ASG-HEVC

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Overview

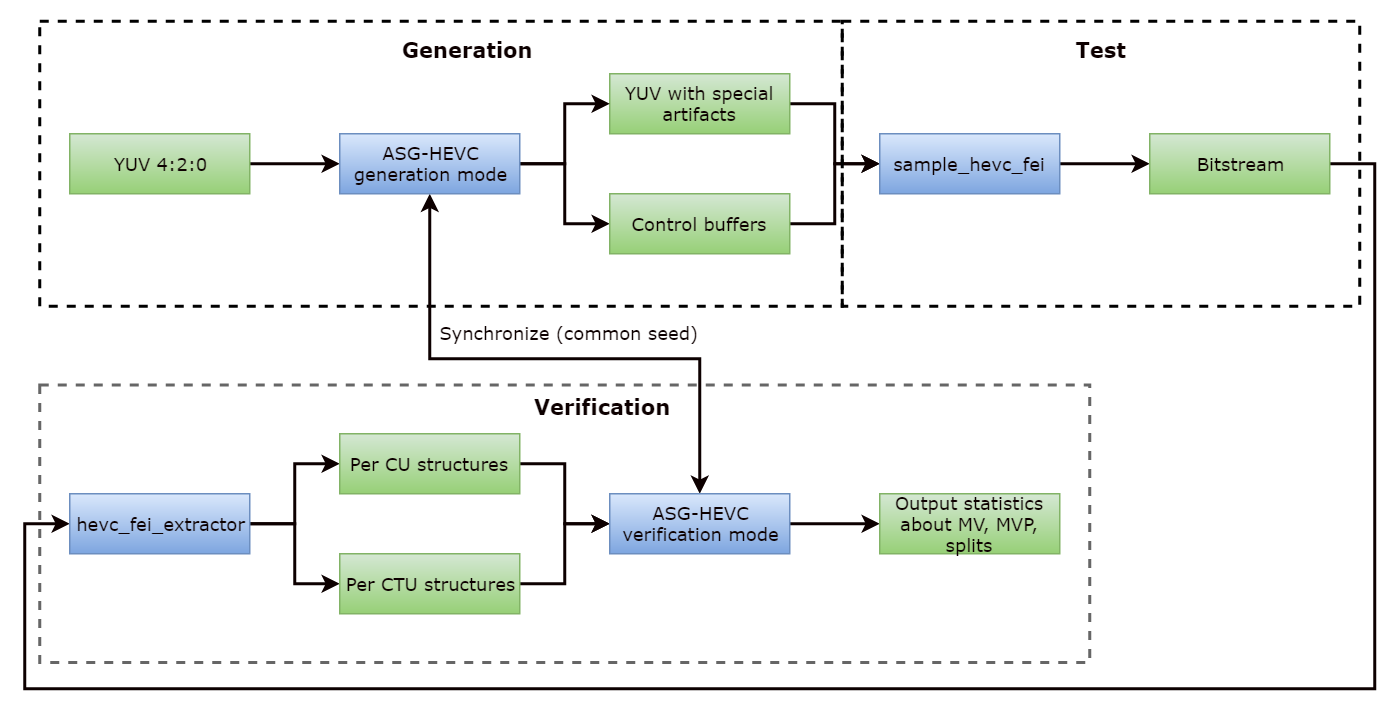
**ASG-HEVC** is the specific validation tool for the motion estimation/mode decision. Current tool was developed to analyze HEVC FEI (Flexible encoding infrastructure) encoder.

Tool helps to check:

* Motion estimation quality in cases w/ and w/o External MVP (FEI specific).
* Optimality of Inter/Intra predictions.

Tool is required for validation of the open source MSDK.

The picture below shows the typical validation pipeline.



Running the Software

Usage:

asg-hevc -i InputYUVFile -o OutputYUVFile -w width -h height -n number\_of\_frames\_to\_process

The above params are required. If -pic\_file or repack parameters are enabled, parameters -i InputYUVFile -o OutputYUVFile -w width -h height can be removed.

Additional options:

