Data Compression Conference

Iterative enhancement scheme of synthesized color and depth images for immersive video system

Yongquan Su[1,2], Qiong Liu[1,2], Kejun Wu[1,2], Gangyi Jiang[3] and You Yang[1,2]

1. Huazhong University of Science and Technology, Wuhan, China
2. Wuhan National Laboratory for Optoelectronics, Wuhan, China
3. Ningbo University, Ningbo, China

suyongquan@hust.edu.cn

Outline

- **Introduction**
- **Iterative enhancement scheme**
  - Problem statement
  - Proposed iterative enhancement scheme
- **Experiment**
  - Experiment settings
  - Experimental results
- **Summary**

Introduction

- Immersive video:
  - is an emerging paradigm of visual service;
  - allows users to switch the viewpoints;
  - allows users to interact with video content.

- The intensity of immersive experience relies on the quality of synthesized depth maps at the decoder side.

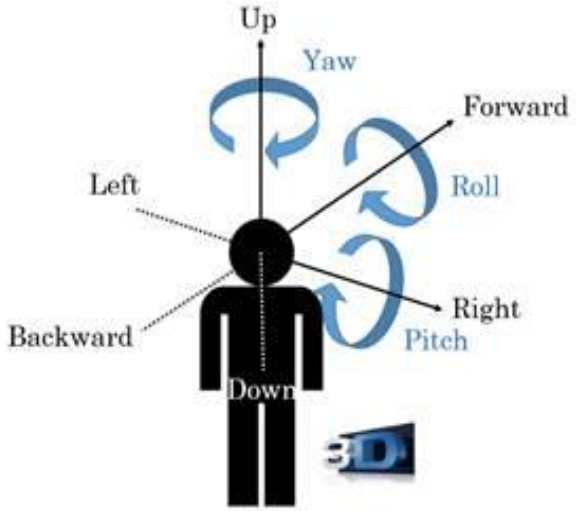

Fig. 1. Examples of immersive video

Iterative enhancement scheme

Problem statement

- Inaccurate depth estimation in the input depth maps;
- The rounding errors caused by compression;
- Affect the visual quality of synthesized color images.

