



AKADEMIA GÓRNICZO-HUTNICZA
IM. STANISŁAWA STASZICA W KRAKOWIE
AGH UNIVERSITY OF SCIENCE
AND TECHNOLOGY

VQEG Meeting (Spring - 2025)
Meta, Menlo Park, CA, USA

Human Factors Influencing on Crowdsourcing Subjective Video Quality Assessment

Author: Avrajyoti Dutta | avrajyoti.dutta@agh.edu.pl

Supervisor: Prof. Dr. hab. inż. Mikołaj Leszczuk | mikolaj.leszczuk@agh.edu.pl

Co-Supervisor: Dr. inż. Dawid Juszka | dawid.juszka@agh.edu.pl

Institute of Telecommunications

Discipline: Information & Communication Technology

Unit: Faculty of Computer Science, Electronics & Telecommunications

8th May 2025

Research Purpose:

Human Factors Influencing on Crowdsourcing Subjective Video Quality Assessment

Problem Statement:

- Growing demand for **high-quality video streaming and conferencing** services.
- Ensuring **optimal user experience (QoE)** is a major challenge.
- **Network factors** (bandwidth, latency, jitter, packet loss) significantly impact video quality.
- **Traditional assessment methods** use controlled environments, failing to reflect real-world conditions.
- Gap exists between **technical network parameters** and **actual user perception** of quality.
- Research focuses on **real-world testing standards** for accurate quality evaluation.
- Findings will help design **better evaluation frameworks** for video applications.
- Goal: **Improve service optimization** and enhance **user satisfaction**.

Research Proposal:

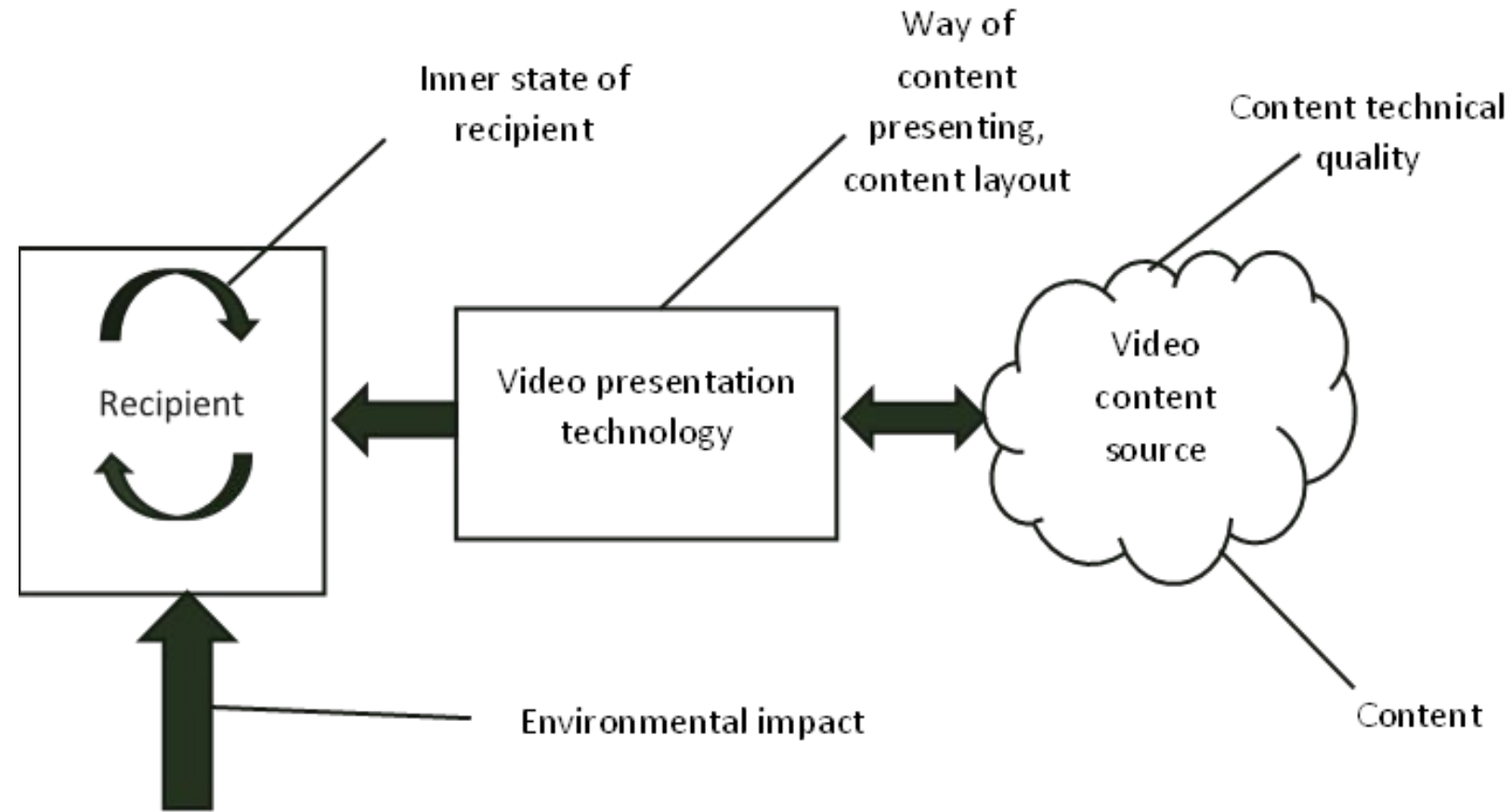


Figure 01: Factors impacting recipient's perception

Introduction:

Evaluation of video quality is a crucial topic for Internet content providers (ICPs) to address to enhance their service. Although there have been some studies on evaluating objective video quality, real-time evaluation is still a challenging task. The development of a web interface for assessing video clips' quality is covered in this work. Approximately 55 minutes were required for the full experiment or to assess the quality of video clips.

Web Version Link of the Experiment:

<https://s.agh.edu.pl/611Xh>



Scientific Experiment (As per ITU-T P.910 Guidelines):

Greetings,

Welcome to the Video Quality Assessment Test. Your participation in this study will greatly contribute to our ongoing research into video quality algorithms.

To ensure optimal performance and accurate results, we recommend using the latest version of the Google Chrome web browser in Incognito mode ([instructions](#)).

If you don't have access to this browser, you can download it by following [this link](#)

All information collected during this test will be used solely for the purpose of evaluating video quality.

We prioritize your privacy and do not collect or share personal information with third parties.

Please note the following guidelines before proceeding:

1. **Browser Recommendation:** We highly recommend using the latest version of Google Chrome in Incognito mode.
2. **System Requirements:** Your system should have a minimum internet speed of 40 Mbps and a monitor with Full HD (1920x1080) resolution.
3. **Test Duration:** The test comprises sequentially viewing one video (without audio) for minimum 10 seconds to maximum 25 seconds each, totaling approximately 50 to 55 minutes.
4. **Assessment Task:** Your task is to evaluate the quality of each video presented.
5. **Quality Assessment:** You will be asked to choose the quality level (Excellent, Good, Fair, Poor or Bad) you believe best describes each video's viewing experience.
6. **Criteria for Assessment:** You are free to use any criteria you deem relevant to determine the superiority of one video variant over the other.
7. **Device Usage:** Please refrain from using mobile phones during the test.
8. **Navigation:** Avoid using the "Back Button" during the test to maintain continuity.
9. **Full Screen Mode:** Press F11 for a better viewing experience in full-screen mode.
10. Upon completion of the test, you will receive a confirmation message.

Thank you for your voluntary participation and valuable contribution to our research.

Sincerely,

[AGH Video Quality of Experience \(QoE\) Team](#)

For any inquiries related to this test, feel free to reach out to us via email at: avrajyoti.dutta@agh.edu.pl

Warning: For this test, please use a PC, desktop or laptop.
Please complete this assessment within **60 minutes** to avoid the risk of rejection.

