

Evaluation Report of Chimera Test Sequence for Future Video Coding

Hyunsuk Ko, Sung-Chang Lim, Jungwon Kang, Dongsan Jun,
Jinho Lee, Hui Yong Kim



Introduction

❑ Evaluation report for encoding Chimera test sequences using HM16.6

❖ For the objective evaluation:

- 9 sequences from Chimera test sequence have been encoded under the HM common test conditions

❖ For the subjective evaluation:

- Investigate the characteristics of the original sequences as well as the visual artifacts in the decoded sequences

❖ Based on the both evaluations, we will suggest to include the five as candidate test sequences for the future video coding standardization

Test Configurations

❑ Preparation of test sequences

- ❖ Downloaded 9 YUV sequences corresponding to 9 scenes of Chimera test sequence from the FTP site
- ❖ Confirmed that the MD5 checksums of the downloaded YUV sequences are exactly matched with those provided by Netflix
- ❖ For the objective and subjective evaluations, first 300 frames (5 seconds) are extracted

MD5 checksums for the extracted YUV sequences (300 frames)

Sequence (Scene)	Format	MD5 checksums
Aerial	4096x2160, YUV4:2:0, 10 bit, 60p	e5135189aae0a87a190a8a53e03c0eb5
BarScene		6832ad82b16f7fc6bbfc01184d979d56
Dancers		57edb8ef05c47678db51c9b7c8270631
DinnerScene		0444909099af36134a04bcfcaa8845b4
DrivingPOV		43f0c38cd43620c55290b54a0ef69300
PierSeaside		0dd24b7cf6553d1e4190262adc228423
RollerCoaster		6632b92cfa52a5bb43b01b82c231d951
ToddlerFountain		9aaf6e6a55488717513d15a003898523
WindAndNature		79f8164a38a5233733df67754675b3a0

Test Configurations

❑ Objective test condition & Environment

❖ The HM16.6 encoding were carried out using the following configurations:

➤ Prediction structure

○ [1] Random access Main 10 (RA-Main10)

» Intra period is set to 64 since the frame rate of Chimera sequence is 60p

○ [2] Low-delay B Main 10 (LDB-Main10)

➤ QP: 22, 27, 32, 37, 42

❑ Subjective test condition & Environment

❖ Samsung 78" 4K SUHD TV JS9500F was used for viewing of the decoded sequences

❖ The decoded sequences were played in 15 Hz so that the viewers could discriminate the details

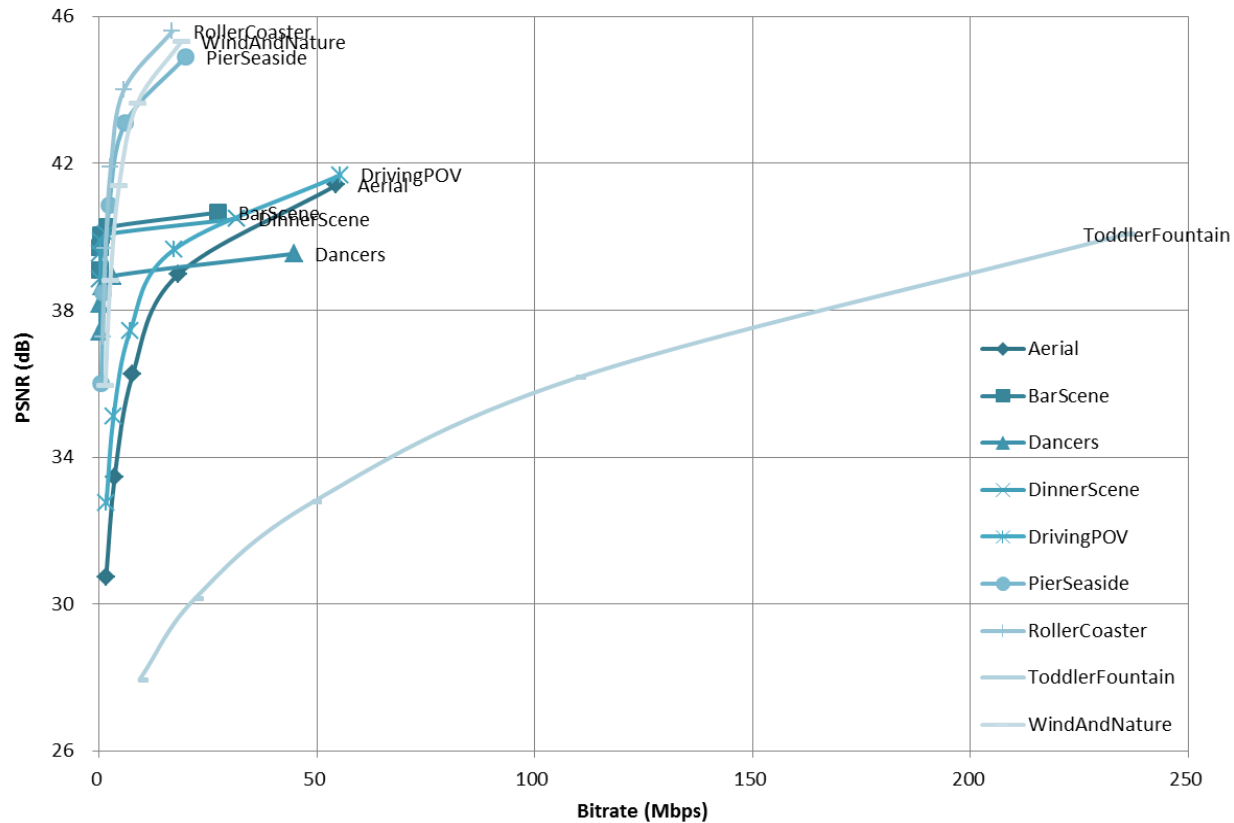
❖ 5 video coding experts participated the viewing sessions

