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Title: **Exploration Experiments on Future MIV: PUT results**
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Abstract & Recommendations

The document presents the results of EE-related experiments that were conducted by PUT. The results include full results of EE3. The recommendation is that this EE should be continued to test the performance of the new TMIV 9.0.

1   Introduction

The document presents the results of EE-related experiments that were conducted by PUT. The results include full results for EE3, which can be found in the attached reporting template.

2   Experiments

For all experiments, GCC 10.2.0 was used to compile all used software.

2.1   EE5

The experiment tested the performance of depth maps estimated by IVDE in comparison with the current CTC depth maps. The table below compares the performance of the A17 anchor against the new depth maps (estimated at the TMIV encoder side).

Mandatory content - Proposal vs. Low/High-bitrate Anchors

Sequence		High-BR BD rate Y-PSNR	Low-BR BD rate Y-PSNR	Max delta Y-PSNR	High-BR BD rate VMAF	Low-BR BD rate VMAF	High-BR BD rate IV-PSNR	Low-BR BD rate IV-PSNR
ClassroomVideo	A	---	---	4.57	---	---	699.8%	663.1%
Museum	B	---	---	24.74	---	---	---	---
Fan	O	-66.7%	-65.7%	5.91	-53.2%	-56.7%	-48.4%	-53.2%
Kitchen	J	189.5%	95.8%	16.06	294.3%	106.9%	87.8%	56.3%
Painter	D	52.6%	48.6%	7.98	47.5%	46.3%	63.8%	52.9%
Frog	E	-5.6%	-1.0%	5.63	-2.6%	0.4%	0.7%	2.3%
Carpark	P	44.2%	57.1%	7.33	32.5%	52.5%	46.4%	58.5%
Chess	N	---	---	28.52	---	---	---	---
Group	R	---	---	22.28	233.0%	22.7%	---	---
MIV		---	---	**13.67**	---	---	---	---

Optional content - Proposal vs. Low/High-bitrate Anchors

Sequence		High-BR BD rate Y-PSNR	Low-BR BD rate Y-PSNR	Max delta Y-PSNR	High-BR BD rate VMAF	Low-BR BD rate VMAF	High-BR BD rate IV-PSNR	Low-BR BD rate IV-PSNR
Fencing	L	-8.8%	19.3%	9.05	35.8%	37.6%	1.7%	23.2%
Hall	T	-59.9%	-49.1%	9.61	-59.4%	-48.0%	-48.1%	-43.3%
Street	U	31.1%	36.5%	8.80	-3.3%	21.3%	29.6%	37.2%
ChessPieces	Q	---	---	28.35	---	---	---	---
Hijack	C	---	---	22.44	---	199.5%	---	---
Mirror	I	---	-48.0%	9.02	---	-38.9%	---	-45.6%
MIV		---	---	**14.54**	---	---	---	---

Comments:

- As expected, the quality of depth maps generated in the experiment is lower than for CTC depth maps. The depth maps in this experiment are generated using the same estimation parameters for all sequences, while for CTC depth maps (even if they were generated earlier using IVDE), the parameters were fine-tuned to give the best possible quality.
- The high quality in SO is the result of much higher redundancy in atlases when estimated depth maps are used (more information from input views is transmitted, resulting in the increased quality of synthesized views). There are also fewer high-frequency edges in depth maps (fewer details on a fan), which decreased the bitrate of encoded geometry atlases.
- A high BD-rate decrease was observed for ST. The possibility of generating new CTC depth maps for this sequence will be considered.
- The high quality in SI is the result of mirrors that are present in the scene. In the ground-truth depth maps, the depth of mirrors shows the distance from the camera to the mirror, while in estimated depth, the distance from the camera to the reflected object (see the comparison below).

SI v11: Ground-truth depth map:

SI v11: Estimated depth map:

A17 synthesis (GT depth map):

A17 synthesis (estimated depth map):

Recommendations:

- EE3 should be continued to test the performance of the new TMIV 9.0.

Acknowledgement