

Intra depth-map coding using flexible segmentation, constrained depth modeling modes and simplified/pruned directional prediction

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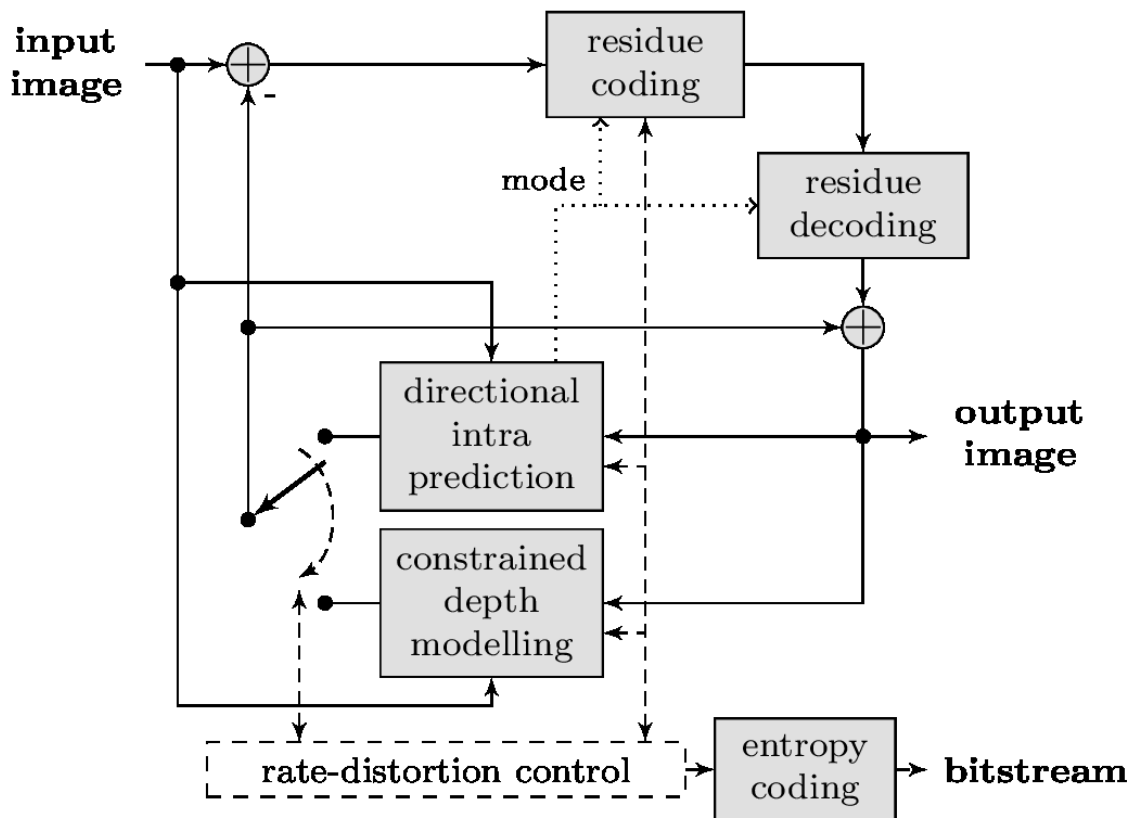
Chair of Multimedia Telecommunications and Microelectronics
Poznań University of Technology, Poland