➤ Each viewer checked the scene characteristics and coding artifacts of the decoded sequences

Objective Evaluation

❑ Combined Luma R-D curves for all sequences under RA-Main10

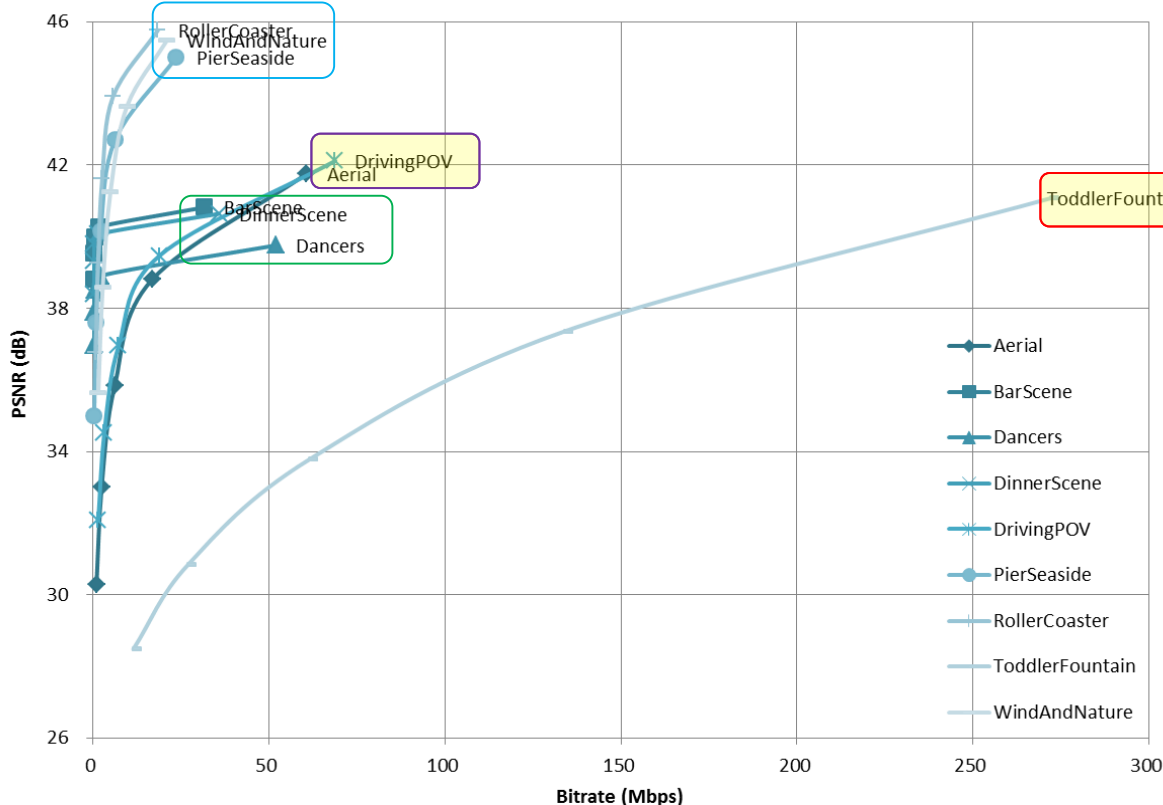
Total (RA-Main10)