|  |  |
| --- | --- |
| -g <size> | GOP size. |
| -r <number> | Number of B frames plus 1. |
| -x <size> | DPB size in frames. |
| -idr\_interval <interval> | IDR interval in frames. |
| -num\_active\_P <number> | Number of active references for P frames. |
| -num\_active\_BL0 <number> | Number of active List 0 references for B frames. |
| -num\_active\_BL1 <number> | Number of active List 1 references for B frames. |
| -generate | Run ASG in test stream generation mode. |
| -verify | Run ASG in test results verification mode. |
| -gen\_split | Enable CTU splitting. |
| -no\_cu\_to\_pu\_split | Disable CU splitting into Pus. |
| -force\_extbuf\_mvp\_block\_size <size> | Force mfxFeiHevcEncMVPredictors::BlockSize field in MVP output buffer to a specified value. ALL output mfxFeiHevcEncMVPredictors structs will be affected. Supported values are 0, 1, 2 and 3. See MVPredictor description in HEVC FEI manual for details. |
| -mvp\_block\_size <size> | Actual MVP block size used in actual generation algorithm.  If -force\_extbuf\_mvp\_block\_size is not specified, this value is used in output mfxFeiHevcEncMVPredictors::BlockSize only for the structures for which MVPs were actually generated.  When -force\_extbuf\_mvp\_block\_size is specified and -mvp\_block\_size is not default algorithm for MVP generation is used : MVP block size equals to CTU size.  When both -force\_extbuf\_mvp\_block\_size and -mvp\_block\_size are specified : the 1st one value is used in the output ExtBuffer regardless to actual MVP block size.  Supported values are 0, 1, 2 and 3. |
| -force\_symm\_cu\_part | Forces using only symmetric CU into PU partioning modes for inter prediction test. |
| -gen\_inter | Generate inter CUs (inter prediction test). |
| -gen\_intra | Generate intra CUs (intra prediction test). |
| -gen\_pred | Generate MV predictors (inter prediction test). |
| -gen\_mv | Generate motion vectors inside search window (inter prediction test).  If -gen\_mv is not specified, then resulting MVs for PUs will be generated outside the search window only. |
| -gen\_repack\_ctrl | Generate/verify repack control data. |
| -pred\_file <File> | Output file for MV predictors. |
| -pic\_file <File> | Output file for pictures' structure. |
| -log2\_ctu\_size <size> | Log2 CTU size to be used for CU quad-tree structure. Default is 4. Cannot be less than min\_log2\_tu\_size (described below). |
| -min\_log2\_tu\_size <size> | Minimum log2 TU size to be used for quad-tree structure. Must be less than min\_log2\_cu\_size (described below), default is 2. |
| -max\_log2\_tu\_size <size> | Maximum log2 TU size to be used for quad-tree structure. Must be less than or equal to Min(log2\_ctu\_size, 5), default is 4. |
| -max\_tu\_qt\_depth <value> | Maximum TU quad-tree depth inside CU. Overrrides min\_log2\_tu\_size, default is 4. |
| -min\_log2\_cu\_size <size> | Mminimum log2 CU size to be used for quad-tree structure. Cannot be less than max\_log2\_tu\_size, default is 3. |
| -max\_log2\_cu\_size <size> | Maximum log2 CU size to be used for quad-tree structure. Cannot be larger than log2\_ctu\_size, default is 4. |
| -block\_size\_mask <size> | Bit mask specifying possible partition sizes. |
| -ctu\_distance <distance> | Minimum distance between generated CTUs (in units of CTU), default is 3. |
| -gpb\_off | Specifies that regular P frames should be used, not GPB frames. |
| -bref | Arrange B frames in B pyramid reference structure. |
| -nobref | Do not use B-pyramid. |
| -pak\_ctu\_file <File> | Input file with per CTU information. |
| -pak\_cu\_file <File> | Input file with per CU information. |
| -repack\_ctrl\_file <File> | Output/input file with repack control data for repack control generation/verify. |
| -repack\_stat\_file <InputFile> | Input file with repack stat data for repack control verify. |
| -repack\_str\_file <File> | Input file with multiPakStr data for repack control generation/verify. |
| -log <File> | Log output file. |
| -csv <File> | File to output statistics in CSV format. |
| -config <File> | Input configuration file. |
| -sub\_pel\_mode <value> | Specifies sub pixel precision for motion vectors.  0 - integer, 1 - half, 3 - quarter (0 is default). |
| -mv\_thres <value> | Threshold for motion vectors in percents (0 is default). |
| -numpredictors <number> | Number of MV predictors enabled. Used in verification mode to check NumMvPredictors FEI control works correctly.  Valid values are in range [1; 4] (4 is default). |
| -split\_thres <value> | Thresholds for partitions in percents (0 is default). |
| -DeltaQP <value(s)> | Array of delta QP values for repack ctrl generation, separated by a space (8 values at max). |
| -InitialQP <value> | The initial QP value for repack ctrl verify (26 is default). |

Below are examples of command-lines that can be used to execute ASG-HEVC:

**Test of the inter prediction for p-frames with EMVP**

Run of the validation tool in the generation mode (CU 16x16)

asg-hevc -generate -gen\_inter -gen\_mv -gen\_pred -gen\_split -i input\_1920x1088\_250.yuv -o test.yuv -w 1920 -h 1088 -n 250 -g 2 -x 1 -num\_active\_P 1 -r 1 -log2\_ctu\_size 5 -no\_cu\_to\_pu\_split -max\_log2\_cu\_size 4 -min\_log2\_cu\_size 4 -mvp\_block\_size 1 -gpb\_off -sub\_pel\_mode 0 -pred\_file emvp.mvin