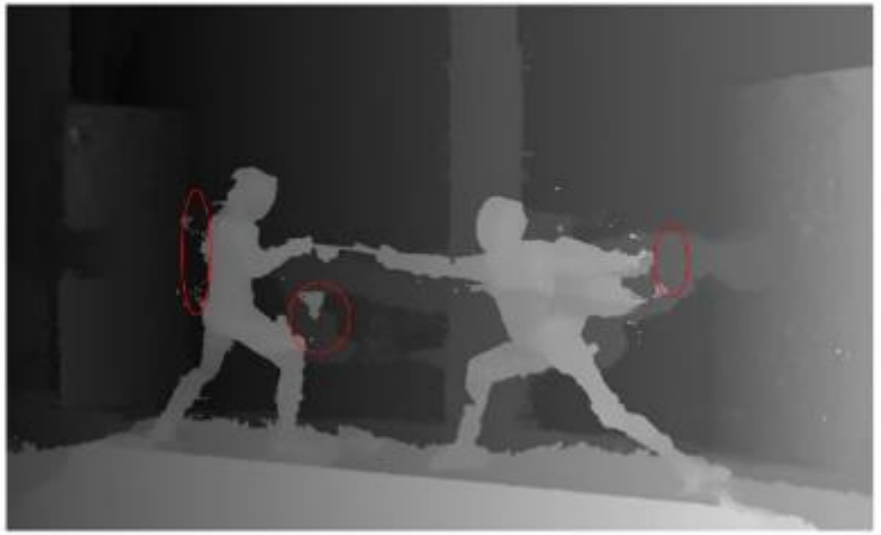

Fig. 2. Existing problems on the synthesized depth map

Iterative enhancement scheme

Proposed iterative enhancement scheme

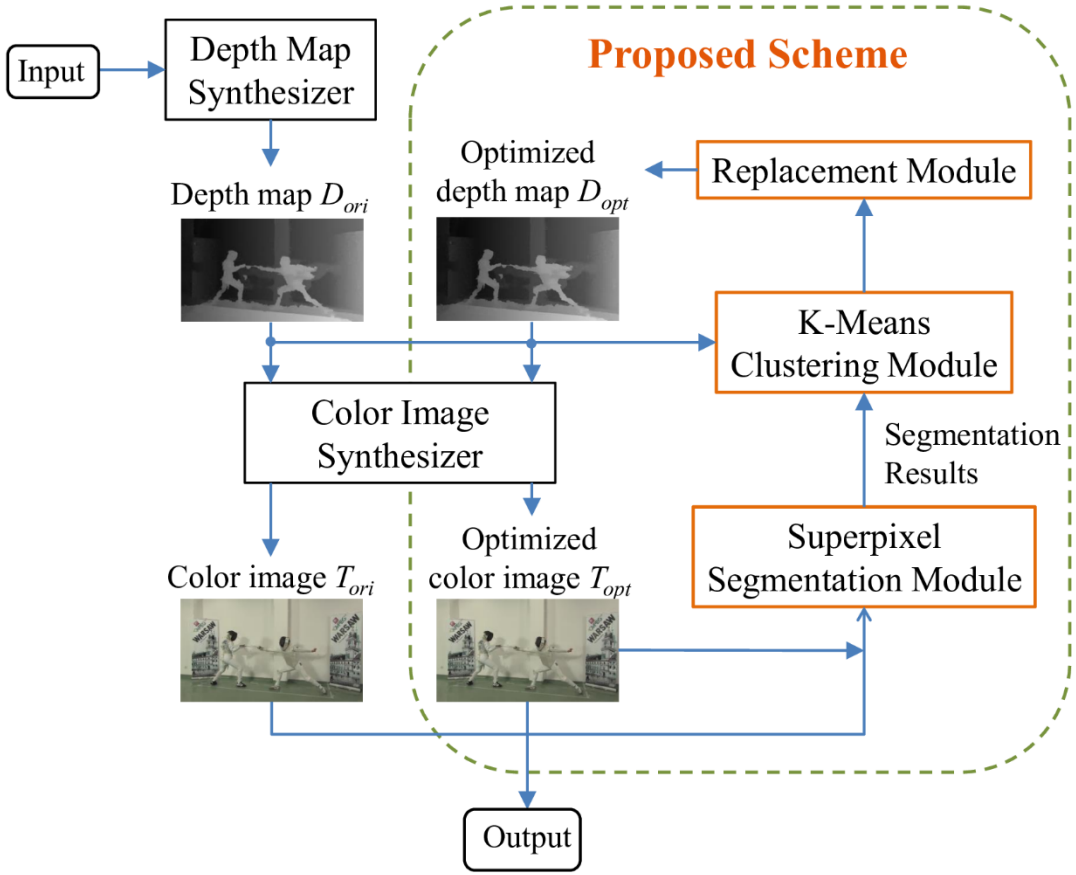

Fig. 3. The proposed iterative enhancement scheme

Experiment

Experiment settings:

Four sequences: *fencing*, *frog*, *hall*, *painter*;

Each sequence with 2 viewpoints;

Each viewpoint with 17 frames;

The *numSuperpixel*: 2500;

The thr_{center}: 30

The thr_{num}: 7;

The QPs of input depth maps:22, 27, 32, 37, 42, 47;

The QP of the input color images: 32;

Number of iterations: 1.

Experiment

Experimental results:

Table 1. Comparison in term of PSNR between proposed scheme and original scheme

Sequence	QP=22	QP=27	QP=32	QP=37	QP=42	QP=47
Fencing	0.0342	0.0472	0.0679	0.0692	0.0623	0.0143
Frog	0.0550	0.0617	0.0833	0.0690	0.0537	0.0533
Hall	0.0212	0.0433	0.0503	0.0032	0.0002	0.0003
Painter	0.0224	0.0407	0.0446	0.0375	0.0198	0.0087
Average	0.0332	0.0483	0.0615	0.0447	0.0340	0.0192
Average of all	0.0397					

Table 2. Comparison in term of SSIM between proposed scheme and original scheme

Sequence	QP=22	QP=27	QP=32	QP=37	QP=42	QP=47
Fencing	0.0004	0.0008	0.0015	0.0018	0.0018	0.0016
Frog	0.0008	0.0012	0.0021	0.0022	0.0021	0.0022
Hall	0.0001	0.0001	0.0002	0.0002	0.0001	0.0000
Painter	0.0001	0.0004	0.0007	0.0006	0.0004	0.0003
Average	0.0004	0.0006	0.0011	0.0012	0.0011	0.0010
Average of all	0.0009					