m34292, July 2014, Sapporo

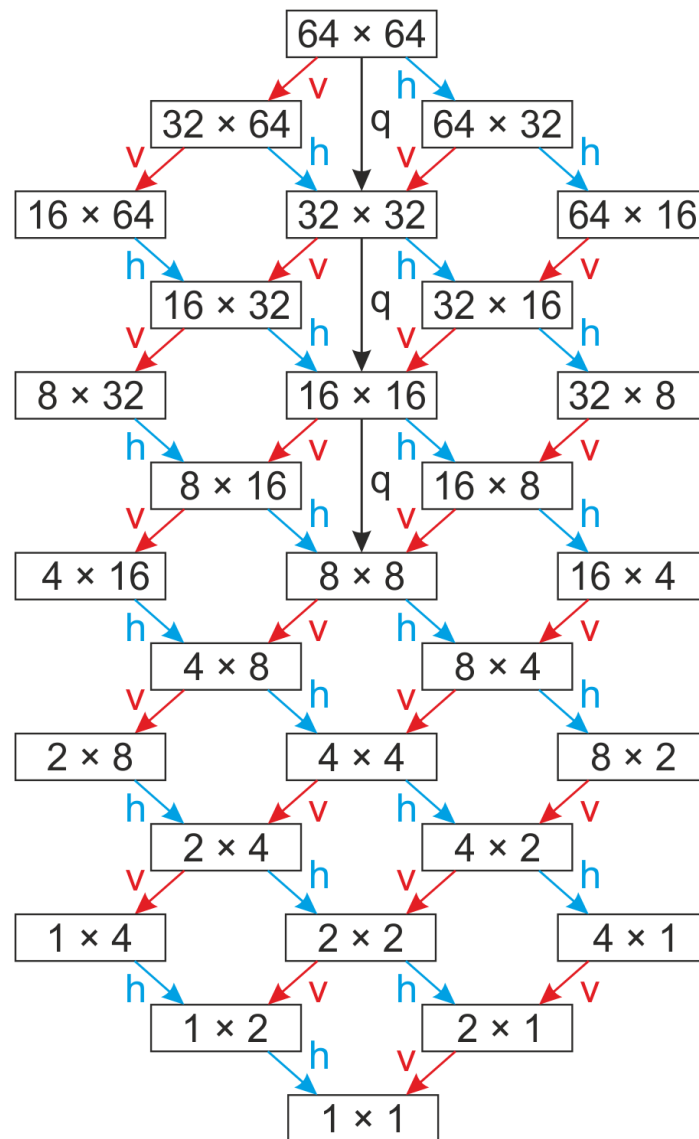
■ 3D-HEVC

- Design for video and depth coding
- It can be used for depth coding only
- Intra directional prediction
- Transform based residual coding
- Depth specific tools
 - Depth modeling modes (DMM)
 - Depth lookup table (DLT)
 - Region boundary chain coding
 - All in-loop filters disable

- Flexible Block Partitioning
- Directional Intra Prediction
 - Pre-defined reduction intra direction
 - Adaptive reduction intra direction
- Constrained Depth Modelling Mode
- Non-transform residual signal coding

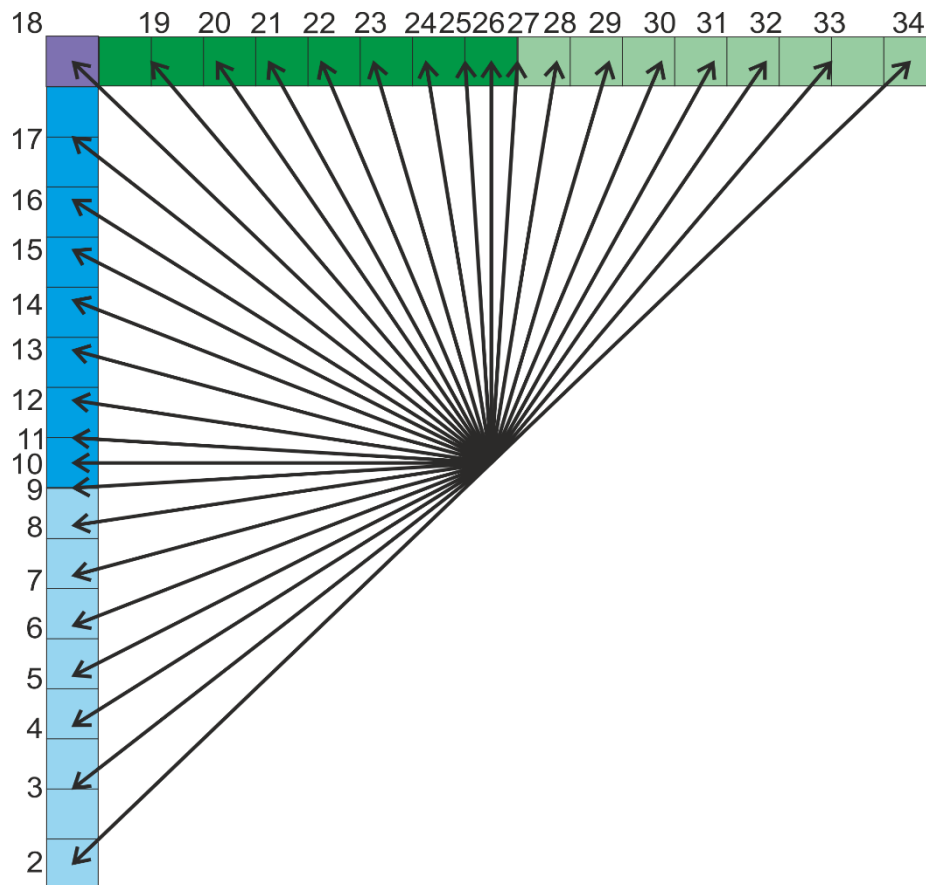


- Combination of QuadTree and BinTree
 - Quad split (q)
 - Horizontal split (h)
 - Vertical split (v)
- Various block sizes allowed
 - From 64x64
 - Down to 1x1
 - High asymmetry block excluded e.g. 8x64, 1x64



