# SSV360: A Dataset on Subjective Quality Assessment of 360° Videos for Standing and Seated Viewing on an HMD

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# Introduction

- Virtual reality (VR) applications have become increasingly popular in recent years.
- Human ratings on the quality are needed to provide a ground truth.
- In this paper, we introduce the SSV360 dataset on the subjective quality assessment of $360^\circ$ videos which provides:
  - A pilot study on the impact of standing and seated viewing on a head-mounted display (HMD) [Hu et al., 2021].
  - A wide range of psychophysical and psychophysiological data.

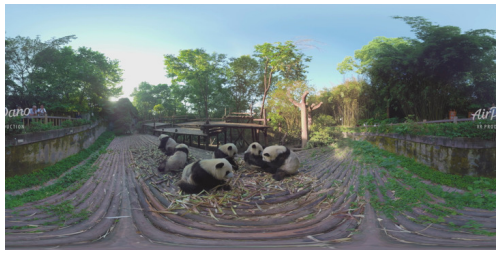
# Stimuli, Software, and Equipment (I)

- Four natural scenes of 10 s duration.

Alcatraz

BloomingAppleOrchards

FormationPace



PandaBaseChengdu

Figure 1: Sample frames of the video scenes in ERP format.

# Stimuli, Software, and Equipment (II)

- Reference videos of 6K, 4K, 2K, and optimal resolution (OR) [Zhang et al., 2018] were produced from the 8K reference videos.
- The test videos were produced from the references videos by compressing them with quantization parameter (QP) set to QP=22, 27, 32, 37, and 42.
- A set of 120 360° videos for each session.
- Each participant joined two sessions, one for standing and one for seated.

# Stimuli, Software, and Equipment (III)

- The 360° videos were displayed on an HTC Vive Pro HMD of resolution 1440×1600 pixels per eye, 110° field of view, and refresh rate of 90 Hz.
- The test platform was built using the Unity 3D game engine.
- The iMotion Software Version 7.1 was integrated into the test platform to record the heart rate and galvanic skin response (GSR) and to provide the graphical user interface for collecting the simulator sickness questionnaire (SSQ).

# Participants

- The SSV360 dataset contains data that were recorded for five expert participants familiar with immersive media (2 females and 3 males).
- The age of the five participants was between 31 and 60 years with an overall average age of 38.6 years, an average age of 34.75 years of the females, and an average age of 41.33 years of the males.
- They all attended the full sessions and watched the entire set of 120 videos which consumed an average of 23.43 minutes including the rating times.

# Test Procedure

- The participants were given the quality assessment task of casting their opinion scores to the set of videos in two sessions, i.e., one session for seated viewing and the other session for standing viewing of the videos on the HMD.

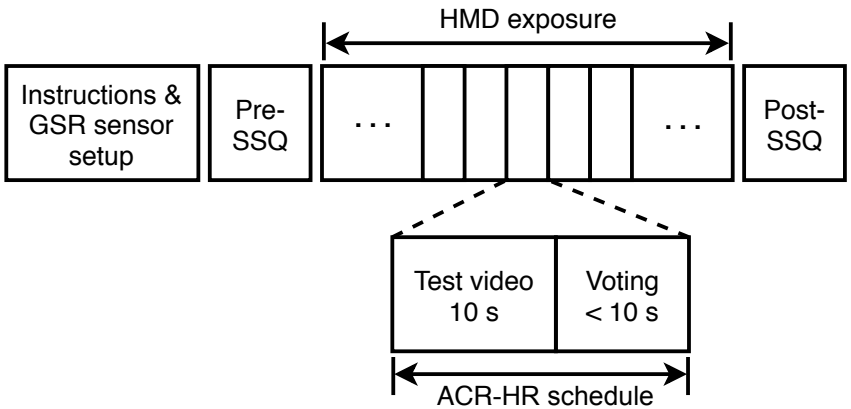



Figure 2: Schedule of a test session used for standing and seated viewing of 360° videos on an HMD [Hu et al., 2021].

