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| *Title:* | **CE6.d: Cross Check of Category 4 on Tool Combinations for Intra Prediction with Secondary Boundary** | | |
| *Status:* | Input Document to JCT-VC | | |
| *Purpose:* | Information | | |
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# Abstract

In CE6.d experiments are carried out on intra prediction with secondary boundary. Filtering, gradient and bi-directional prediction tools are applied to the boundary of directional and non-directional intra predicted PUs. In particular, the goal of CE6.d Category 4 is to experiment with tool balanced combinations to achieve good BD-rate gains. This cross check confirms the BD-rate results of Tests 9 to 13 as specified in JCTVC-G565. The source code is checked against the various tool descriptions and corresponds.

# Cross Check of Results

For a description of the tests performed in CE6.d Category 4 and references to the tools, see [1]. The following tables enumerate the cross checked results for “Tests 9 to 13”. The execution times are measured in a heterogeneous computing environment and are therefore approximate. In CE6 it was decided to exclude class F from the results, hence, they are not included in the tables. All BD-rate results match those from [1].

Table “Test 9” results

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **All Intra HE** | | | **All Intra LC** | | |
|  | Y | U | V | Y | U | V |
| Class A | -0.7% | -0.7% | -0.6% | -0.6% | -0.8% | -0.9% |
| Class B | -0.4% | -0.4% | -0.4% | -0.3% | -0.6% | -0.6% |
| Class C | -0.4% | -0.4% | -0.4% | -0.4% | -0.5% | -0.5% |
| Class D | -0.5% | -0.4% | -0.5% | -0.5% | -0.5% | -0.5% |
| Class E | -0.6% | -0.5% | -0.5% | -0.5% | -0.7% | -0.7% |
| **Overall** | -0.5% | -0.5% | -0.5% | -0.5% | -0.6% | -0.6% |
|  | -0.5% | -0.5% | -0.5% | -0.5% | -0.6% | -0.6% |
| Enc Time[%] | 96% | | | 94% | | |
| Dec Time[%] | 104% | | | 105% | | |

Table “Test 10” results

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **All Intra HE** | | | **All Intra LC** | | |
|  | Y | U | V | Y | U | V |
| Class A | -0.7% | -0.6% | -0.6% | -0.5% | -0.7% | -0.8% |
| Class B | -0.5% | -0.4% | -0.4% | -0.4% | -0.6% | -0.6% |
| Class C | -0.6% | -0.5% | -0.5% | -0.6% | -0.7% | -0.6% |
| Class D | -0.6% | -0.5% | -0.6% | -0.6% | -0.6% | -0.6% |
| Class E | -0.6% | -0.4% | -0.5% | -0.6% | -0.7% | -0.6% |
| **Overall** | -0.6% | -0.5% | -0.5% | -0.5% | -0.6% | -0.6% |
|  | -0.6% | -0.5% | -0.5% | -0.5% | -0.6% | -0.6% |
| Enc Time[%] | 104% | | | 95% | | |
| Dec Time[%] | 104% | | | 104% | | |

Table “Test 11” results

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **All Intra HE** | | | **All Intra LC** | | |
|  | Y | U | V | Y | U | V |
| Class A | -0.7% | -0.6% | -0.6% | -0.6% | -0.7% | -0.8% |
| Class B | -0.5% | -0.5% | -0.5% | -0.4% | -0.6% | -0.6% |
| Class C | -0.5% | -0.5% | -0.5% | -0.5% | -0.6% | -0.6% |
| Class D | -0.5% | -0.5% | -0.6% | -0.6% | -0.6% | -0.6% |
| Class E | -0.6% | -0.6% | -0.7% | -0.6% | -0.7% | -0.8% |
| **Overall** | -0.6% | -0.5% | -0.6% | -0.5% | -0.6% | -0.7% |
|  | -0.6% | -0.6% | -0.6% | -0.5% | -0.6% | -0.7% |
| Enc Time[%] | 100% | | | 97% | | |
| Dec Time[%] | 101% | | | 102% | | |

Table “Test 12” results

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **All Intra HE** | | | **All Intra LC** | | |
|  | Y | U | V | Y | U | V |
| Class A | -0.9% | -0.8% | -0.9% | -0.8% | -1.0% | -1.1% |
| Class B | -0.7% | -0.7% | -0.6% | -0.6% | -0.8% | -0.8% |
| Class C | -0.6% | -0.7% | -0.7% | -0.7% | -0.8% | -0.7% |
| Class D | -0.6% | -0.7% | -0.7% | -0.7% | -0.7% | -0.7% |
| Class E | -0.8% | -0.8% | -1.0% | -0.8% | -0.9% | -0.9% |
| **Overall** | -0.7% | -0.7% | -0.7% | -0.7% | -0.8% | -0.9% |
|  | -0.7% | -0.7% | -0.7% | -0.7% | -0.8% | -0.9% |
| Enc Time[%] | 98% | | | 98% | | |
| Dec Time[%] | 101% | | | 102% | | |

Table “Test 13” results

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **All Intra HE** | | | **All Intra LC** | | |
|  | Y | U | V | Y | U | V |
| Class A | -0.9% | -0.8% | -0.9% | -0.8% | -1.0% | -1.1% |
| Class B | -0.6% | -0.6% | -0.6% | -0.6% | -0.8% | -0.8% |
| Class C | -0.6% | -0.6% | -0.7% | -0.7% | -0.8% | -0.7% |
| Class D | -0.7% | -0.6% | -0.7% | -0.7% | -0.7% | -0.7% |
| Class E | -0.8% | -0.7% | -0.9% | -0.7% | -0.9% | -0.9% |
| **Overall** | -0.7% | -0.7% | -0.7% | -0.7% | -0.8% | -0.8% |
|  | -0.7% | -0.7% | -0.7% | -0.7% | -0.8% | -0.9% |
| Enc Time[%] | 97% | | | 98% | | |
| Dec Time[%] | 97% | | | 98% | | |

# Cross Check of Source Code

The source code was thoroughly studied and verified against the various Torino proposals. No discrepancies with the proposals were observed.

# Conclusions

This cross check confirms the BD-rate results reported in JCTVC-G565 for Tests 9 to 13. The source code was studied and corresponds to the proposals describing the various intra prediction with secondary boundary tools.

# References

[1] J. Lainema, K. Ugur, “CE6.d: Nokia report on intra prediction with secondary boundary,” 7th JCT-VC Meeting, Geneva, Switzerland, November 2011, Doc. JCTVC-G565