Supplementary Material for CHUG: Crowdsourced User-Generated HDR Video Quality Dataset

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1 Dataset Overview and Access

This document provides details on accessing, downloading, and utilizing the CHUG dataset, including its structure, metadata files, AWS S3 video access, and its significance for HDR research.

Public Access: For review purposes, we provide access via an anonymous GitHub repository (we strongly recommend readers to access github repository for instructions):
Repository: https://anonymous.4open.science/r/CHUG-675D/
Webpage: https://anonymous.4open.science/w/CHUG-675D/
This repository includes:

- Metadata File (`chug.csv`): Contains video IDs, MOS scores, resolution, bitrate, and additional attributes (discuss in sec. 4).
- Video ID List (`chug-video.txt`): All hashed video names for direct access via AWS S3.

Video Access: CHUG's videos are hosted on an AWS S3 bucket and can be accessed directly:
AWS-S3: `https://ugchdrmturk.s3.us-east-2.amazonaws.com/videos/VIDEO.mp4`
where `VIDEO` is the corresponding hashed video ID from `chug-video.txt`.
Example: https://ugchdrmturk.s3.us-east-2.amazonaws.com/videos/9ae245a27cc5ea9d2f3fae9692250281.mp4

2 Downloading Videos Using AWS CLI

For large-scale downloads, we recommend using AWS CLI.

2.1 Installing AWS CLI

AWS CLI can be installed as follows:

- Windows: Download and install from https://aws.amazon.com/cli/.
- macOS/Linux:

```
brew install awscli  # macOS
sudo apt install awscli  # Ubuntu/Debian
sudo yum install awscli  # CentOS
```

Verify installation:

```
aws --version
```

2.2 Downloading a Single Video

```
aws s3 cp s3://ugchdrmturk/videos/VIDEO.mp4 ./CHUG_Dataset/
```

Replace `VIDEO` with the actual video ID.

2.3 Downloading All Videos

Download `chug-video.txt` from our repository, to read all video IDs and download videos using aws cli:

```
cat chug_video.txt | while read video; do
    aws s3 cp s3://ugchdrmturk/videos/${video}.mp4 ./CHUG_Videos/
```

2.4 Downloading Selected Videos Using a List

Select a set of video IDs and save in a new text file `chug-video-samples.txt`, then run:

```
cat chug_video_samples.txt | while read video; do
    aws s3 cp s3://ugchdrmturk/videos/${video}.mp4 ./CHUG_Videos/
```

To limit downloads to 100 videos:

```
head -n 100 chug_video.txt | while read video; do
    aws s3 cp s3://ugchdrmturk/videos/${video}.mp4 ./CHUG_Videos/
```

3 Dataset Features and HDR Viewing Recommendations

Diversity and Realism: CHUG captures real-world UGC-HDR distortions such as overexposure, banding, compression artifacts, and motion noise.

Recommended Viewing Setup: For accurate HDR rendering, videos should be viewed on an HDR10-compatible display.

- HDR Displays: Certified HDR TVs, macOS/Windows HDR-enabled monitors, iPhones (12+), Samsung Galaxy (S20+).
- Supported Browsers: Chrome, Edge, Safari (with HDR enabled).

4 Metadata Description

The CHUG dataset provides an extensive metadata file (`chug.csv`) containing key attributes for each video. This metadata is essential for analyzing video quality trends, training machine learning models, and performing statistical evaluations.

4.1 Overview of Metadata File

The metadata file (`chug.csv`) includes structured information for all 5,992 videos in CHUG. Each row corresponds to a unique video and contains attributes related to quality assessment, video characteristics, and experimental settings.

4.2 Metadata Attributes

Table 1 provides an overview of the key metadata fields.

- **Video ID (`Video`)**: Each video is uniquely identified using a hashed name, ensuring anonymity while allowing direct access from the AWS S3 bucket.
- **Mean Opinion Score (MOS, `mos_j`)**: This field represents the final subjective quality rating, computed using the robust SUREAL algorithm.

Table 1: Metadata attributes in CHUG dataset.

Column	Description
`Video`	Unique hashed video identifier
`mos_j`	Mean Opinion Score (MOS) based on AMT ratings
`sos_j`	Standard deviation of MOS scores
`type`	Video type (Crowd-sourced or Reference)
`resolution`	Video resolution (360p, 720p, 1080p)
`bitrate`	Bitrate (Mbps) applied during compression
`raw_scores`	List of raw individual scores for each video
`orientation`	Video aspect (Portrait or Landscape)
`framerate`	Frame rate (e.g., 30 FPS)
`content_name`	Source name for reference tracking
`split`	Dataset partition (Train/Validation/Test)
`height`	Video frame height (pixels)
`width`	Video frame width (pixels)

- **Standard Deviation of Scores (`sos_j`)**: This metric indicates the variability in user ratings, with higher values suggesting greater disagreement among viewers.
- **Resolution (`resolution`)**: Each video exists in multiple resolutions (360p, 720p, and 1080p), allowing for quality comparisons across different compression levels.
- **Bitrate (`bitrate`)**: The bitrate represents the level of compression applied, ranging from low-bitrate versions to near-original quality.
- **Orientation (`orientation`)**: Identifies whether the video is in portrait or landscape mode, allowing for analysis of aspect ratio impact on quality perception.
- **Frame Rate (`framerate`)**: The dataset primarily consists of 30 FPS videos, maintaining consistency across different devices and capture settings.
- **Content Name (`content_name`)**: Provides a reference to the original content name before processing and compression.
- **Height and Width (`height, width`)**: These fields define the pixel dimensions of each video frame.