# Dataset Structure

- The SSV360 dataset has been made available to the public under the GitHub link: (https://github.com/MajedElwardy/SSV360)
- The SSV360 dataset comprises of the following three main folders:
  - *Test_scenes*
  - *Standing_viewing_ACR_SSV360*
  - *Seated_viewing_ACR_SSV360*

# Rating Times

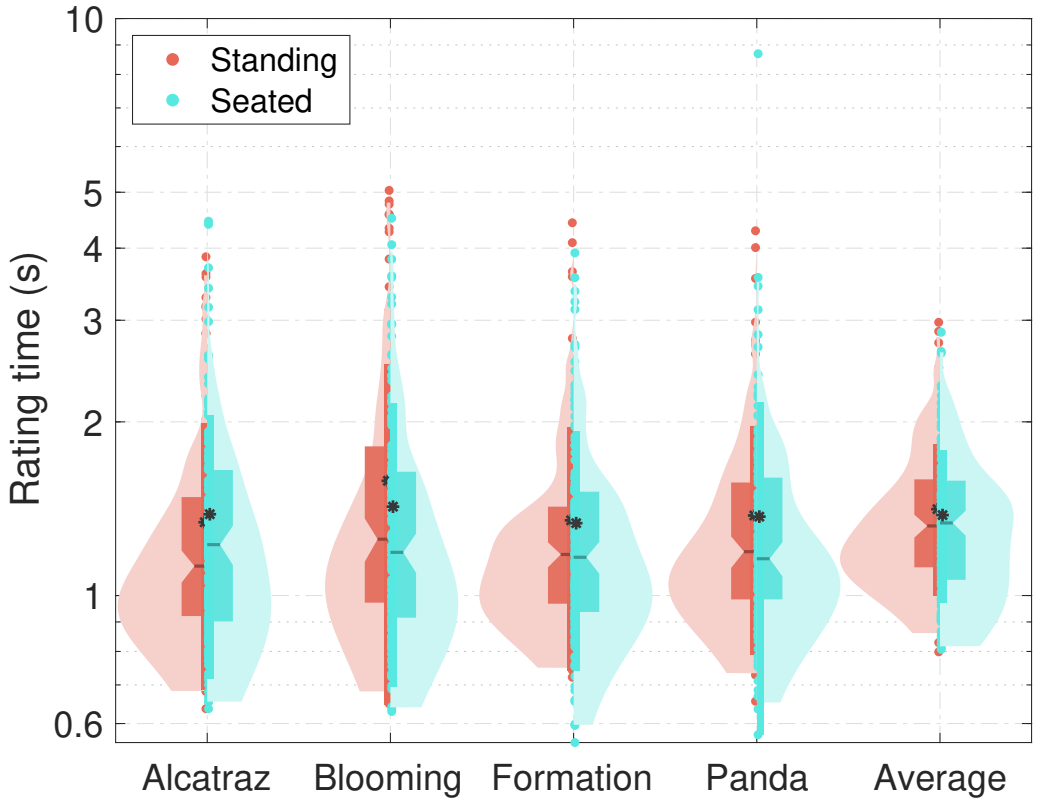



Figure 3: Violin plots of the rating times for each video scene and average rating times over the four video scenes.

