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| *Title:* | **On partial updating the set of quantization matrices** | | |
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| *Purpose:* | Proposal | | |
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# Abstract

The overhead to signal the quantization matrices in HEVC video stream is still huge, especially when the quantization matrices are updated and used in small picture size sequences, even though use quantization compression method in current HM5-QM and set the matrices loaded in a long interval. The quantization matrices update interval and the number of matrices need to be changed will impact the ratio of generated QM bits against video data bits in bitstream. However, the updating frequency and the updating pattern are both data dependent. There is little work done in this area on the adaptive quantization matrix update.

In practical application, quantization matrix need be reload as a whole in scene change occurs, but in normal case, partially updating the quantization matrices may make sense. To simulate a practical update scheme is required for evaluating the quantization matrices compression tools. This contribution provides software to simulate the quantization updating in practice. The updating interval and partial updating are supported in this software.

The details about the software configurations will be introduced in the following sections.

# Description

## QM Updating Configuration

The software is implemented on the top of HM5 QM branch software. To simulate different partial updating scheme, we add QM\_FRAME\_UPDATE macro in software. Set QM\_FRAME\_UPDATE to 1 to enable the partial updating scheme. The update interval is determined in encoder configure file.

#define SCALING\_LIST                   1 //JCTVC-G880/JCTVC-G1016

#define SCALING\_LIST\_OUTPUT\_RESULT     1 //JCTVC-G880/JCTVC-G1016

#define QM\_FRAME\_UPDATE               1 //scaling list updates enable

Here is an example to set updating every 5 frames in encoder configure file.

UpdateInterval                : 5                      # ScalingList update every UpdateInteval frame

In this implementation, if updating occurs in one frame, only one size of quantization matrices is changed.

## QM Updating

This section describes how to simulate the update behaviors of the quantization matrixes in the software.

The quantization matrix updating should be adaptive to the video content for better video quality. To determine which matrices is to be changed adaptively to the video content is an encoding optimization issue and is depended on video content.

For simplicity, a simple updating approach is used in this tool. When update occurs, only one size of quantization matrices (4x4, 8x8, 16x16, 32x32) will be updated and the size of matrices to be updated are loaded from 8 input sets of matrices(each set of matrix has 4 sizes of matrices and totally 24 matrices for intra/inter/luma/chroma/block sizes). The scheme of partially update the QM is determined as follows,

switch((m\_iNumScalingList/4)%4)

case 0: update 4x4 block matrices

case 1: update 8x8 block matrices

case 2: update 16x16 block matrices

case 3: update 32x32 block matrices

The substituting size of matrices is load from one of QM sets. In CE4, totally 6 symmetry QM sets and 6 asymmetry QM sets are provided.

# Conclusion

This contribution provides a tool for simulating the QM partial updating in practical application. It can be used for the future QM related core experiments and evaluation of quantization matrices compression tools. It was suggested to include the partial update feature in HM QM branch software.

# Patent rights declaration(s)

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