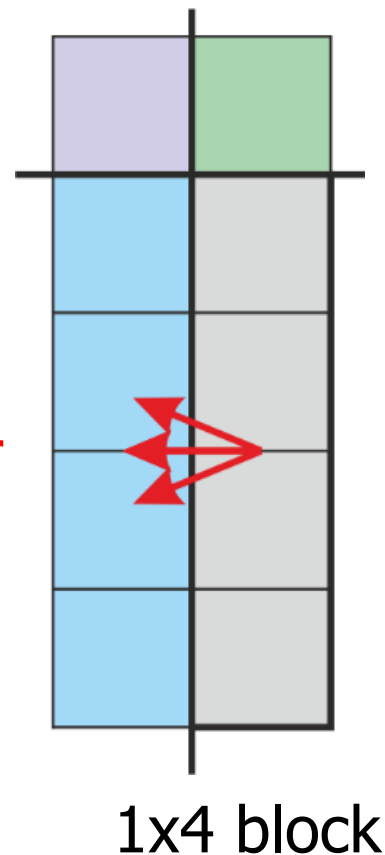
- Intra directional prediction from HEVC

- Planar
- DC
- 33 angular



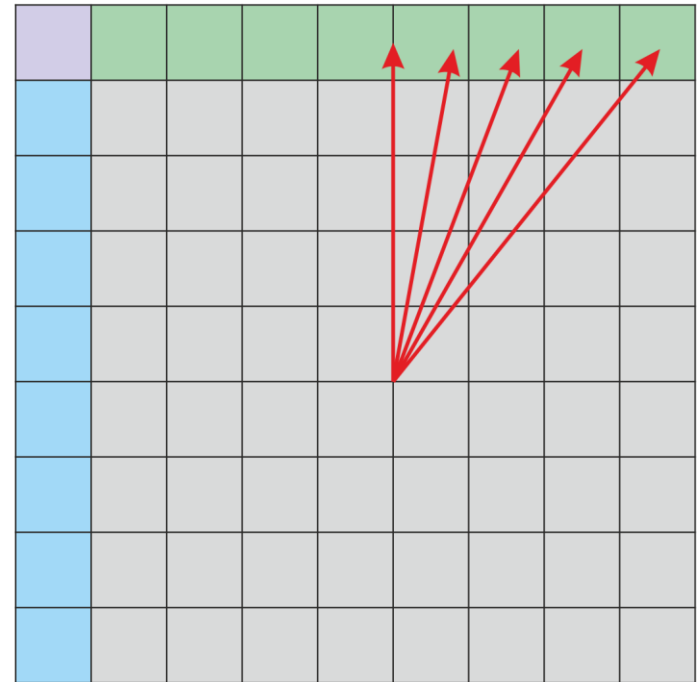
- In case of
 - small blocks
 - asymmetric blocksmany directions produce similar prediction signal
- Pre-defined set of directions for every block size
 - Reduced computational complexity
 - Reduced necessary bits