4.3 Accessing Metadata

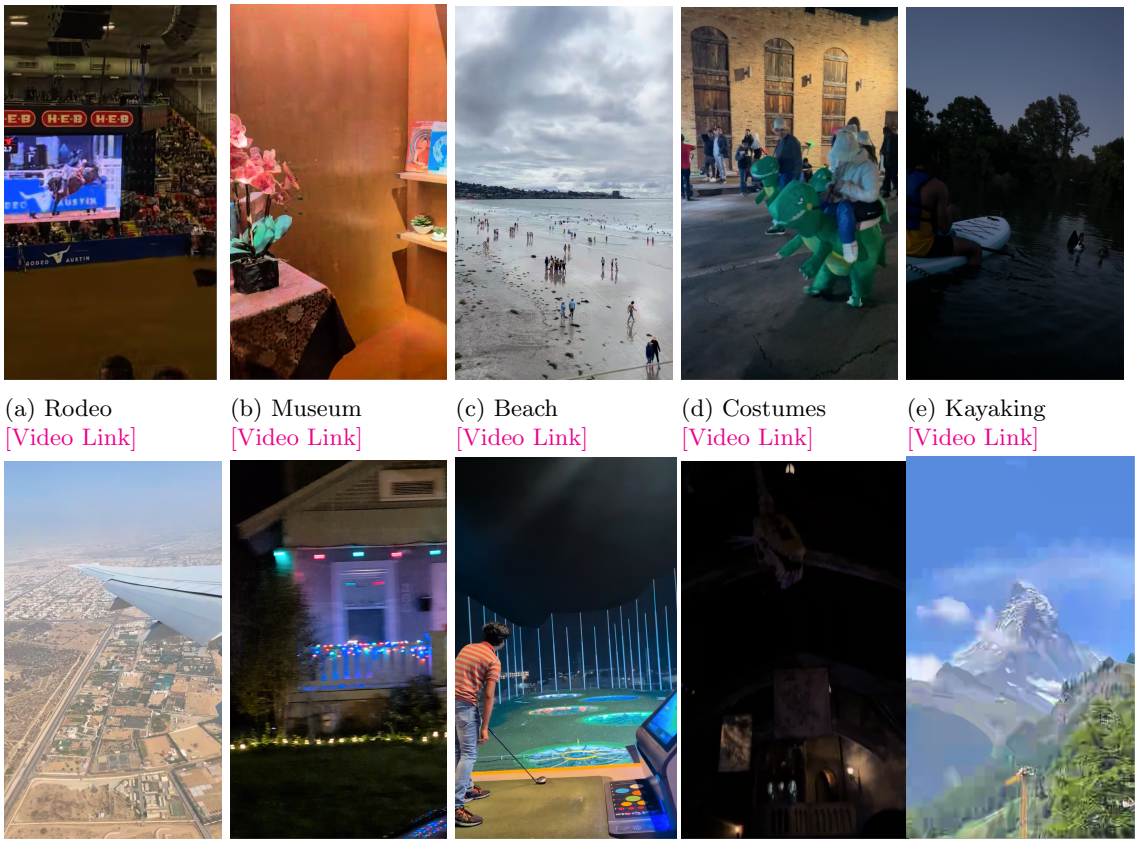
The complete `chug.csv` metadata file is available in our anonymous GitHub repository: https://anonymous.4open.science/r/CHUG-675D/
Users can leverage this file to retrieve video-specific details and access videos directly from the AWS S3 bucket.

5 Dataset Samples

Figure 1 and 2 shows selected video samples from the CHUG dataset, showcasing diverse content types and perceptual quality levels. Each video frame is labeled with its corresponding category and provides a direct access link.