# Opinion Scores

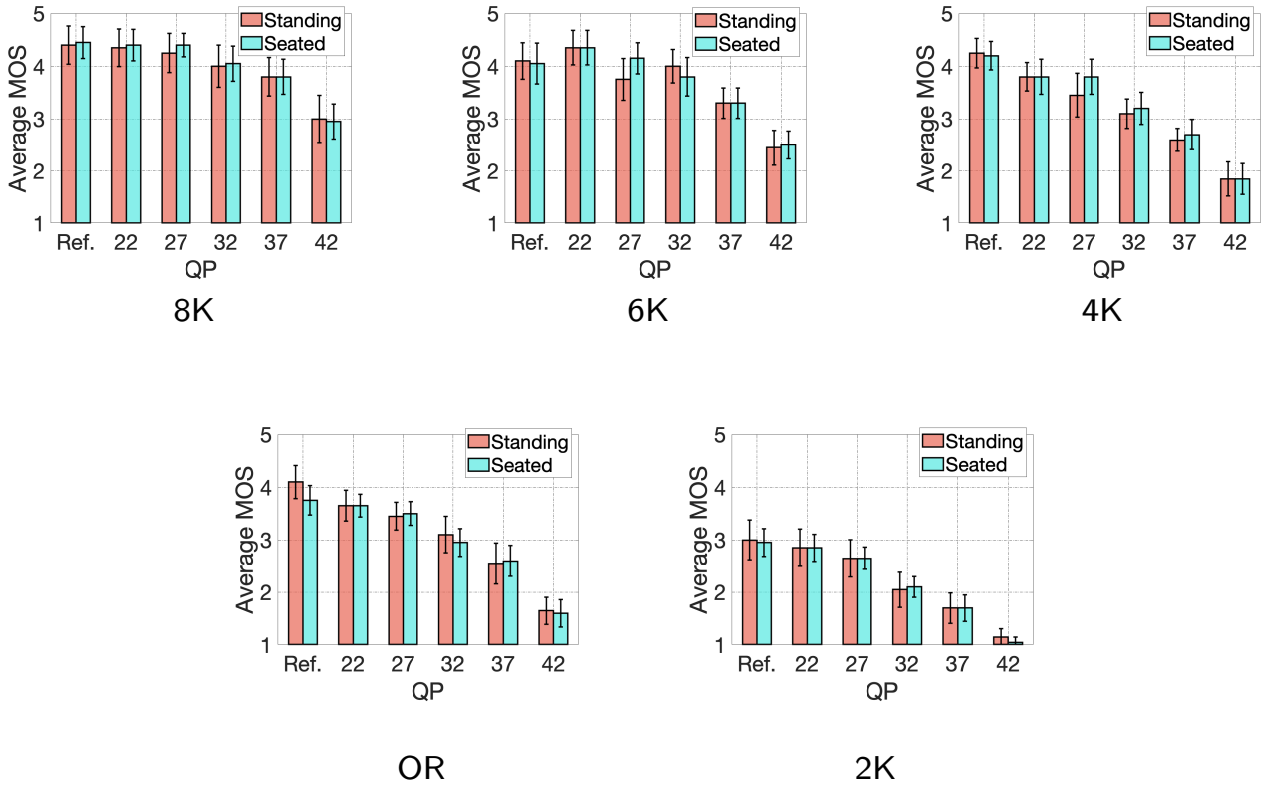



Figure 4: Average MOS versus quantization parameter for each resolution and 95% confidence interval (CI).

# Head Movements

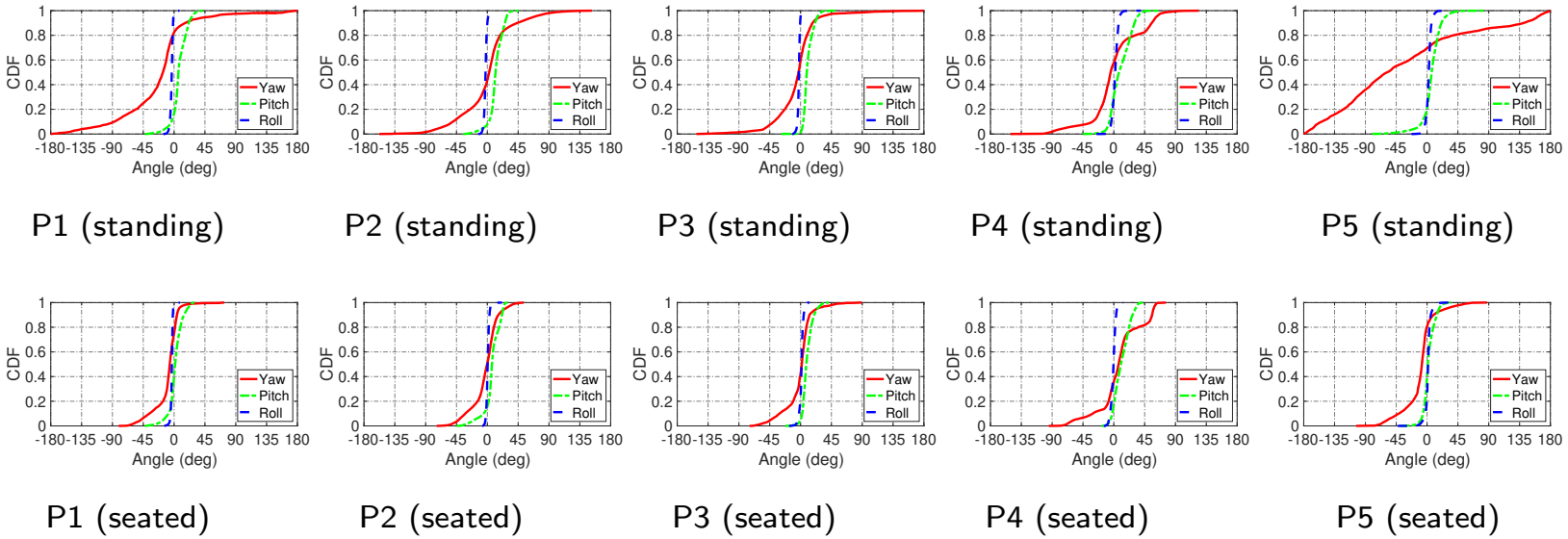



Figure 5: CDFs of the yaw, pitch, and roll angles for standing and seated viewing which represents the video scene exploration behavior of each participant.