Start

Figure 02: Preview of “Guidelines Page”



User Information

Country:

Please select your country

Age:

- ☐ Below 18
- ☐ 19 to 30
- ☐ 31 to 45
- ☐ Above 45

Gender:

- ☐ Male
- ☐ Female
- ☐ Other

Education Group:

- ☐ Primary School
- ☐ GCSEs or Equivalent
- ☐ University Undergraduate Programme
- ☐ University Post-Graduate Programme
- ☐ Doctoral Degree

Education Type:

- ☐ Administrative
- ☐ Agricultural/ Forestry
- ☐ Artistic
- ☐ Economic
- ☐ Engineering and Technology
- ☐ Humanistic
- ☐ Legal
- ☐ Medical
- ☐ Military and Naval
- ☐ Pedagogical
- ☐ Psychological
- ☐ Social
- ☐ Tourism and sports
- ☐ Other

Subjective Mood Assessment:

- ☐ Positive (+)
- ☐ Neutral (0)
- ☐ Negative (-)

Subjective Feeling of Tiredness:

- ☐ High
- ☐ Medium
- ☐ Low

Interests:

- ☐ Art
- ☐ Beauty
- ☐ Cars, automotive
- ☐ Cinema, movies
- ☐ Cooking, food
- ☐ Electronics
- ☐ Entertainment
- ☐ Gaming
- ☐ Health
- ☐ History
- ☐ IT, Computers
- ☐ Literature
- ☐ Multimedia
- ☐ Music
- ☐ Nature
- ☐ Photography
- ☐ Science
- ☐ Sport
- ☐ Theatre
- ☐ Travelling

Crowdsourcing:

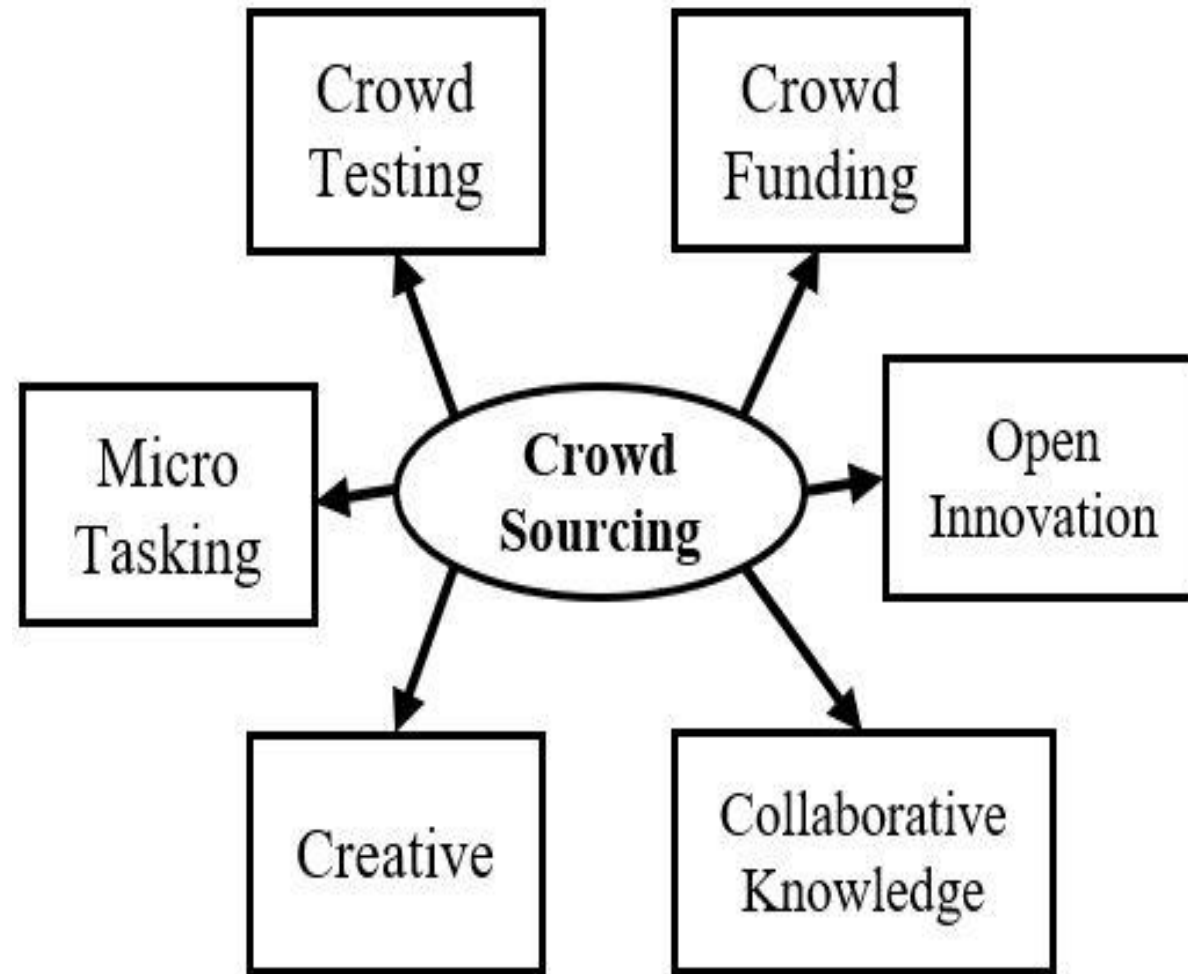


Figure 03: Different types of crowdsourcing

- Technique
- Via an online platform
- Divided into small parts
- Large group of individuals
- Impossible for machines to do
- More comprehensive
- Short period
- Low cost

Flowchart:

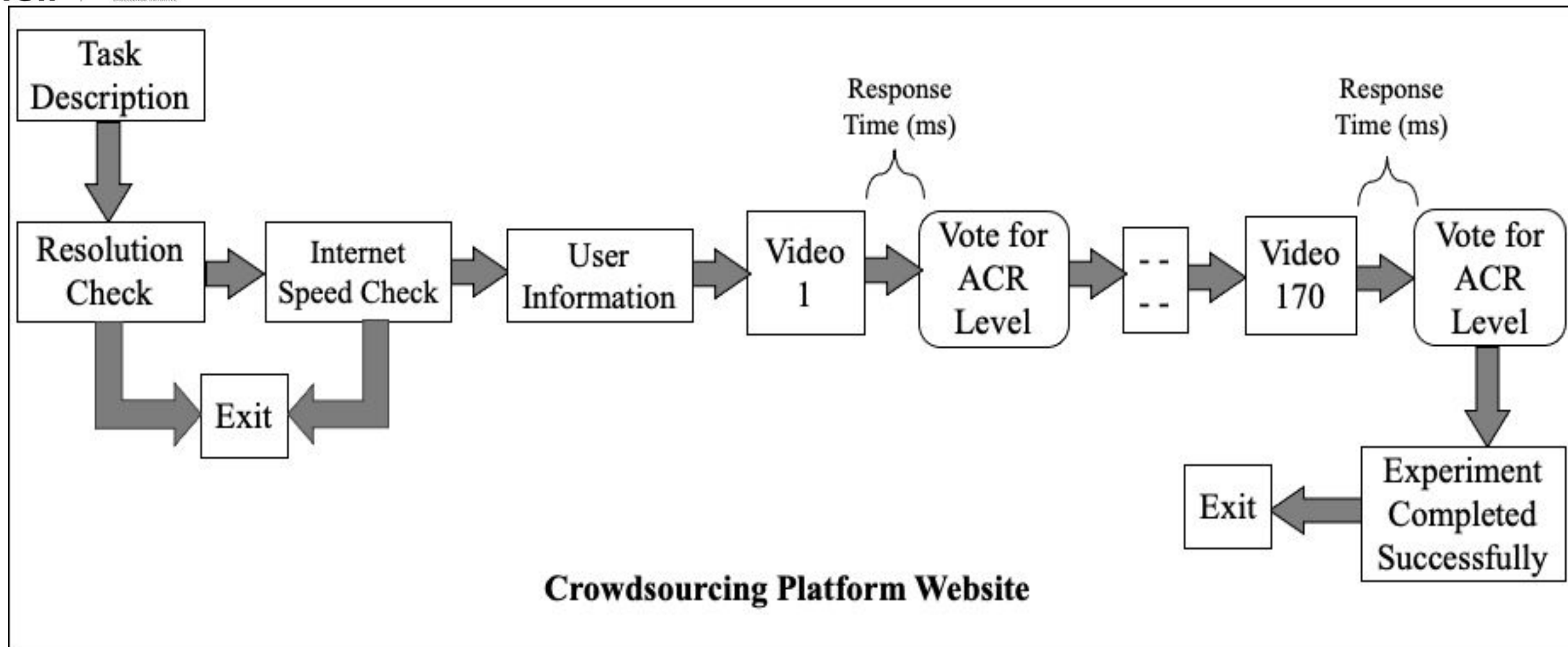


Figure 04: Flowchart of the experiment

Summary of Experiment Parameters:

Parameters	Specifications
Crowdsourcing Platform	PHP, HTML5, JS & CSS at AGH University Web Server
No. of Participants	47
Education Group	Engineering Undergraduate Students
Total Logic	6
Processed Video Sequence (PVS)	170
Experiment Duration	55 minutes
Total No. of Votes	8219
Participant's Platform	Desktop Computer/ Laptop
Participant's Browser	Google Chrome (Incognito Mode)
Length of video clips	9 to 21 seconds
Video Databases	Netflix, CableLabs, SJTU Media Lab and Xiph.org
Video Resolution	Full HD (1080x1920 pixels)
Internet Speed	40 Mbps
Video Source	News, sports, entertainment 10



Figure 05: Preview of ‘Video Clips’

This is the voting section of the previous video

Which quality best describes the previous video?
Please Vote!!

- ☐ Excellent
- ☐ Good
- ☐ Fair
- ☐ Poor
- ☐ Bad

Figure 06: Preview of 'Voting Page'

Results:

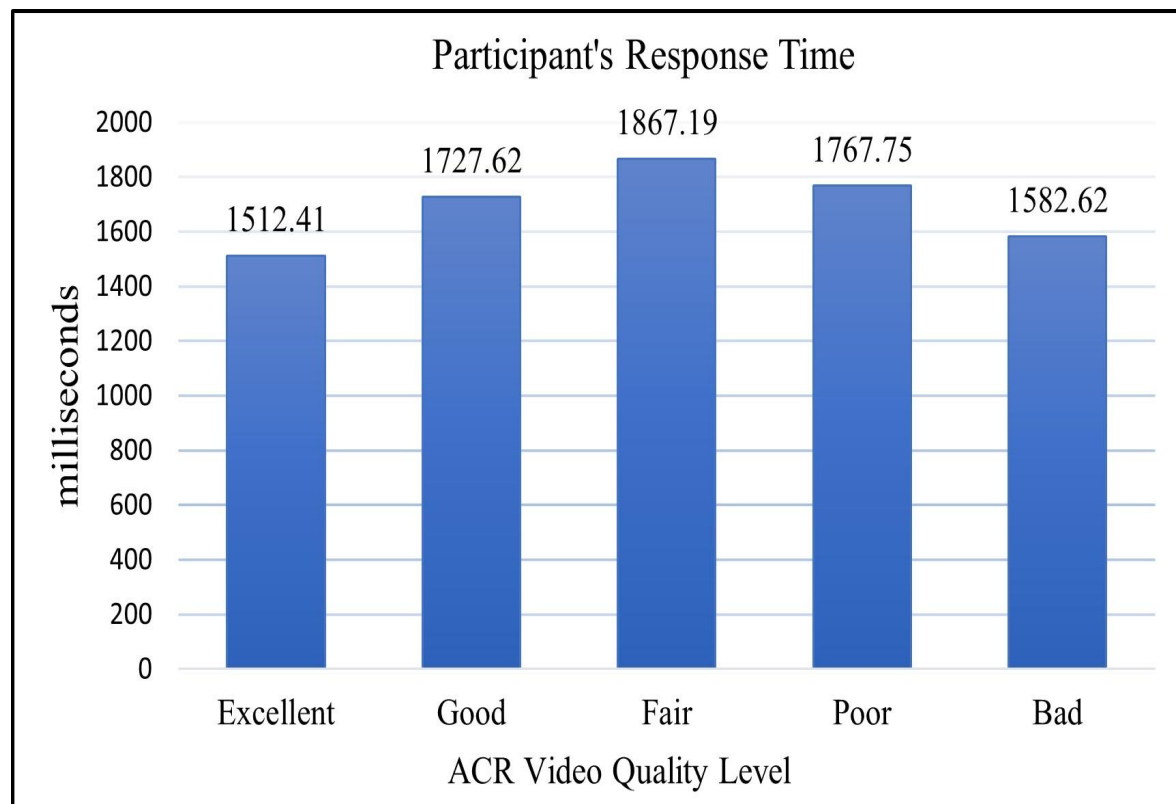


Figure 07: Response time

<i>ACR Video Quality Level</i>	<i>Mean Response Time (ms)</i>	<i>SD (ms)</i>
Excellent (5)	1512.41	870.142
Good (4)	1727.62	960.115
Fair (3)	1867.19	1042.44
Poor (2)	1767.75	1020.17
Bad (1)	1582.62	869.601