Objective Evaluation

❑ Combined Luma R-D curves for all sequences under LDB-Main10

Total (LDB-Main10)



“ToddlerFountain” (over 200Mbps at QP 22)
: Very difficult to encode with HM16.6

“PierSeaside, RollerCoaster & WindAndNature”

: Very simple to encode based on the fact that those have higher PSNR values and lower bitrates at QP 22 compared to other sequences

“BarScene, Dancers & DinnerScene”

: Can be encoded easily at QPs except 22 because those can be encoded with less than 3Mbps at higher QPs (27, 32, 37, 42)

“Aerial & DrivingPOV”




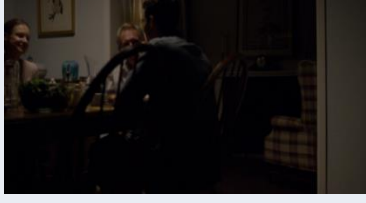
: Medium range of complexity

From the point of view of objective evaluation:

➔ Recommend ToddlerFountain, DrivingPOV & Aerial for the potential test sequence candidates





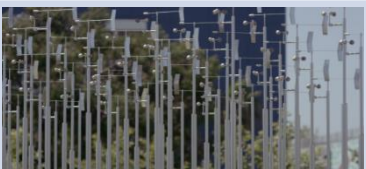
Subjective Evaluation

❑ Scene characteristics of the original video content

Sequence	Thumbnail	Description	Scene characteristics
Aerial		A scene captured by a camera mounted on a drone, containing trees, soils and people with drone controller	Lots of textures / shaking camera causing global rotation
BarScene		A woman playing shuffleboard in a room with a dim light	Camera focus shift / static camera / sensor noises
Dancers		A couple dancing in a very dark background	Very dark scene / static camera / sensor noises
DinnerScene		Three people having dinner in a dark kitchen	Dark scene / camera panning / sensor noises

Subjective Evaluation

❑ Scene characteristics of the original video content

Sequence	Thumbnail	Description	Scene characteristics
DrivingPOV		A scene captured by a camera on a car, the scene shows driver's point of view of the road	Camera moving forward / zooming motion
PierSeaside		Scene of pier	Diagonally moving camera
RollerCoaster		A scene captured by a camera on a roller coaster, the scene shows the rider's point of view	Shaking camera
ToddlerFountain		A toddler walking through the fountains	Random motion of water drops / slowly moving camera
WindAndNature		Many windmills moving as the wind blows	Irregular motion of windmills / static camera

Subjective Evaluation

- ☐ Observations of decoded sequences (at QP 42 under RA-Main10 configuration)



Frame #201 of decoded Aerial sequence

Visible artifact on gray shorts possibly from intra prediction, coding artifacts on a leg and side of waist, blurring artifacts on the soils

Subjective Evaluation

- ❑ Observations of decoded sequences (at QP 42 under RA-Main10 configuration)

