

Suggested Software Implementation

JCTVC-K0345r3

Overview

- General
- HM 6.1 and HM 8.1 versions
- Performance
- Speed
- Memory usage
- Matching software and description
- Additional Material
on Tool Experiment Discussion

General

- Software JCTVC-K0345 offered for use as starting point for the scalability extension work
- Software has high commonality with the HM software and can be merged and maintained with it
- Individual tools are identified by macros and may be individually enabled and disabled

Status of HM 6.1 version

- Based on merging subsets of the software in CfP responses JCTVC-K0042 and JCTVC-K0045
- Results available for all test cases:
 - AI, RA, SNR, AVC
- Software made available on request since 11 October
- 17 companies in JCT-VC have requested and evaluated the JCTVC-K0345 software
 - The feedback has helped to significantly improve it

Status of HM 8.1 version

- HM 8.1 integrated into software
- Performance verified
 - Created HM 8.1 base layer bit streams using same QPs as in CfP
 - Created HM 8.1 single layer anchors using same QPs as in CfP
- Updated software released on 17 October via JCT-VC document repository
 - More thorough removal of unused software elements
 - Reduced memory requirements while maintaining coding efficiency

Performance

- Comparable to best submissions to CfP with inter-layer only tools despite minimal tool set

HM6.1 based	x2 AI	x1.5 AI	x2 RA	x1.5 RA	SNR RA	x2 AVC	x1.5 AVC
JCTVC-K0042	35.8%	54.5%	31.5%	48.9%	39.3%	30.0%	44.9%
JCTVC-K0345	34.8%	54.3%	30.5%	47.9%	37.6%	28.4%	43.6%
JCTVC-K0045	35.4%	54.1%	30.3%	47.1%	36.8%	28.9%	43.2%

HM8.1 based	x2 AI	x1.5 AI	x2 RA	x1.5 RA	SNR RA	x2 AVC	x1.5 AVC
JCTVC-K0345	34.6%	53.9%	30.9%	48.8%	37.7%	28.7%	44.0%
JCTVC-K0345*	38.4%	57.8%					

* Simulcast QP settings

Speed

- Encoder and Decoder faster than K0045 and K0042
- Run-time comparison of JCTVC-K0345 vs JCTVC-K0045
 - Both implemented based on HM 6.1
 - Both used same QP settings

Test case	Encoding time	Decoding time
All Intra HEVC 2x	95%	87%
All Intra HEVC 1.5x	95%	87%
Random Access HEVC 2x	94%	85%
Random Access HEVC 1.5x	94%	85%
Random Access HEVC SNR	94%	84%

Memory usage

- New HM 8.1-based JCTVC-K0345 software release significantly reduces memory requirements from the initial release while maintaining identical coding behaviour
- Memory requirements depend on the tools enabled

Memory usage

- Maximum memory usage for SVC test cases

Class A+ SNR

Coding tools	Encoder	Decoder
Intra_BL	5.2 Gbyte (208 %)	2.1 Gbyte (190 %)
Intra_BL + motion pred.	6.8 Gbyte (272 %)	3.1 Gbyte (282 %)
Intra_BL + motion pred. + diff. coding	7.2 Gbyte (288 %)	3.3 Gbyte (300 %)
old version	11.3 Gbyte (452 %)	5.2 Gbyte (473 %)
HM 8.1 (single layer)	2.5 Gbyte (100 %)	1.1 Gbyte (100 %)

Matching software and description

- Helpful identification of alignment issues between software and description was provided in JCTVC-K0373
 - Residual fragments of unused tools from CfP responses were more thoroughly removed
 - Missing description of deblocking filter copied from JCTVC-K0045
- All identified alignment issues have been resolved in JCTVC-K0345r2 and the corresponding HM 8.1-based software release

Conclusions on Software Package

- JCTVC-K0345r3 and associated software provides a well-structured and well-tested basis for the identified tool experiments
- Supports desired features of all identified tool experiments, including
 - HM 8.1
 - Both HEVC and AVC base layers
- Combines good performance with fast encoding and decoding times
 - Set of example interlayer-only coding tools
- Flexibility to allow testing of various options in tool experiments

Additional Material on Tool Experiment Discussion

Tool Categorization

- Category A:
 - Upsampling filters (non-adaptive)
 - Inter-layer texture prediction signalling
- Category B:
 - Combined prediction (combining BL & EL sample prediction)
 - Inter-layer filtering
- Category C:
 - Inter-layer syntax prediction with HEVC base layer
 - Inter-layer syntax prediction with AVC base layer
- Category D:
 - ALF for EL
 - Modified deblocking filter for EL

Comparison of Supported Features

Category	JCTVC-K0348	JCTVC-K0345
A	☑	☑
B		☑
C	☑	☑
D		

- AVC base layer support in JCTVC-K0345
- Verified example features for in all categories with identified tool experiments
 - Allows for testing of combinations of tools and categories

Possible Test Methodology

- Make simulcast the reference for category A
- Perform category B and C tests on top of agreed example category A tools
- Provide additional results when enabling other features in combined tests
 - Using features in software or
 - Other additionally implemented features
- Defer category D tests