Directions that produce similar prediction

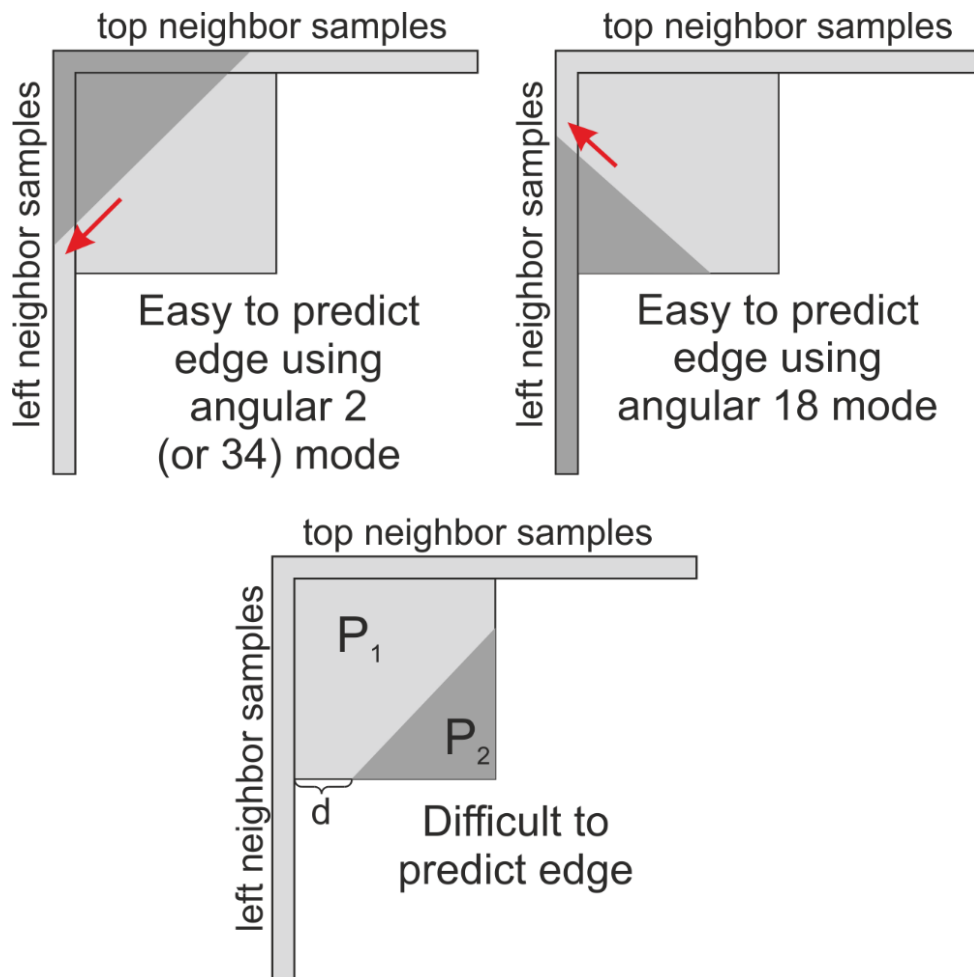


- When all reference samples are exactly the same
 - many directions produce similar prediction signal
- Three sets of directions can be disabled depending on
 - Top and left neighbor samples
 - Disable of modes 10-26
 - Left neighbor samples
 - Disable of modes 2-9
 - Right neighbor samples
 - Disable of modes 27-34

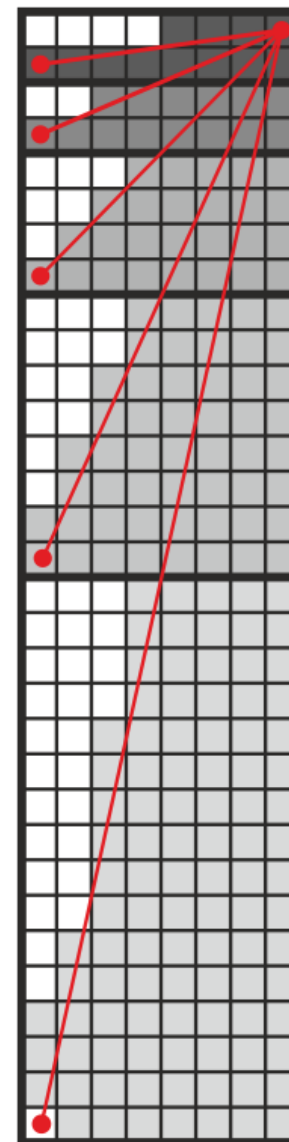
Directions that produce similar prediction



- Similar to DMM in 3D-HEVC
- Designed to represent edges difficult to predict
- Only edges located below anti-diagonal of the block
- Minimal signaling
 - Average depth value of the partition P_1 and P_2
 - Distance in pixels from anti-diagonal d

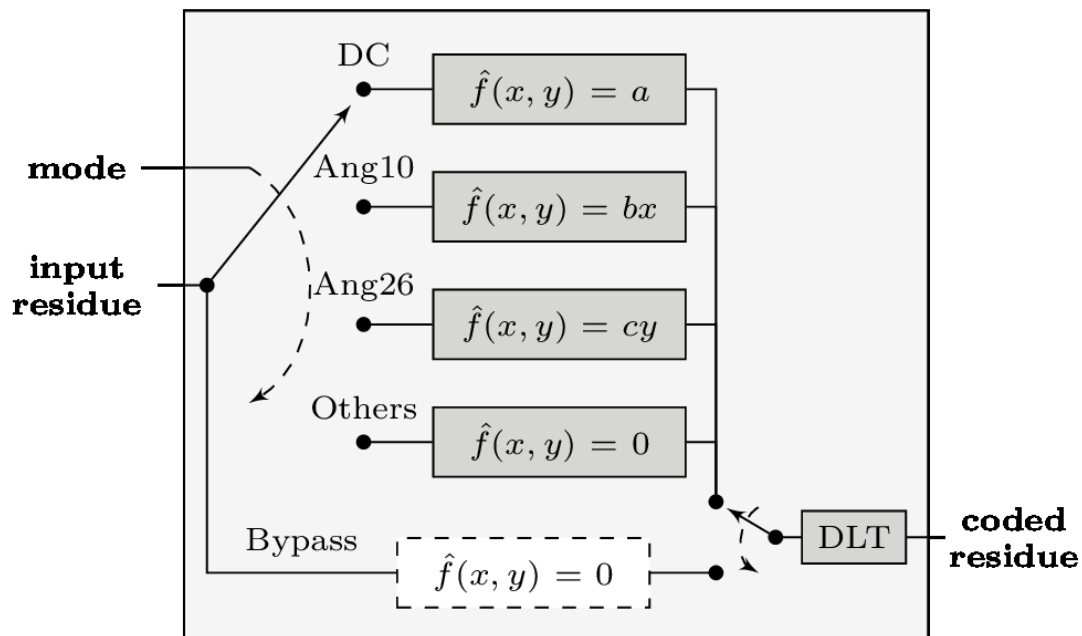


- Various slopes possible
- Depends on block size
- Exploits flexible partitioning