6 Use Cases and Future Impact on HDR Research

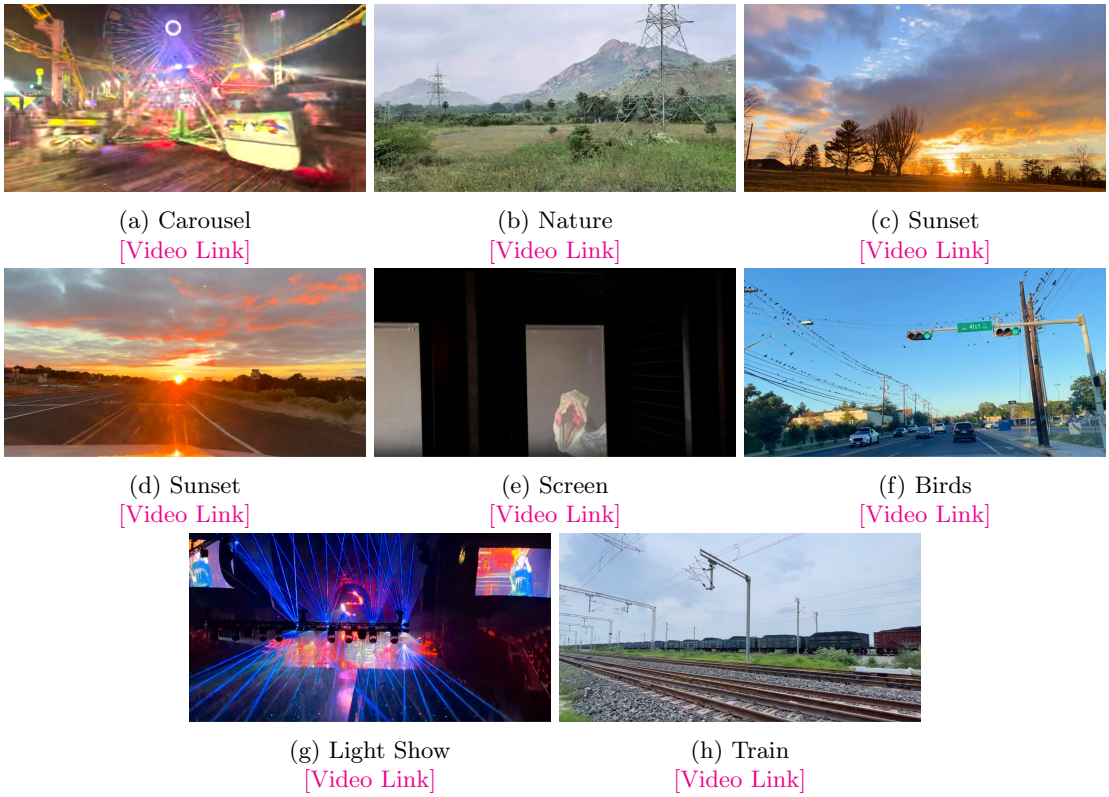
The CHUG dataset serves as a crucial benchmark for **No-Reference HDR Video Quality Assessment (NR-HDR-VQA)** and real-world streaming quality analysis. Unlike traditional datasets that focus on professionally generated content, CHUG provides an **authentic representation of UGC-HDR distortions**, making it invaluable for **machine learning models, perceptual quality studies, and HDR streaming optimizations**. Below, we outline key applications and future directions.



(a) Rodeo [Video Link] (b) Museum [Video Link] (c) Beach [Video Link] (d) Costumes [Video Link] (e) Kayaking [Video Link]

(f) City [Video Link] (g) Decorations [Video Link] (h) Sports [Video Link] (i) Museum [Video Link] (j) Mountains [Video Link]

Figure 1: Sample frames from the CHUG dataset(Portrait Only). Each image represents a distinct category of user-generated HDR content with a direct video access link.



(a) Carousel [Video Link] (b) Nature [Video Link] (c) Sunset [Video Link]

(d) Sunset [Video Link] (e) Screen [Video Link] (f) Birds [Video Link]

(g) Light Show [Video Link] (h) Train [Video Link]

Figure 2: Sample frames from the CHUG dataset(Landscape Only). Each image represents a distinct category of user-generated HDR content with a direct video access link.

6.1 Studying Real-World UGC-Specific HDR Distortions

- CHUG captures **compression artifacts, exposure issues, noise, banding, and luminance inconsistencies**, making it a **realistic dataset** for HDR content research.
- Researchers can analyze **how different HDR-capable devices and social media encoding pipelines impact video quality**, leading to better **HDR encoding and transmission strategies**.
- The dataset allows for **distortion analysis** across different resolutions, bitrates, and device types.

6.2 Evaluating Bitrate-Resolution Trade-Offs in HDR Streaming

- **Streaming providers and content delivery networks (CDNs)** can leverage CHUG to analyze **perceptual quality trade-offs** across bitrates and resolutions.
- The **bitrate ladder strategy** used in CHUG enables testing of **adaptive bitrate (ABR) streaming algorithms** for HDR content.
- Helps in **optimizing HDR transcoding pipelines**, ensuring **better user experience across bandwidth-constrained environments**.

6.3 Enhancing HDR Quality Metrics and Perceptual Studies

- CHUG can be used to **refine HDR-specific quality metrics**, such as HDR-VMAF, HDR-SSIM, and deep-learning-based HDR perceptual models.
- The dataset's **large-scale subjective study** provides ground-truth MOS scores, which can help in **improving objective HDR quality assessment algorithms**.
- Future work can extend CHUG by **incorporating tone-mapped versions**, allowing research on **HDR to SDR conversions and inverse tone-mapping algorithms**.

7 Conclusion

The CHUG dataset is a significant step forward in UGC HDR quality assessment, providing a diverse and realistic collection of UGC-HDR videos. By leveraging a large-scale subjective study and real-world compression artifacts, CHUG sets a new standard for benchmarking No-Reference HDR-VQA models.