Table 01: Statistical analysis

Statistical Analysis and Validation:

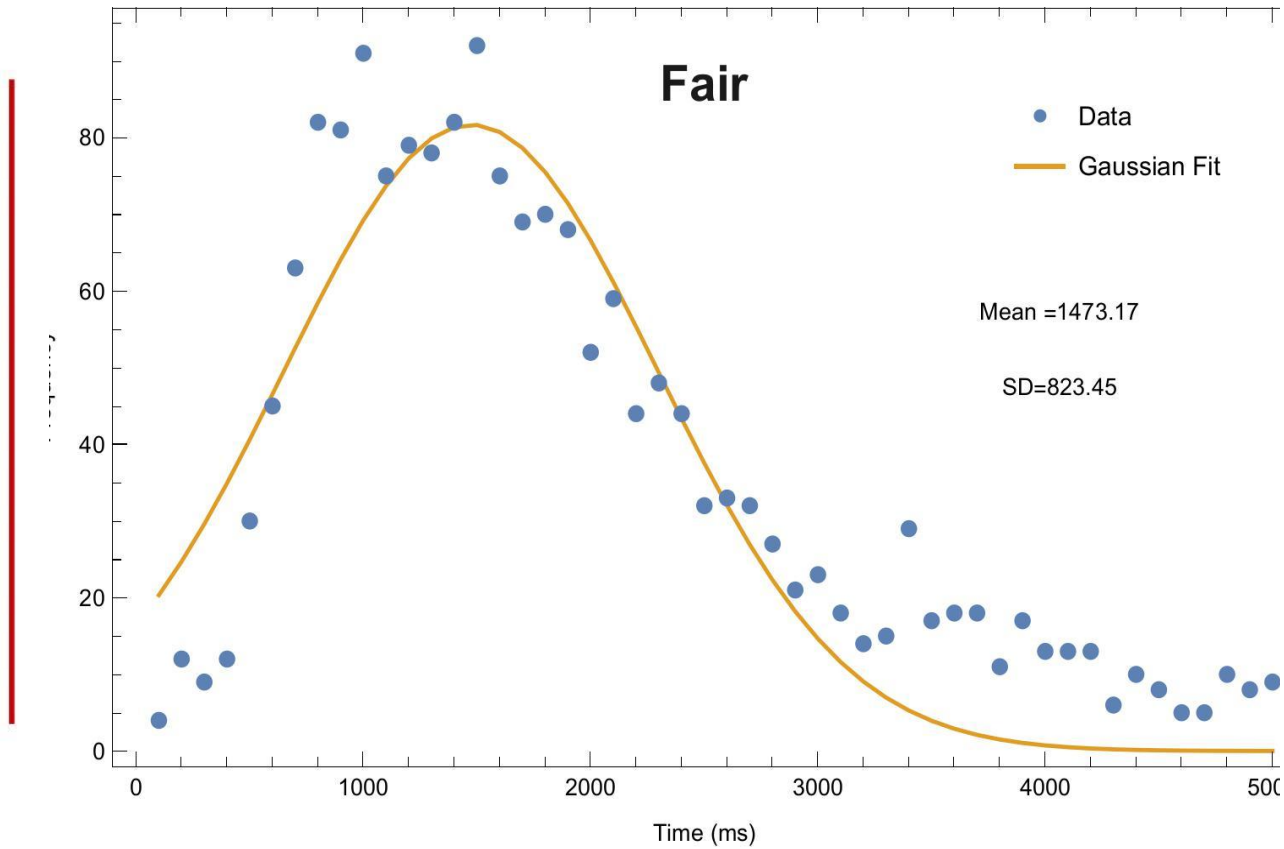


Figure 08: Gaussian Fit

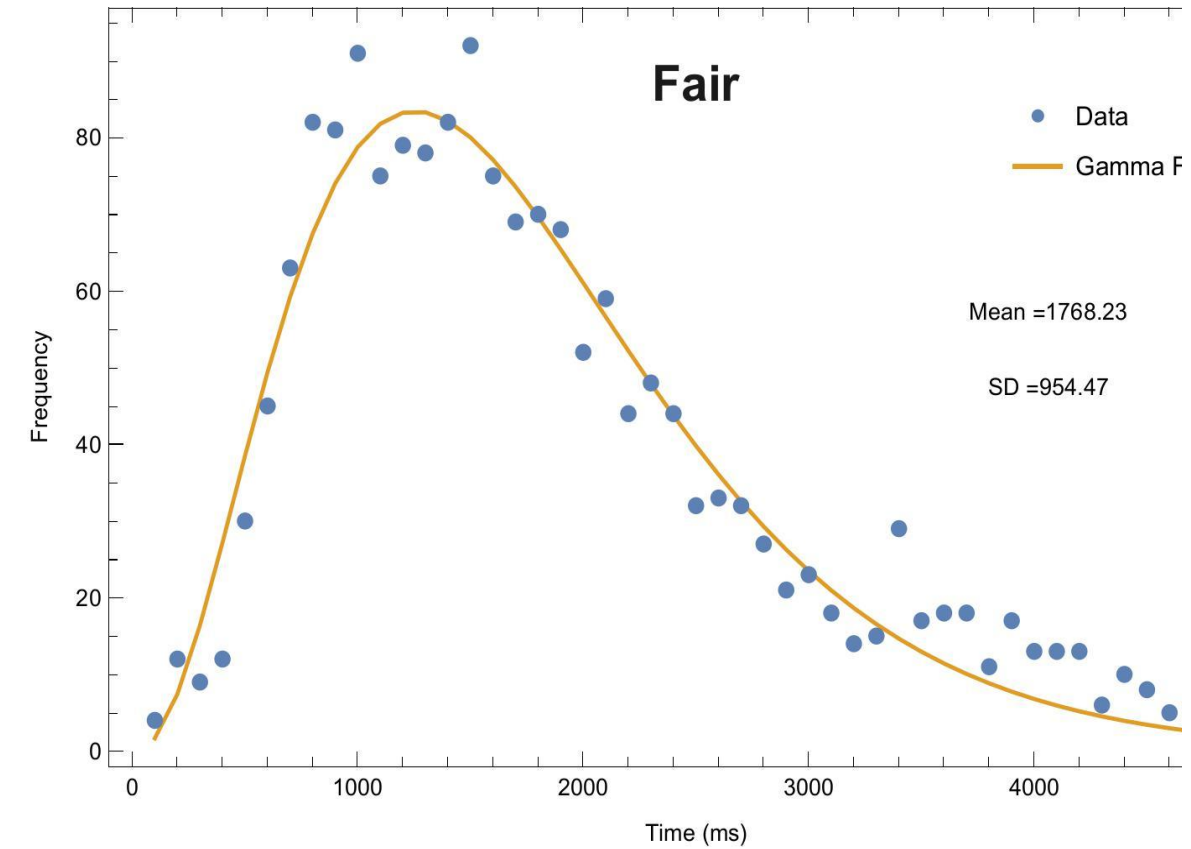


Figure 09: Gamma Fit

Conclusion:

- The study analyzed subjective video quality assessment using a crowdsourced evaluation and the Absolute Category Rating (ACR) scale.
- Results show that videos of Fair quality required longer response times, indicating increased cognitive effort in evaluating moderate-quality content.
- Experimental design followed ITU-T P.910 guidelines, using Google Chrome in Incognito mode and automated playback to ensure reliable and unbiased assessments.
- Response times serve as an insightful cognitive parameter, providing additional context beyond conventional quality ratings.
- Crowdsourcing proves to be a scalable and reliable method for subjective video quality research, facilitating efficient data collection.
- The insights from this research contribute to improving multimedia technology, enhancing video content evaluation, and refining user experiences.

