

The SJTU HDR Video Sequence Dataset

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Abstract—In this short paper, we present a novel set of High Dynamic Range (HDR) video sequences of ultra-high definition (UHD) to satisfy the growing need of HDR relevant researches and to remedy the shortage of lacking open source high quality HDR video dataset. The details of processing procedures and sequences characteristics are illustrated.

Keywords—HDR, UHD, video dataset

I. INTRODUCTION

Recently, with the rise of High Dynamic Range (HDR) application in media and entertainment industries, its extraordinary property to deliver dynamic range that is close to human visual system (HVS) has been recognized by global communities. The corresponding efforts on HDR video coding has been initiated by the Moving Picture Experts Group (MPEG) in February 2015. However, current existing HDR datasets are insufficient in both quality and quantity, with few being released to the public. Thus, there is a severe lack of open and complete HDR datasets which parallel such close attention in HDR development.

The Society of Motion Picture and Television Engineers (SMPTE) has indicated the critical role of a proper designed HDR system in improving the available creative palette and enhancing the consumer experience [1]. Efforts has been devoted to the extension of High Efficiency Video Coding (HEVC) standard to explore the future coding standard, expecting to fully support the HDR and Wide Color Gamut (WCG) video content [2]. So far, except the recent clips recorded by RED SCARLET-X camera in the Digital Multimedia Lab HDR (DML-HDR) dataset [3], the majority of available datasets focusing HDR content are HD resolutions despite UHD is highly required.

To remedy this problem, we propose the new UHD HDR video datasets, which provide a set of 16 UHD HDR sequences. All sequences contain 600 frames with the frame rate of 60 fps.

II. DATASET DESCRIPTION

A. Shooting and Processing

The shooting equipment adopted to produce our HDR dataset was of prudent contemplation. The Sony F65 and F55 camera, were chosen to produce all UHD HDR video sequences. The raw data of the videos which were recorded in Sony RAW 16bit MAF format contains more than 14 stops of color gamut. In the post-producing process, the original S-Gamut/S-Log3 color model was used in the color grading software with the color gamut under BT.2020 standard, the output was then

transformed into video under SMPTE ST 2084 standard through Electro-Optical Transfer Function (EOTF). During the process, the video was output to the 4k HDR monitor (Sony PVM-X300) through Quad SDI interface. The raw data of the frames were exported at resolution of 3840x2160 with 16 bit OpenEXR format(.exr). The resulted picture quality provided the actual highest fidelity of contrast and colors. Furthermore, 4:2:0 10 bit YUV files can be produced by using HDRTools software consistent with current MPEG/JCT-VC conversion and coding practices for HDR/WCG Video [4].

B. Source Sequence Characteristic

Considering the critical role of video content played in the establishment of a representative dataset and related researches, we shoot the sequences with real-life professional content, containing scenes with architecture, landscapes, and portraits. The content factor such as texture complexity, object moment speed, light intensity, and the camera lens stretching, panning are taken into account. Figure 1 shows tone-mapped versions of representative video frames in the dataset and the detailed illustration of the video sequences in our dataset is provided as follows.

- **Bonfire**---Shows the flames in a mental basin at a campsite with dark background.
- **Car Exhibition**---Shows the fancy sports car exhibition with close-up shots of the features.
- **Cargo Boat**---Shows the scene of cargo boats voyaging the Huangpu River of Shanghai.
- **Framework**---Shows the scene of city framework celebrating the new year's eve.
- **Flowers**---Shows the close-up view of a bunch of flowers with a gentle breeze.
- **Furniture**---Shows the traditional Chinese furniture under the sun shadow.
- **Skyscraper**---Shows the overview of the skyscrapers in the center business district in Shanghai.
- **Night Street**---Shows the night Street of Shanghai during the Chinese Spring Festival, containing night scenes with extremely bright lights coming from light bulbs and LEDs.
- **Office Building**---Shows the office building in Lujiazui, Pudong New District in Shanghai.
- **Porsche Close-up**---Shows the close-up view of a Porsche elite sports car.

- **Traffic Light**---Shows the traffic light changing at a pedestrian cross.
- **Urban Landmark**---Shows the night scene of Shanghai landmark, the Bund with the Oriental Pearl Tower.
- **Center panorama**---Shows the panoramic view of the Lujiazui business center in Shanghai.
- **Nigh Traffic Flow**---Shows the traffic flow of the downtown area at night with a panning camera.
- **Court Yard**---Shows the scene of traditional Chinese court yard and gardening.
- **Game Competition**---Shows the live competition of Electronic Sports in a television studio.

The further information including video content complexity estimation, subjective quality assessment of the HDR sequences will be provided with our database in the future. All sequences will be open later at our homepage and the detailed configuration of YUV format will also be provided through the following link.

<http://medialab.sjtu.edu.cn/HDR/index.html>

III. SUMMARY

In this paper, we propose a brand new comprehensive HDR UHD video dataset consists of real-life content at high frame

rate, with a proper duration for relevant researches. The detailed processing procedures and sequences characteristics description are illustrated.

