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**ISO/IEC JTC 1/SC 29/WG 11**

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**Description of Exploration Experiment 13.2 for G-PCC on Inter-prediction for Attribute Coding**

# Abstract

This document provides a description of G-PCC Exploration Experiment (EE) 13.2 on Inter-prediction for Attribute Coding.

# Introduction

The goal of 13.2 is to further study and evaluate the inter-prediction scheme proposed in [1][2].

# Information about proposed tools

## m49599: [EE13-2] Report on Inter-prediction for Attribute Coding [1]

In this contribution, the result of studying the mandates of EE13-2 is reported. The results regarding the second mandate reveals that interframe coding even without any motion-compensation brings sizeable coding gains both for geometry and attribute coding. In addition, the current global motion-compensation in the interEM SW does not bring an additional coding gain for either the geometry or attribute while the local motion-compensation does to a degree both for the geometry and attribute. The results show that additional coding gains (3%~4% for CY, 1 ~2% bpp for CW) for attributes were obtained by local motion-compensation for ford\_01 and ford\_02 sequence cases.

## m47838: Interframe Prediction for Attribute Coding [2]

In this contribution, it is proposed to use an attribute-value from other point-cloud frames at different time instances in addition to the attribute-values from within the same point-cloud frame for prediction. The method can improve prediction performance especially when point-cloud samples are sparse within the current frame by providing sample attribute-values from corresponding locations in other frames.For the CY (near-lossless attribute coding) test category under the CTC, it achieves the Hausdorff BD-rate savings of -9.1% for the Category3 reflectance data set. For the CW (lossless attribute coding) tests under the CTC, it achieves 5.3% bpp reduction on average.

# Description of Exploration Experiments

## Mandates

Mandates for EE13.2 are as follows:

1. Migration of the interEM v1.0 SW to a recent TMC13 code base.

- Verify the functionality of the migrated SW

- Reproduce the results reported in [1][2]

2. Report on the results of exploring improved motion-estimation and compensation algorithms for attribute coding.

## Participants

| **Name** | **Company** | **E-mail address** | **Type** |
| --- | --- | --- | --- |
| Sehoon Yea | Tencent | sehoonyea@tencent.com | Proponent |
| David Flynn | Apple | [davidflynn@apple.com](mailto:davidflynn@apple.com) | Crosscheck |
|  |  |  |  |

## Software

The proposed tools shall be implemented on top of interEM V1.0 or later [3][4].

## Test configurations

Parameters and configurations for interEM will be provided by the proponent.

## Evaluation Method

Tests will be performed basically following the G-PCC test conditions specified in CTC [8]. Conditions CW (lossless geometry, lossless attribute) and CY (lossless geometry, lossy attributes) will be tested.

Tests will be performed using dynamic content from CTC category 3, namely the Ford (fps=10) and QNX (fps=5) test sequences. In inter mode, a GOP size of 8 frames with the IPPP structure will be used leading to an inter frame period between 1 and 2 seconds.

Objective results will be provided using the result spreadsheet template. Coding efficiency vs. complexity (e.g., number of calculations, memory usage) aspects will also be studied and reported.

## EE.13.2 Coordinators

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# Timeline:

* **2019-12-09**: Expected date for the new interEM release;
* **2019-12-30 [New interEM + 3 weeks]**: Deliver source code and results for cross check;
* **2020-01-08**: MPEG document upload deadline.

# References

[1] Report on Inter-prediction for Attribute Coding, ISO/IEC JTC1/SC29 WG11 input document m49599, Gothenburg, SE, July 2019

[2] Interframe Prediction for Attribute Coding, ISO/IEC JTC1/SC29 WG11 m47838, Geneva, CH, March 2019.

[3] Exploratory model for inter-prediction in G-PCC, ISO/IEC JTC1/SC29 WG11 N18096, Macau, CN, October 2018.

[4] An exploratory model for inter geometry-based PCC, ISO/IEC JTC1/SC29 WG11 m44754, Macau, CN, October 2018.

[5] Global motion compensation for point cloud compression in TM3, ISO/IEC JTC1/SC29 WG11 m44751, Macau, CN, October 2018.

[6] On motion compensation for geometry coding in TM3, ISO/IEC JTC1/SC29 WG11 m42521, San Diego, USA, April 2018.

[7] PCC Test Model Category 13 v7, ISO/IEC JTC1/SC29/WG11 w18664, Gothenburg, SE, July 2019.

[8] Common Test Conditions for PCC, ISO/IEC JTC1/SC29 WG11 w18665, Gothenburg, SE, July 2019.