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| *Title:* | **A Comparison of HM-5.0 ALF with H0068’s Proposed Single-Shape ALF for Some Video Sequences** | | |
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# Abstract

This contribution presents the advantages of using HM-5.0’s two ALF filter shapes. Using both test-set and non-test-set video sequences, it is shown that a single-shape ALF solution doesn’t allow enough adaptivity to handle all kinds of video content. More specifically, compared to HM-5.0, the proposed single shape in [2] yields large coding efficiency losses in several test-set and non-test-set video sequences.

# Introduction

In the 7th JCT-VC meeting held at Geneva, Switzerland, ALF using two shapes, Snowflake5x5 and Cross9x9 [1], both having 9 coefficients, was adopted. The two shapes in [1] are depicted in Figure 1 below.



Figure 1 ALF shapes in HM-5.0

In [2], different single-shape solutions have been proposed, and the shape (depicted in Figure 2) that yields the best complexity-performance trade-offs is considered in our experiments.



Figure 2: Proposed ALF shape in [2]

# Simulation Results

The BD-Rate performance of the proposed single shape is shown in Table 1 for those test-set video sequences where the single shape achieves large losses. Even that many single-shape solutions have been tested, some losses are still observed in some test-set video sequences, as illustrated in Table 1 below. For example, the average BD-Rate loss for the Vidyo1 and Vidyo3 sequences for LDP/LD is **0.5%**.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Sequence** | **Resolution** | **IO** | | | **LD-P** | | | **LD** | | | **RA** | | |
| BQSquare | WQVGA | **0.0%** | 0.0% | 0.0% | **0.0%** | 0.3% | 0.5% | **0.6%** | -0.8% | -0.3% | **0.5%** | -0.1% | 0.1% |
| Vidyo1 | 720p | **-0.2%** | -0.1% | -0.1% | **0.5%** | 0.1% | 0.2% | **0.3%** | -0.2% | 0.0% |  |  |  |
| Vidyo3 | 720p | **-0.2%** | -0.1% | 0.0% | **0.9%** | -0.9% | -1.1% | **0.3%** | -0.2% | 0.2% |  |  |  |

Table 1 Single shape performance in some test-set sequences

Following the conditions in [3], experiments were also conducted using the HM-5.0 software for some non-test-set sequences. Table 2 compares the BD-Rate performance of the HM-5.0 shapes with that of the single shape proposed in [2].

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Sequence** | **Resolution** | **IO** | | | **LDP** | | | **LD** | | | **RA** | | |
| ShuttleStart | 720p | **-0.1%** | -0.2% | -0.2% | **0.0%** | -0.5% | 0.3% | **-0.2%** | -1.0% | -0.4% | **-0.1%** | -0.3% | -0.2% |
| City | 720p | **-0.3%** | -0.1% | -0.1% | **0.0%** | -0.5% | -0.1% | **0.7%** | 0.3% | 0.8% | **0.2%** | -0.3% | 0.0% |
| Crew | 720p | **-0.1%** | -0.1% | -0.1% | **-0.1%** | 0.0% | 0.0% | **-0.1%** | -0.2% | 0.2% | **-0.1%** | 0.4% | -0.1% |
| Jets | 720p | **-0.1%** | 0.0% | 0.0% | **-0.3%** | 0.5% | 1.7% | **0.2%** | 1.1% | -0.8% | **0.0%** | 0.0% | 0.5% |
| SpinCalendar | 720p | **-0.4%** | -0.2% | -0.7% | **0.4%** | 0.1% | -0.5% | **0.3%** | 0.0% | -0.7% | **0.0%** | -0.2% | -0.2% |
| BlueSky | 1080p | **0.3%** | -0.1% | -0.3% | **1.5%** | 0.5% | 0.3% | **1.2%** | 0.5% | 0.5% | **1.2%** | 0.2% | -0.1% |
| RiverBed | 1080p | **-0.1%** | 0.0% | 0.0% | **-0.1%** | 0.1% | 0.0% | **-0.1%** | 0.0% | 0.0% | **-0.1%** | 0.1% | -0.2% |
| Station2 | 1080p | **-0.1%** | 0.0% | 0.0% | **1.2%** | -0.1% | -0.3% | **0.7%** | 0.4% | 0.1% | **0.3%** | -0.3% | 0.0% |
| Sunflower | 1080p | **-0.1%** | 0.0% | 0.0% | **0.1%** | -0.1% | 0.0% | **0.0%** | -0.3% | -0.1% | **0.0%** | -0.1% | 0.1% |
| WalkingCouple | 1080p | **-0.1%** | 0.0% | 0.0% | **-0.1%** | 0.1% | -0.1% | **-0.2%** | -0.1% | -0.1% | **-0.2%** | 0.0% | 0.2% |

Table 2 BD-Rate performance of ALF using the single shape of [2] for some non-test-set video sequences

The obtained results show the incapability of the single-shape solution to maintain good coding efficiency for a variety of video sequences. For example, in the City, BlueSky and Station2 video sequences, the single-shape solution of [2] degrades the coding efficiency for LDP/LD/RA by an average of **0.8%**.

# Conclusions

Compared to the HM-5.0 ALF, the proposed single-shape ALF of [2] degrades noticeably the coding efficiency for some test-set and non-test-set video sequences.

# References

1. “CE8.d.1: Snowflake5x5 and cross9x9 for luma and chroma ALF shapes”, JCTVC-G208, 7th Meeting: Geneva, CH, 21-30 November, 2011.
2. “CE8.b: ALF with single filter type”, JCTVC-H0068, 8th Meeting: San José, CA, USA, 1–10 February, 2012.
3. “Common test conditions and software reference configurations”, JCTVC-G1200, 7th Meeting: Geneva, CH, 21-30 November, 2011.

# Patent rights declaration(s)

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