Experiment

Experimental results:

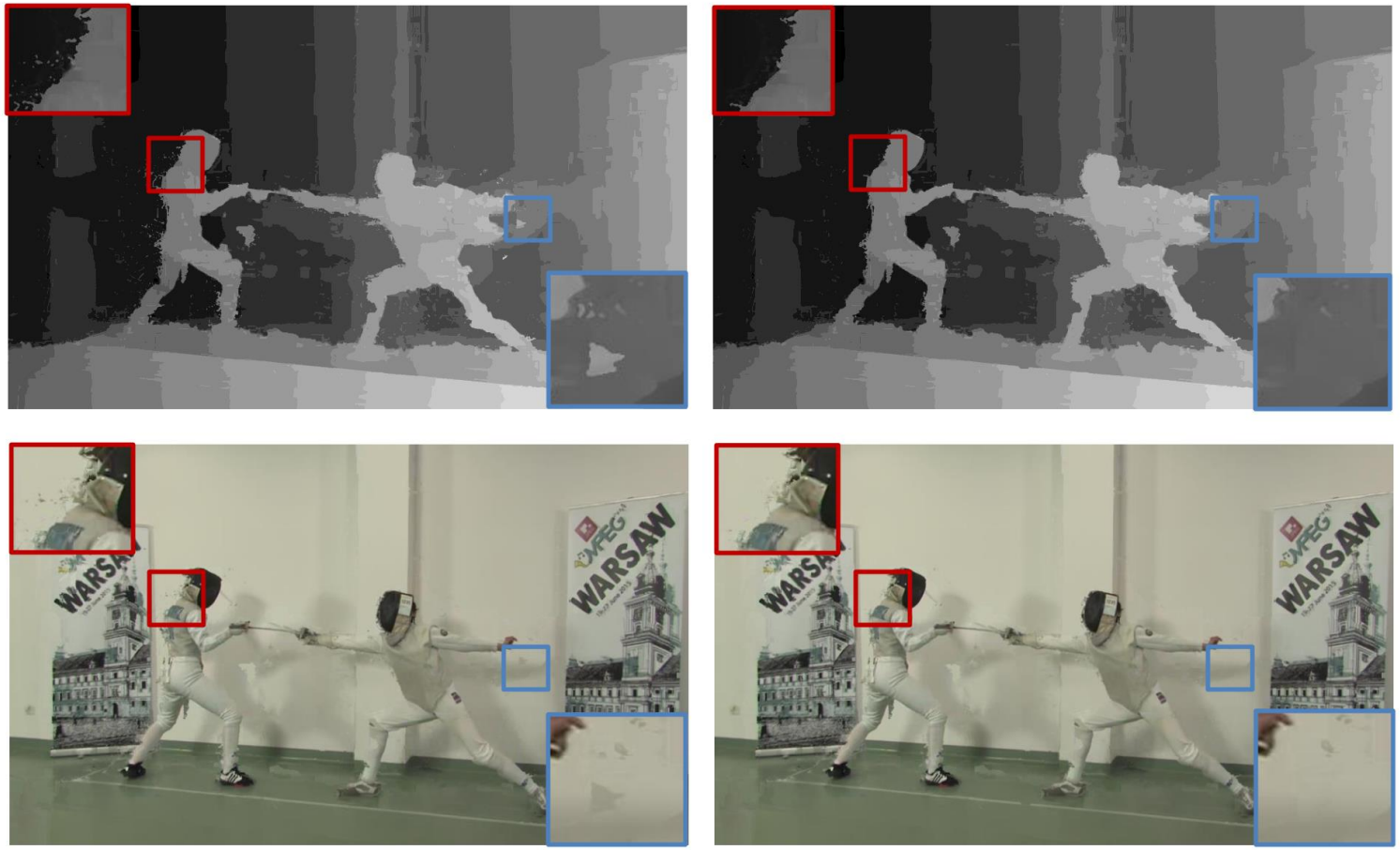

Fig. 4. Comparison on depth maps and color images (*fencing* sequence).