# Pupil Dilation

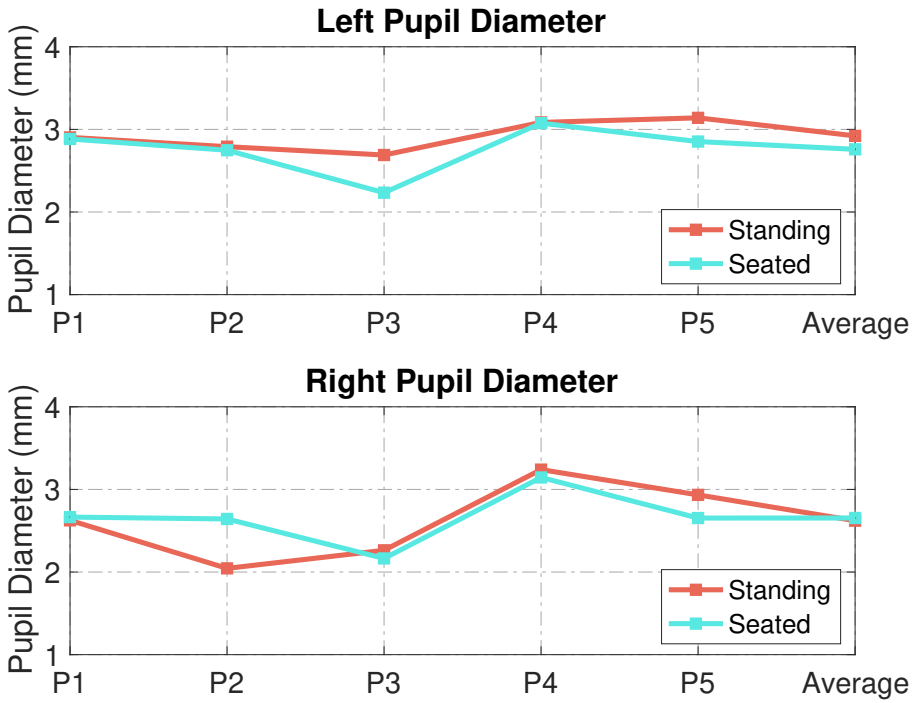



Figure 6: Left and right eye pupil diameters for each participant and related average pupil diameter across all participants.