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REFERENCES

- [1] SMPTE Study Group Report High-Dynamic-Range (HDR) Imaging Ecosystem, <https://www.smpete.org/standards/reports>
- [2] Hanhart, Philippe, Martin Řeřábek, and Touradj Ebrahimi. "Towards high dynamic range extensions of HEVC: subjective evaluation of potential coding technologies," SPIE Optical Engineering Applications. International Society for Optics and Photonics, 2015.
- [3] A. Banitalebi-Dehkordi, M. Azimi, M. T. Pourazad and P. Nasiopoulos, "Compression of high dynamic range video using the HEVC and H.264/AVC standards," Heterogeneous Networking for Quality, Reliability, Security and Robustness (QShine), 2014 10th International Conference on, Rhodes, 2014, pp. 8-12.
- [4] JCTVC-W1017, "Conversion and coding practices for HDR/WCG video," JCT-VC 23rd Meeting, San Diego, USA, Feb. 2016

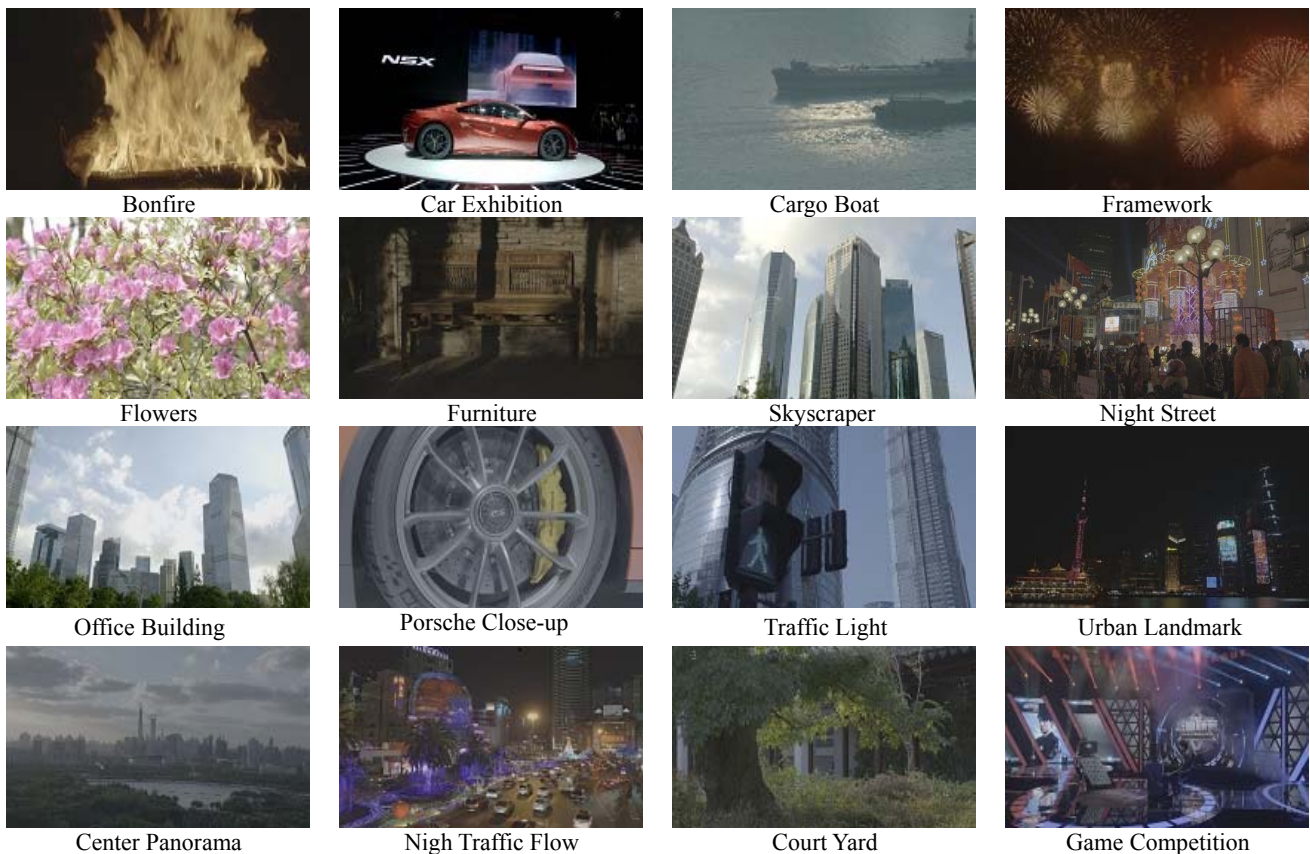


Fig.1. Representative frames of the sequences in the SJTU HDR video dataset. Tone-mapped versions are shown, since typical displays and printers are unable to reproduce high dynamic range images.