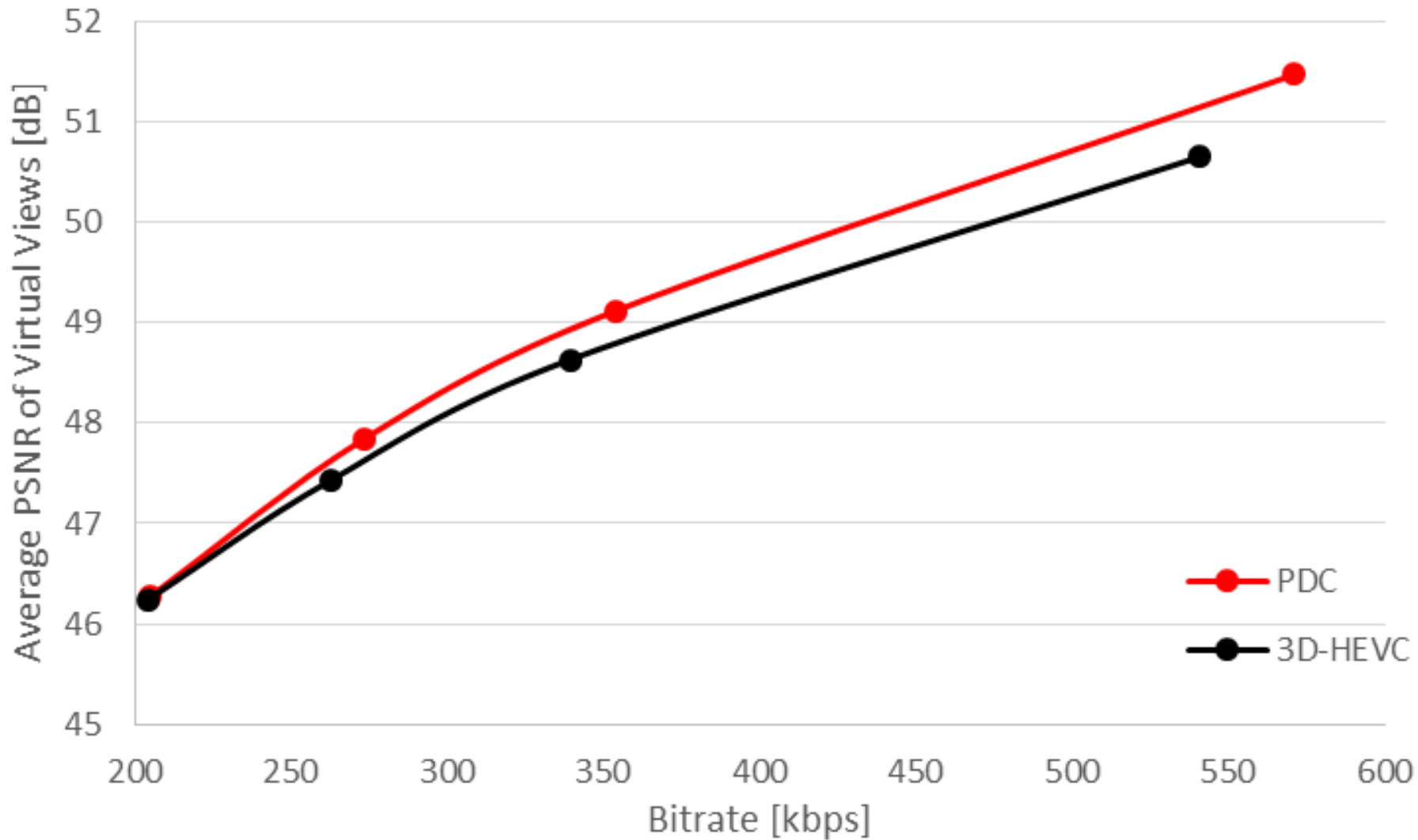
- DCT not used
- Residual coding depending on predic mode used
- Null residual or
- Simple linear approximation