Experiment

Experimental results:

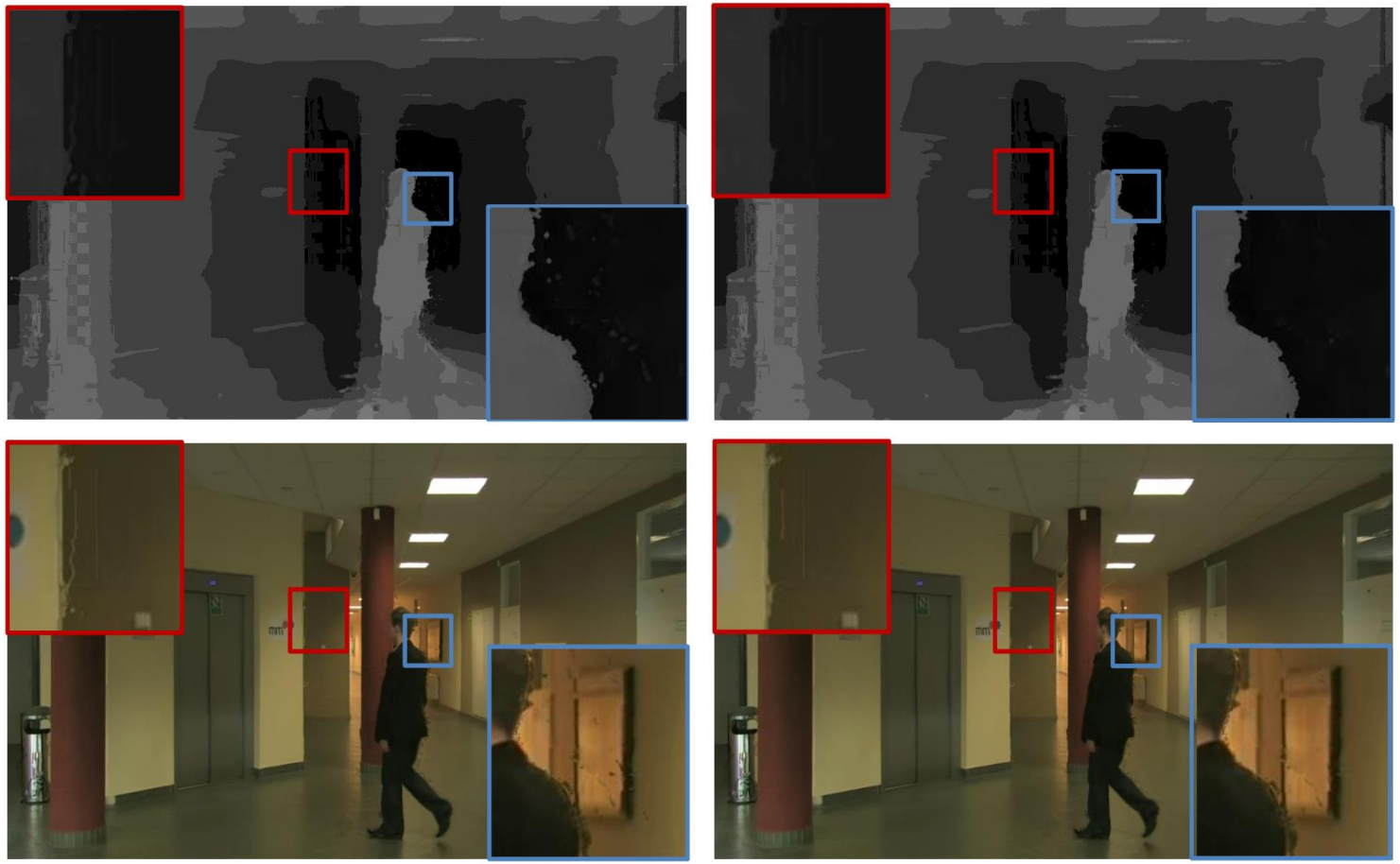

Fig. 5. Comparison on depth maps and color images (*hall* sequence).

Summary

- Propose an iterative enhancement scheme;
- Enhance the quality of synthesized depth map and color image;
- Experimental results show our scheme is effective.

Any question?

please contact Yongquan Su

suyongquan@hust.edu.cn