Run a test application

sample\_hevc\_fei -i test.yuv -o test.hevc -w 1920 -h 1088 -n 250 -f 25 -qp 2 -g 2 -GopRefDist 1 -gpb:off -NumRefFrame 1 -NumRefActiveP 1 -NumPredictorsL0 4 -NumPredictorsL1 4 -encode -EncodedOrder -mvpin emvp.mvin

Run an extractor

hevc\_fei\_extractor test.hevc mvmvp.ctustat mvmvp.custat

Run of the validation tool in the verification mode

asg-hevc -verify -gen\_inter -gen\_mv -gen\_pred -gen\_split -w 1920 -h 1088 -n 250 -g 2 -x 1 -num\_active\_P 1 -r 1 -log2\_ctu\_size 5 -no\_cu\_to\_pu\_split -max\_log2\_cu\_size 4 -min\_log2\_cu\_size 4 -mvp\_block\_size 1 -gpb\_off -sub\_pel\_mode 0 -pak\_ctu\_file mvmvp.ctustat -pak\_cu\_file mvmvp.custat -mv\_thres 80 -split\_thres 80 -numpredictors 4

**Test of the inter prediction for b-frames with EMVP**

Run of the validation tool in the generation mode (CU 16x16)

asg-hevc -generate -gen\_inter -gen\_mv -gen\_pred -gen\_split -i matrix\_1920x1088\_250.yuv -o test.yuv -w 1920 -h 1088 -n 250 -g 32 -x 2 -num\_active\_P 1 -num\_active\_BL0 1 -num\_active\_BL1 1 -r 4 -log2\_ctu\_size 5 -no\_cu\_to\_pu\_split -max\_log2\_cu\_size 4 -min\_log2\_cu\_size 4 -mvp\_block\_size 1 -sub\_pel\_mode 0 -pred\_file emvp.mvin

Run a test application

sample\_hevc\_fei -i test.yuv -o test.hevc -w 1920 -h 1088 -n 250 -f 25 -qp 2 -g 32 -GopRefDist 4 -gpb:on -NumRefFrame 2 -NumRefActiveP 1 -NumRefActiveBL0 1 -NumRefActiveBL1 1 -NumPredictorsL0 4 -NumPredictorsL1 4 -encode -EncodedOrder -mvpin emvp.mvin

Run an extractor

hevc\_fei\_extractor test.hevc mvmvp.ctustat mvmvp.custat

Run of the validation tool in the verification mode

asg-hevc -verify -gen\_inter -gen\_mv -gen\_pred -gen\_split -w 1920 -h 1088 -n 250 -g 32 -x 2 -num\_active\_P 1 -num\_active\_BL0 1 -num\_active\_BL1 1 -r 4 -log2\_ctu\_size 5 -no\_cu\_to\_pu\_split -max\_log2\_cu\_size 4 -min\_log2\_cu\_size 4 -mvp\_block\_size 1 -sub\_pel\_mode 0 -pak\_ctu\_file mvmvp.ctustat -pak\_cu\_file mvmvp.custat -mv\_thres 70 -split\_thres 60 -numpredictors 4

**Test of the multi-pass PAK**

Run a test application

sample\_hevc\_fei -i input\_1920x1088\_250.yuv -o test.hevc -w 1920 -h 1088 -n 250 -qp 24 -g 2 -GopRefDist 1 -encode -EncodedOrder

Run an extractor

hevc\_fei\_extractor test.hevc -multi\_pak\_str test.multipak

Run of the validation tool in the generation mode

asg-hevc -generate -gen\_repack\_ctrl -n 250 -g 2 -r 1 -repack\_ctrl\_file test.repakctrl -repack\_str\_file test.multipak -InitialQP 24 -DeltaQP 1 1 2 2 3 3 4 4

Run a test application

sample\_hevc\_fei -i input\_1920x1088\_250.yuv -o test.repack -w 1920 -h 1088 -n 250 -qp 24 -g 2 -GopRefDist 1 -encode -EncodedOrder -repackctrl test.repakctrl -repackstat test.repakstat

Run an extractor

hevc\_fei\_extractor test.repack -multi\_pak\_str test\_repak.multipak

Run of the validation tool in the verification mode

asg-hevc -verify -gen\_repack\_ctrl -n 250 -g 2 -r 1 -repack\_ctrl\_file test.repakctrl -repack\_stat\_file test.repakstat -repack\_str\_file test\_repak.multipak -InitialQP 24

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