Title:	**3D-CE6 related: Complexity Reduction of DMM Mode 3**
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Abstract

This proposal describes a complexity reduction method for DMM mode 3. By applying a 1-D 3-tap difference filter, four difference points are acquired. Rather than full search, six patterns, representing each orientation, are searched where start/end positions are difference points. The proposed method was implemented on HTM-4.0.1. Simulation results show 3.1% decoder complexity reduction while maintaining performance.

1 Introduction

In 3DV-HTM, depth modeling modes (DMM) are used for depth coding. For DMM mode 3, wedgelet of the depth block is predicted from its colocated texture luma block (CTLB). Table 1 describes the number of patterns required in wedgelet search. However, full search of wedgelet candidates induces high complexity.

Table 1. Number of wedgelet patterns searched

Block size	Wedgelet resolution	Number of patterns
4x4	Half-pel	86
8x8	Half-pel	782
16x16	Full-pel	1394
32x32	Double-pel	1503

2 Proposed Method

Rather than full search, the proposed method first identifies difference points of each side, and then searches only patterns pertaining to such combinations.

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Difference points are identified based on a 1-D 3-tap filter. The filter is applied horizontally for top and bottom, and vertically for left and right sides. For each pixel, the absolute difference of its directly neighboring pixels along the side is calculated. This generates four difference points.

Two of the estimated difference points according to the orientation are used for searching. Since six orientations are defined in wedgelets, a total of six patterns are searched regardless of the block size. Figure 1 represents the flowchart of the proposed algorithm.
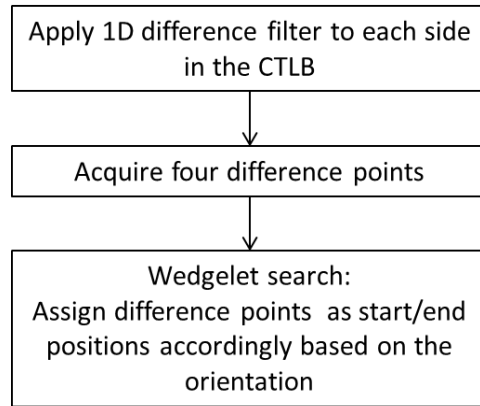

Figure 1. Flowchart of the proposed algorithm

Figure 2 shows an example of CTLB. The red circles indicate two difference points which are start/end positions. In this example, these points will be used in orientation 0 search, which implies that wedgelet starts from top and ends at left. For bottom and right sides, any pixel could be difference points since intensity change along the side is very small.
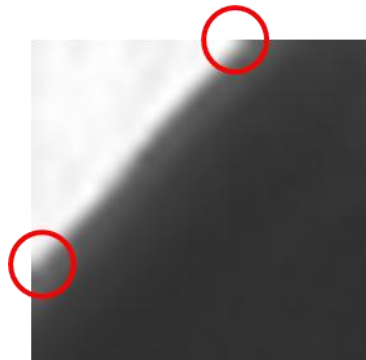

Figure 2. Example of start (top) and end (left) positions for orientation 0 search

To take wedgelet resolution into consideration, difference point positions are adjusted. For half-pel, the coordinate representing the side is doubled. Similarly for double-pel, the coordinate is reduced by half.

3 Simulation Results

The proposed method was tested on HTM-4.0.1 under the common test conditions [1]. Table 2 represents the results of 3-view case. Video coding results are identical to the anchor results since the proposed method affects only depth coding. Decoder complexity was reduced by 3.1% on average while maintaining coding and synthesis performance.

Table 2. Results of 3-view case

	video only	synthesized only	coded & synthesized	enc time	dec time	ren time
Balloons	0.0%	0.0%	0.0%	101.4%	98.7%	111.1%
Kendo	0.0%	0.1%	0.1%	102.9%	98.2%	94.9%
Newspapercc	0.0%	0.0%	0.0%	101.3%	94.3%	93.8%
GhostTownFly	0.0%	0.0%	0.0%	100.1%	96.5%	100.6%
PoznanHall2	0.0%	0.1%	0.0%	99.5%	96.0%	100.0%
PoznanStreet	0.0%	0.0%	0.0%	100.2%	96.5%	101.1%
UndoDancer	0.0%	0.0%	0.0%	100.0%	98.0%	103.7%
1024x768	0.0%	0.0%	0.0%	101.9%	97.0%	99.6%
1920x1088	0.0%	0.0%	0.0%	100.0%	96.7%	101.3%
average	**0.0%**	**0.0%**	**0.0%**	**100.8%**	**96.9%**	**100.6%**

4 Conclusion

The proposed method targets complexity reduction of DMM mode 3 in 3DV-HTM. Four difference points are estimated by calculating difference values of top, bottom, left, and right sides. Rather than full search, only six patterns are searched, representing each orientation. Two of the four difference points are selected according to the orientation. Experimenting on HTM-4.0.1, the decoder complexity was reduced by 3.1% while maintaining performance.

5 Reference

[1] ISO/IEC JTC1/SC29/WG11, "Common test conditions for 3DV core experiments," JCT3V-A1100, Stockholm, SE, July 2012.

6 Acknowledgment

7 Patent rights declaration(s)

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