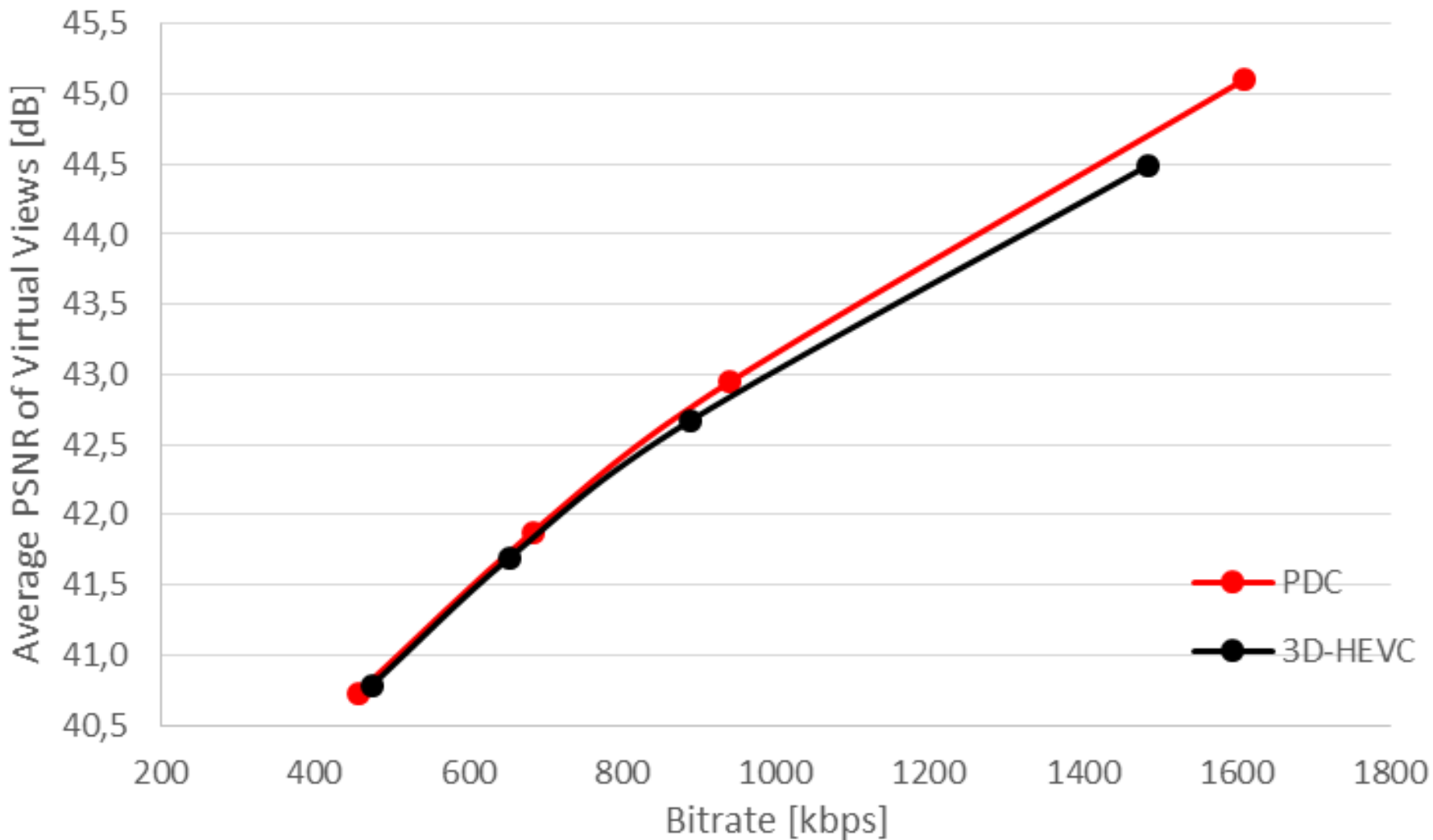
- Enhanced by DLT as in 3D-HEVC



- Compared with 3D-HEVC version 8.2
- All Intra configuration, without VSO
- Only depth maps were coded
- Seven 3D test sequences used (+shark)
- Compared at 4 rate points
- Following evaluation methodology from CTC
 - Virtual views synthesized based on original video and decoder depth maps

