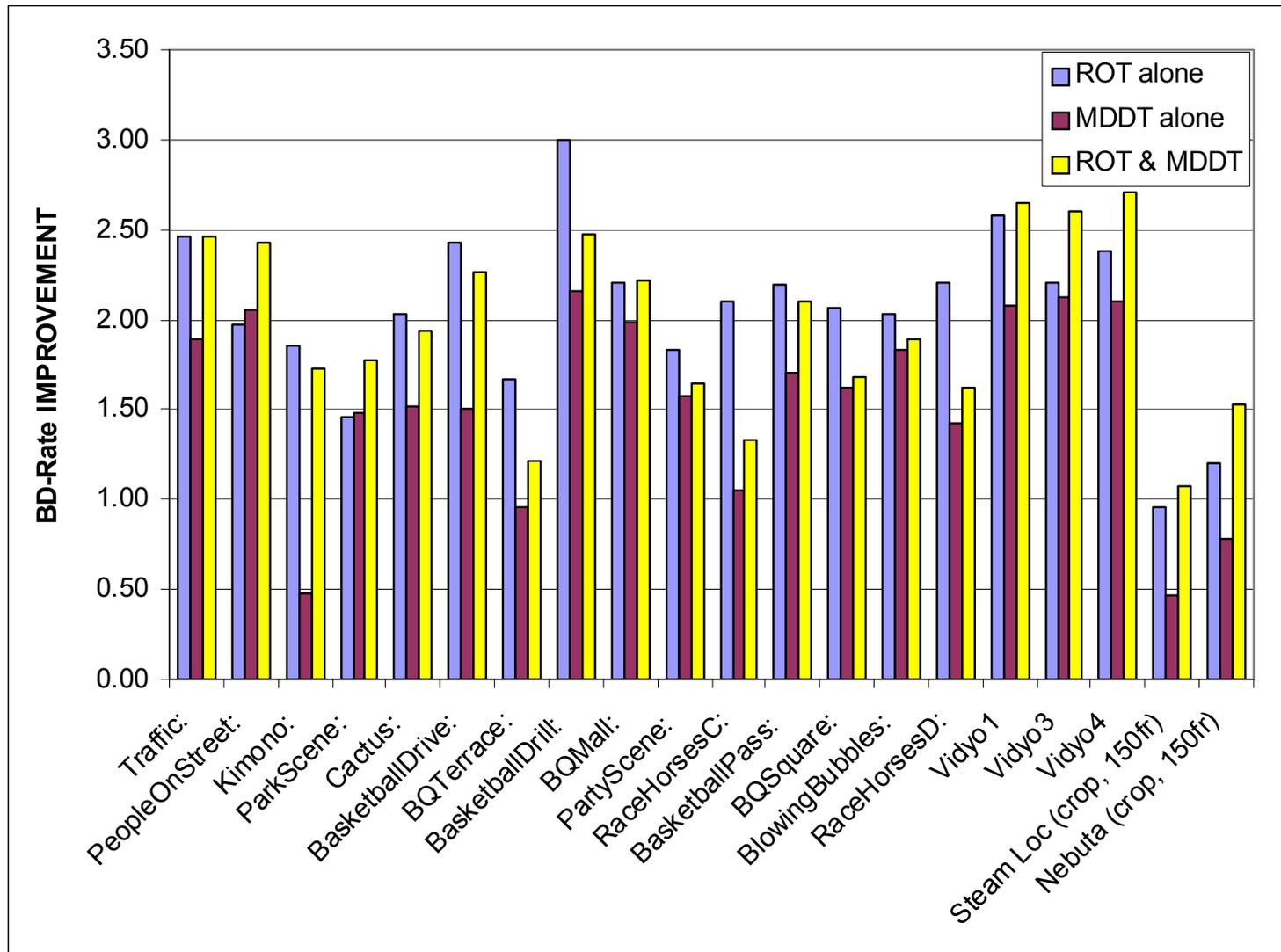
ROT & MDDT Performance, Reference: ROT=0, MDDT=0

Random Access High Efficiency
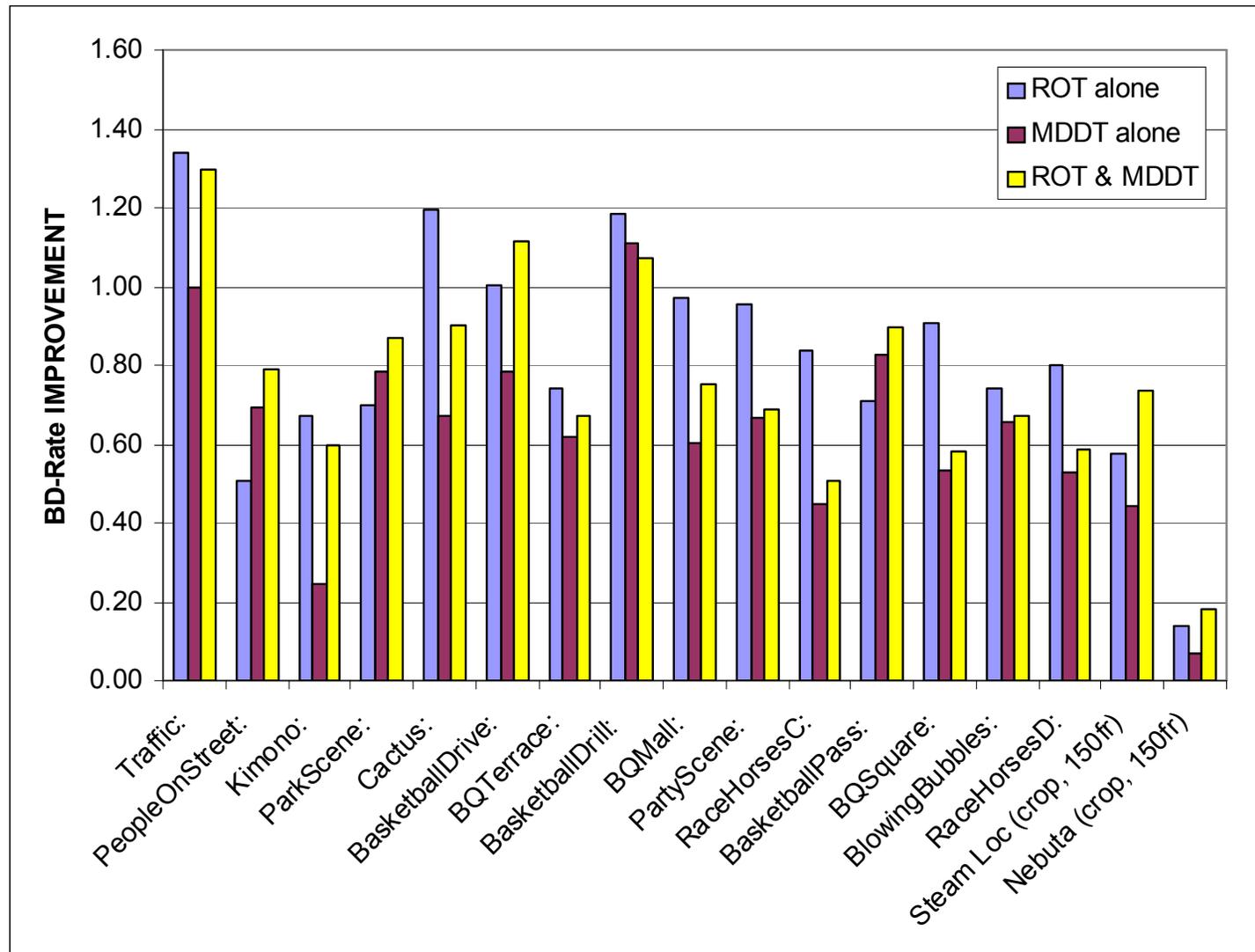
Summary

- Intra: Average gains 2.1% ROT, 1.6% MDDT, 2.0% both
- Random Access: 0.9% ROT, 0.7% MDDT, 0.8% both
- Complexity: ROT affects encoder more, MDDT – decoder.
- For this version of TMuC, ROT generally performs (R-D) slightly better than MDDT or the combination with MDDT.
- Recommendation:
  - Compare to TE12 ROT/MDDT reports, see if consistent
  - Repeat experiments after other issues (e.g. edge-based prediction) resolved (e.g. see JCTVC-C268)
  - Examine subjective differences
  - Examine interaction with other tools
  - Include TE7 MDDT simplifications and recent ROT improvements