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| *Title:* | **Non-CE6: Palette encoder improvements for SCM2.0** | | |
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| *Purpose:* | Proposal | | |
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| *Source:* | Canon CRF | | |

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# Abstract

This contribution is proposing three encoder improvements related to Palette coding mode in the SCM2.0 without introducing any normative change. It is reported that the proposed encoder changes enable decreasing the encoding runtime to 97% compared to SCM2 while keeping the same BDR performance. It is furthermore asserted that the improvement is bigger in encoders where IBC has reduced runtime.

# Introduction

In the 18th meeting held in July 2014 in Sapporo, palette mode was adopted with various normative tools. In particular, some of these tools use full R/D-optimized search. The current proposal modifies the palette determination and palettization process to detect too many escape-coded pixels so as to abort palette evaluation, as well as faster index determination by reusing, if applicable, the previous pixel result. In addition, the method known as palette sharing is not evaluated if too many palette elements cannot be predicted. It is reported that the use of such a prediction method provides gains, compared to SCM2.0 anchor.

# Proposed encoder changes for Palette

Although palette mode is not the largest contributor to SCM2.0 encoding time increase, it is interesting to provide non-normative speedups. Various evaluations in the palette encoder are done at a high cost in time compared to the coding improvement. We propose simple modifications to accelerate palette evaluations.

The thresholds were not fine-tuned at all, and it is expected that new normative or algorithmic changes in SCM3.0 may require specific tuning.

## Escape-coded pixels

When their number reaches a critical ratio, the escape coding method becomes less effective and the palette mode cannot achieve sufficient results compared to other coding modes.

This affects both the palette determination and palettization processes:

* When determining the palette elements, if these elements account for less than z ratio of the CU pixels, then palette evaluation can be stopped altogether;
* When applying the palette to the pixels so as to derive the indexes, the number of actually escape-coded pixels can be determined, and if it reaches a particular ratio then palette evaluation can be stopped.

## Index determination

CUs for which the palette mode works best are often very repetitive, as the palette index prediction modes provide ample proof of. It is therefore possible to store the result of the previous original pixel, and if the current original pixel perfectly match it, then the index associated to that previous original pixel can be reused.

This can be used for both the palette determination and palettization process.

## Palette sharing evaluation

Palette evaluation is first performed in non-shared mode, then palette sharing evaluation is ran. However, the results of the non-shared evaluation provides sufficient insight on whether palette sharing is worth evaluating. The criterion used is:

* Whether the current best coding mode for the CU is palette (indeed, palette sharing rarely provides a coding cost reduction making it perform better than the current best mode, e.g. IBC);
* If a large portion of the palette elements in non-shared evaluation are predicted.

If one of those conditions is not met, then palette sharing is not evaluated.

# Results

Complete results will be uploaded later on.

## Lossy coding





## Lossless coding





# Conclusion

Three non-normative changes are proposed to speed up the palette mode evaluation at the encoder. In light of the minimal impact on coding efficiency, it is suggested to adopt those changes so as to improve the encoder runtime and move towards better assessment of algorithmic changes.

# Patent rights declaration(s)

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