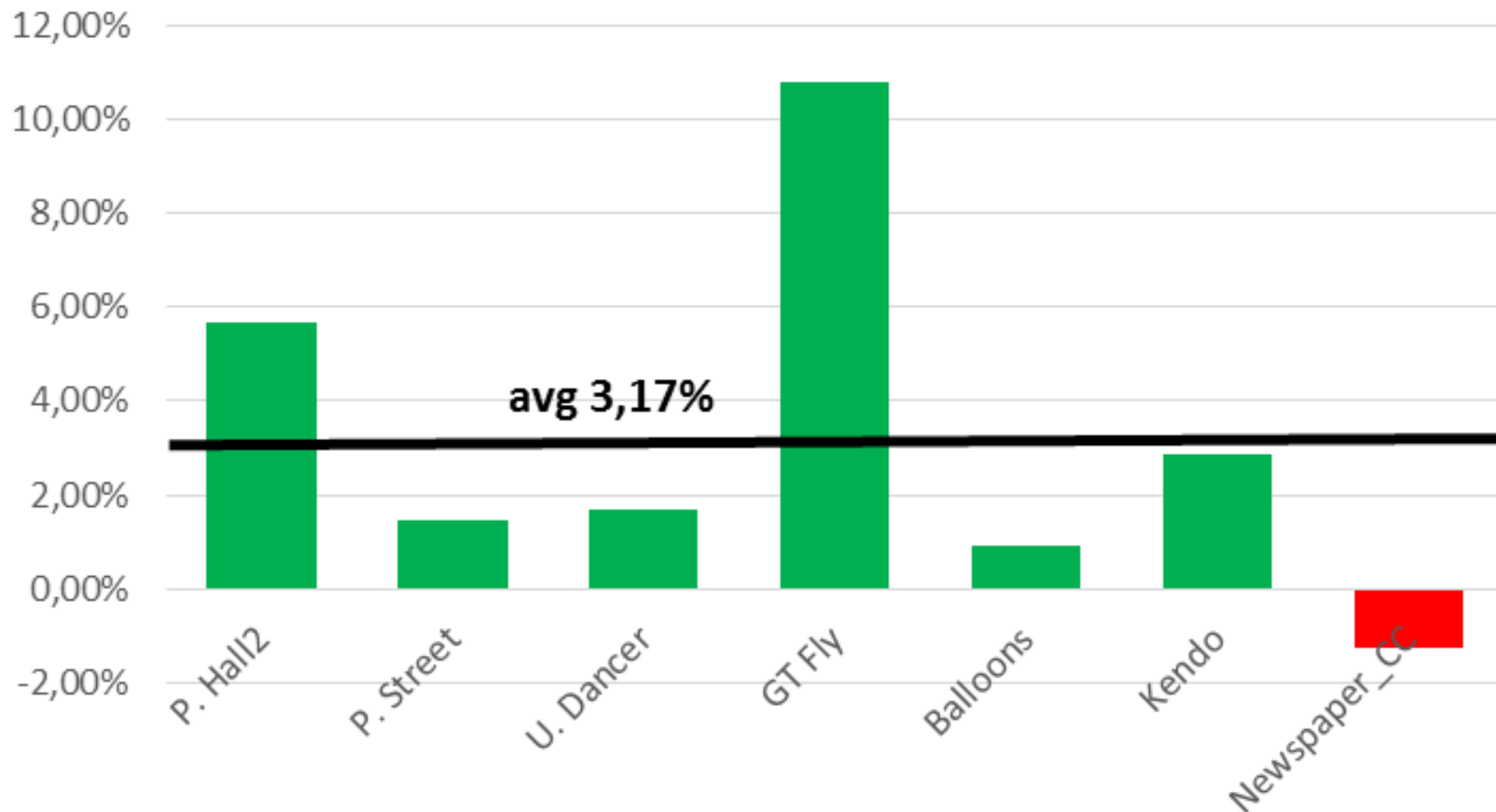


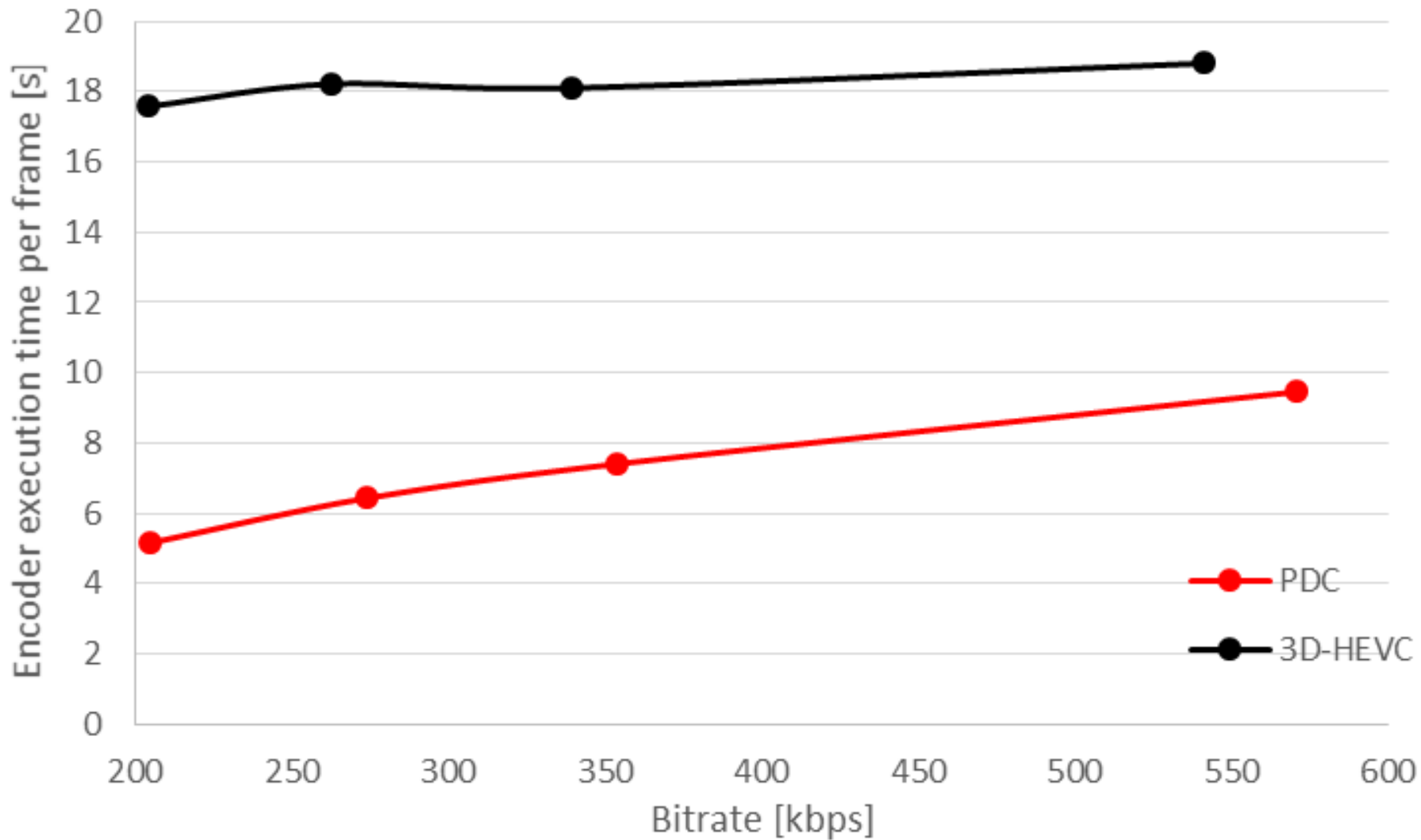


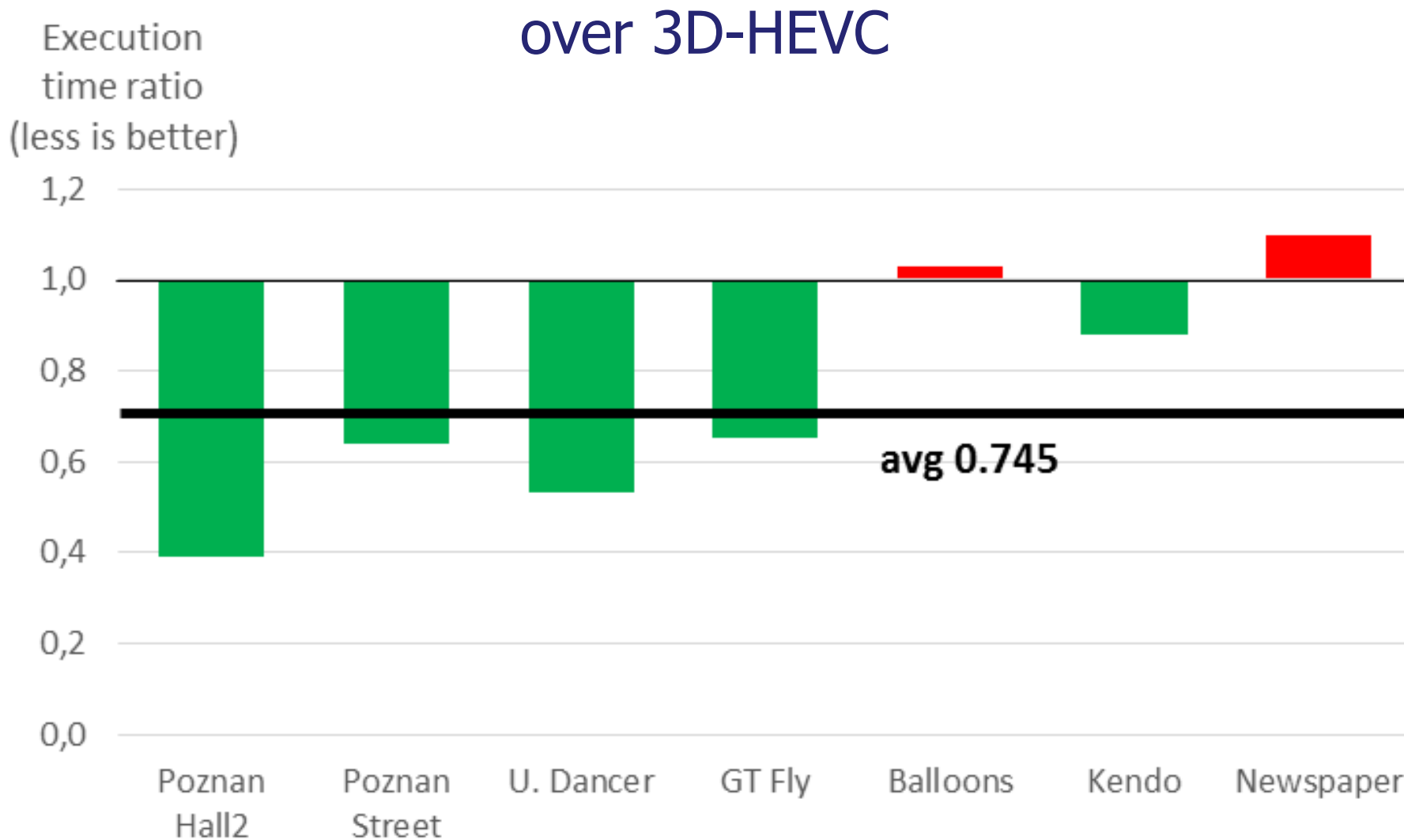


for depth maps, over 3D-HEVC

BD-Bitrate







- New intra based depth maps coding algorithm has been developed
- Provide an **alternative** approach to depth coding
- Provides **3.17%** bitrate reduction on average
- **25%** less complex than state-of-the-art 3D-HEVC

- Requires further works
 - To support VSO
 - Inter-frame prediction

Questions?