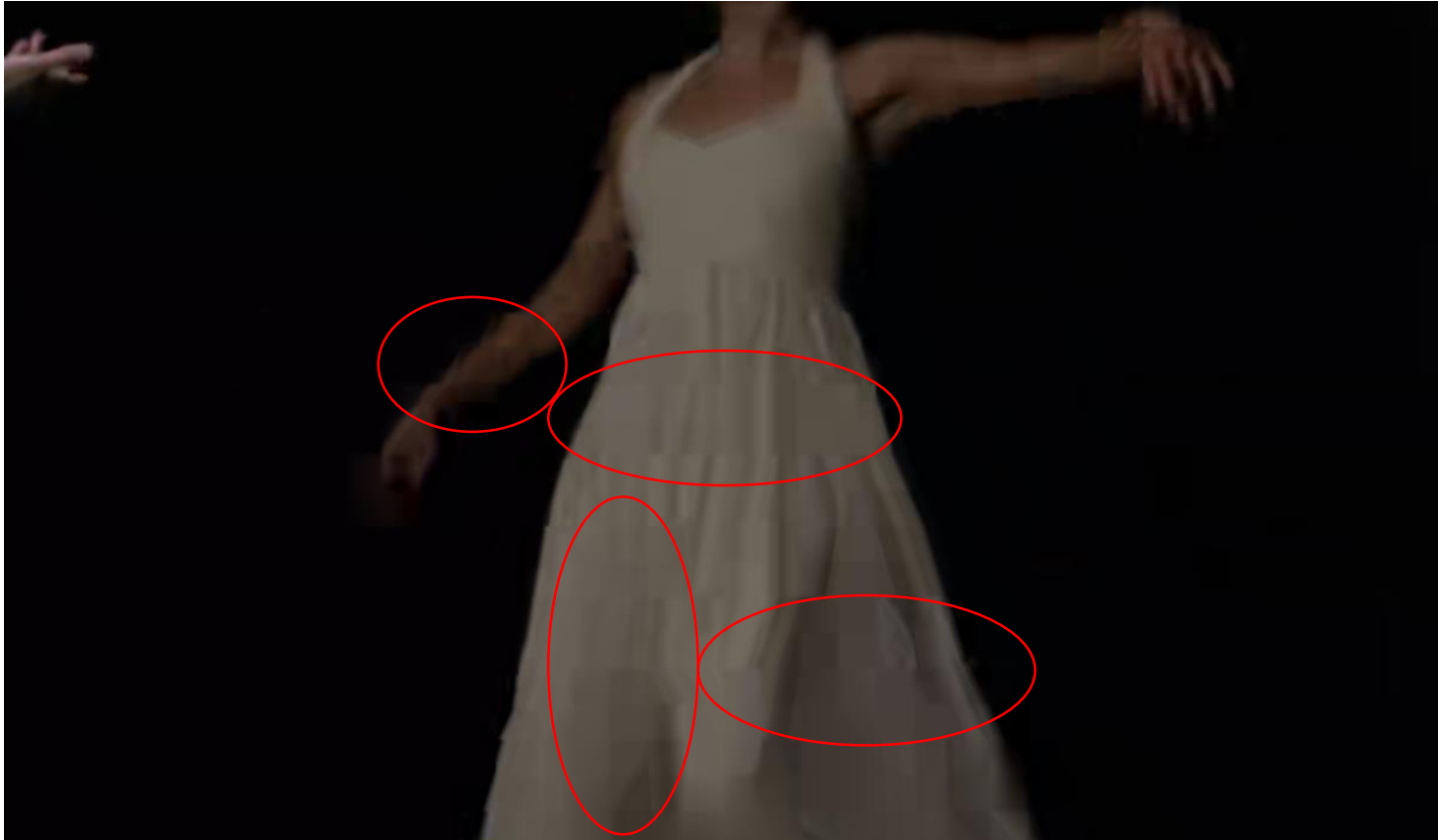


Frame #57 of decoded BarScene sequence

Loss of details on the map, visible blocking artifact on the arm, coding artifact on the table possibly from intra prediction

Subjective Evaluation

- ❑ Observations of decoded sequences (at QP 42 under RA-Main10 configuration)



Frame #213 of decoded Dancers sequence

Small and large blocking artifacts on the dress and the arm

Subjective Evaluation

- ❑ Observations of decoded sequences (at QP 42 under RA-Main10 configuration)



Frame #292 of decoded DinnerScene sequence

Disappeared contours of glass, blurring artifact on forehead of the old man

Subjective Evaluation

- ☐ Observations of decoded sequences (at QP 42 under RA-Main10 configuration)



Frame #131 of decoded DrivingPOV sequence

Ringing artifact near the trees, blurring artifacts on the trees

Subjective Evaluation

- ❑ Observations of decoded sequences (at QP 42 under RA-Main10 configuration)



Frame #49 of decoded PierSeaside sequence

Vanished ropes, blocking artifacts on the sky

Subjective Evaluation

- ❑ Observations of decoded sequences (at QP 42 under RA-Main10 configuration)



Frame #99 of decoded RollerCoaster sequence

Visible coding artifacts and blocking artifacts on the flag

Subjective Evaluation

- ❑ Observations of decoded sequences (at QP 42 under RA-Main10 configuration)