# Galvanic Skin Response

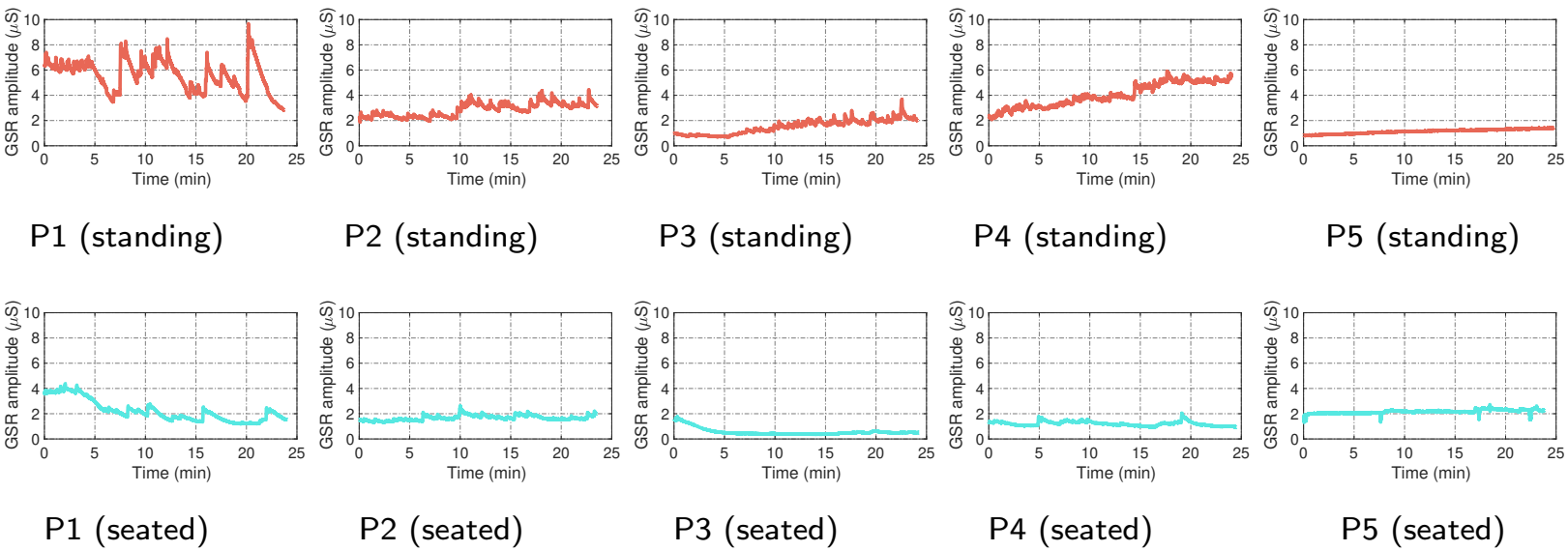



Figure 7: GSR amplitudes for standing and seated viewing during HMD exposure.

# SSQ Scores

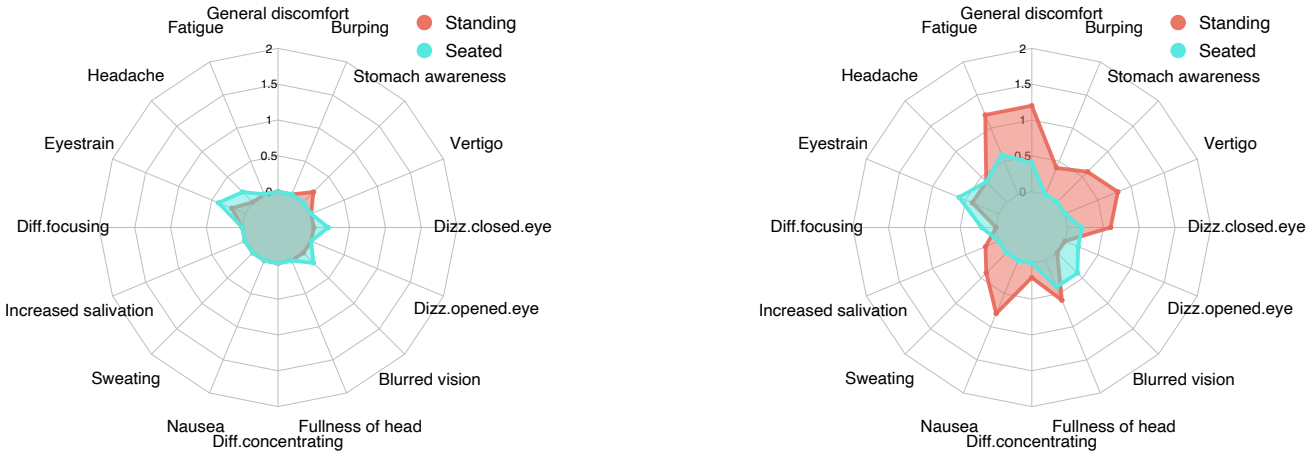



Figure 8: Average Pre-SSQ scores and average Post-SSQ scores for each symptom in standing and seated viewing.

# Conclusions

- In this paper, we have presented the annotated SSV360 dataset that has been made publicly available on GitHub.
- The SSV360 dataset contains the psychophysical and psychophysiological data of five participants that were recorded during a pilot study on the effect of standing and seated viewing of 360° videos on subjective quality assessment.
- The recorded data includes rating times, opinion scores, head movements, pupil dilation, galvanic skin responses, and SSQ scores for each participant and for both viewing conditions.

# Future work

- The ground truth provided in the SSV360 dataset may be applied, for example, to support human-centered and perception-based assessment of immersive media processing algorithms.
- Future work may include conducting subjective tests and producing annotated databases for immersive media with a larger set of viewing conditions.

# Acknowledgments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- We thank the volunteers for their participation in this study.

# References

Hu, Y., Elwardy, M., and Zepernick, H.-J. (2021). On the Effect of Standing and Seated Viewing of 360° Videos on Subjective Quality Assessment: A Pilot Study. *Computers*, 10(6):1–28.

Zhang, Y., Wang, Y., Liu, F., Liu, Z., Li, Y., Yang, D., and Chen, Z. (2018). Subjective Panoramic Video Quality Assessment Database for Coding Applications. *IEEE Trans. on Broadcasting*, 64(2):42–51.