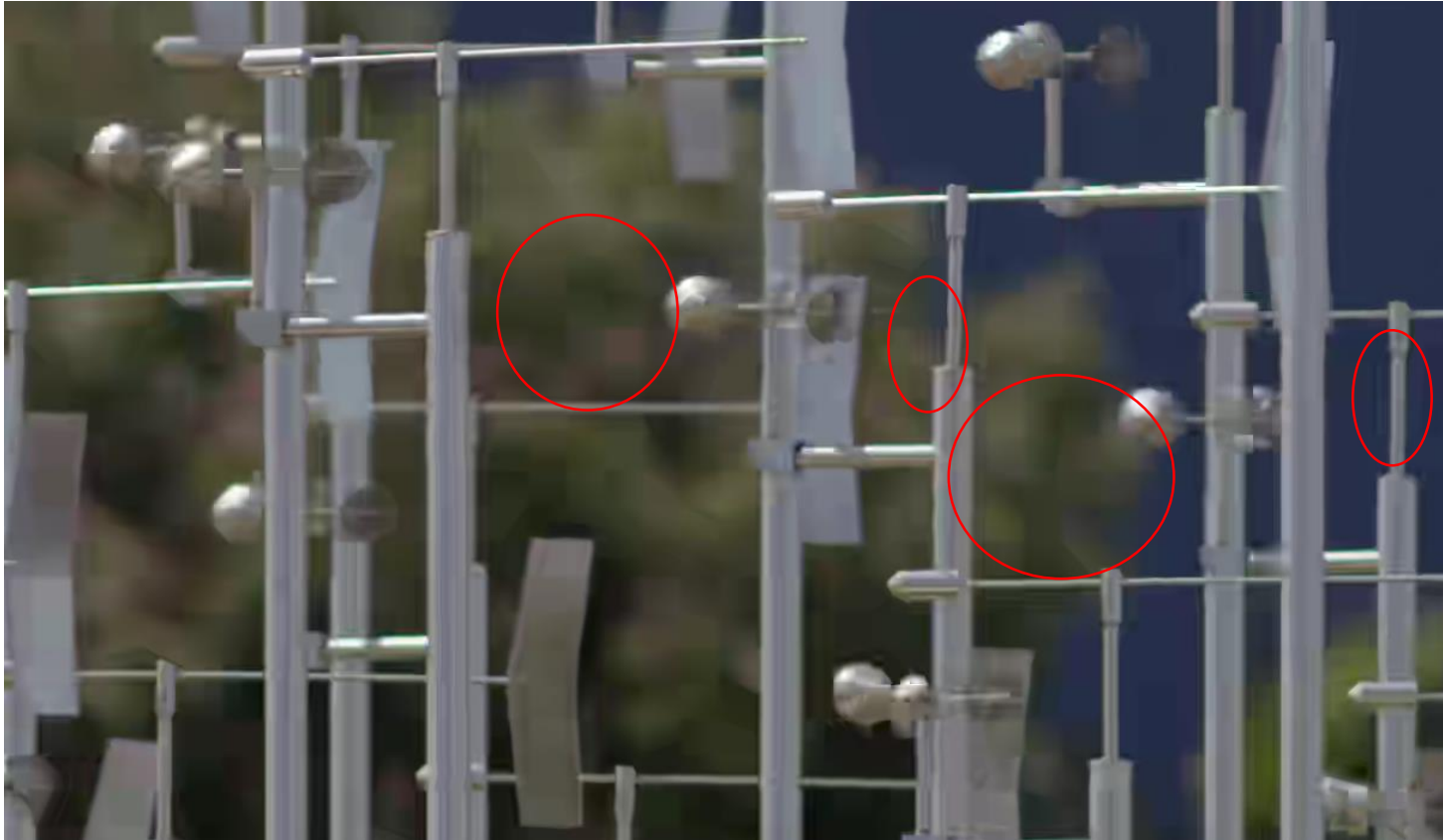


Frame #54 of decoded ToddlerFountain sequence

blocking artifacts on the fountains, strong edge possibly generated by intra prediction

Subjective Evaluation

- ❑ Observations of decoded sequences (at QP 42 under RA-Main10 configuration)



Frame #132 of decoded WindAndNature sequence

Blocking artifact on the background and ringing artifacts near the poles

Subjective Evaluation

❑ General comments on visual artifacts in the decoded sequences

- ❖ Coding artifacts such as blocking artifact, ringing artifact and blurring artifact are observed on the decoded sequences with lots of details (*ToddlerFountain, Aerial, DrivingPOV, RollerCoaster & PierSeaside*)
- ❖ Coding artifacts in *BarScene* & *WindAndNature* sequence are moderate
- ❖ Difficult to find coding artifacts in *Dancers* & *DinnerScene* except blurring/blocking artifacts

Conclusion

❑ Summary:

- ❖ From the point of view of an objective evaluation (based on encoding results):
 - Recommend “***ToddlerFountain, DrivingPOV & Aerial***”
- ❖ From the point of view of a subjective evaluation (based on the scene characteristics and the coding artifacts)
 - Recommend “***ToddlerFountain, DrivingPOV, Aerial, RollerCoaster & PierSeaside***”

❑ In conclusion, we suggest to include the five sequences (in the order named) as for the potential test sequence candidates for future video coding standardization:

- ❖ ***1) ToddlerFountain, 2) DrivingPOV, 3) Aerial, 4) RollerCoaster, 5) PierSeaside***

Thank you

**Special thanks to Netflix for providing
the valuable test sequences**