References:

- [1] M. Grega, L. Janowski, M. Leszczuk, P. Romaniak, and Z. Papir, "Quality of experience evaluation for multimedia services," *Przegląd Telekomunikacyjny I Wiadomości Telekomunikacyjne*, vol. 81, pp. 142–153, 01 2008.
<https://sigma-not.pl/publikacja-34775-quality-of-experience-evaluation-for-multimedia-services-przeglad-telekomunikacyjny-2008-4.html>
- [2] T. Hoßfeld, C. Keimel, M. Hirth, B. Gardlo, J. Habigt, K. Diepold, and P. Tran-Gia, "Best practices for qoe crowdtesting: Qoe assessment with crowdsourcing," *IEEE Transactions on Multimedia*, vol. 16, no. 2, pp. 541–558, 2014. doi.org/10.1109/TMM.2013.2291663
- [3] M. Leszczuk, M. Grega, A. Kozbiał, J. Gliwski, K. Wasieczko, and K. Smaili, "Video summarization framework for newscasts and reports – work in progress," in *Multimedia Communications, Services and Security*, A. Dziech and A. Czyzewski, Eds. Cham: Springer International Publishing, 2017, pp. 86–97.
doi.org/10.1007/978-3-319-69911-0_7
- [4] S.-Y. Wu, R. Thawonmas, and K.-T. Chen, "Video summarization via crowdsourcing," in *CHI '11 Extended Abstracts on Human Factors in Computing Systems*, ser. CHI EA '11. New York, NY, USA: Association for Computing Machinery, 2011, p. 1531–1536. doi.org/10.1145/1979742.1979803
- [5] M. Leszczuk, L. Janowski, J. Nawala, and M. Grega, "User-generated content (ugc)/in-the-wild video content recognition," in *Intelligent Information and Database Systems*, N. T. Nguyen, T. K. Tran, U. Tukayev, T.-P. Hong, B. Trawinski, and E. Szczerbicki, Eds. Cham: Springer Nature Switzerland, 2022, pp. 356–368.
doi.org/10.1007/978-3-031-21967-2_29
- [6] P. Romaniak, L. Janowski, M. Leszczuk, and Z. Papir, "Perceptual quality assessment for h.264/avc compression," in *2012 IEEE Consumer Communications and Networking Conference (CCNC)*, 2012, pp. 597–602. doi.org/10.1109/CCNC.2012.6181021
- [7] Wei-Tek Tsai, Li Zhang, Shufeng Hu, Zizheng Fan, Qianyu Wang, "Crowdtesting Practices and Models: An Empirical Approach," *Information and Software Technology*, Volume 154, 2023, 107103, ISSN 0950-5849, doi.org/10.1016/j.infsof.2022.107103
- [8] M. Shahid et al., "Crowdsourcing-based subjective quality assessment of adaptive video streaming," *2014 Sixth International Workshop on Quality of Multimedia Experience (QoMEX)*, Singapore, 2014, pp. 53-54, doi.org/10.1109/QoMEX.2014.6982289
- [9] A. Zlatintsi, P. Koutras, N. Efthymiou, P. Maragos, A. Potamianos and K. Pastra, "Quality evaluation of computational models for movie summarization," *2015 Seventh International Workshop on Quality of Multimedia Experience (QoMEX)*, Pilos, Greece, 2015, pp. 1-6, doi.org/10.1109/QoMEX.2015.7148146
- [10] Borchert, K., Seufert, A., Gamboa, E. et al. "In vitro vs in vivo: Does the study's interface design influence crowdsourced video QoE?," *Qual User Exp* 6, 1 (2021), doi.org/10.1007/s41233-020-00041-2
- [11] A. Dutta, M. Leszczuk, D. Juska, M. Grega, 2023, "Subjective Quality Assessment of Video Summarization Algorithms: A Crowdsourcing Approach" vol. 96, no. 4, pp. 333-336, *Przegląd Telekomunikacyjny + Wiadomości Telekomunikacyjne*. dx.doi.org/10.15199/59.2023.4.75
- [12] ITU-T. Recommendations: ITU-T P.910: <https://www.itu.int/rec/T-REC-P.910-202207-I/en> (Accessed on 6 June 2024)

Publications:

- 1) Published (2024): **Avrajyoti DUTTA**, Dawid JUSZKA, Mikołaj LESZCZUK; “**Crowdsourcing evaluation of video summarization algorithm**” International Journal of Electronics and Telecommunications (IJET); ISSN 2081-8491, Volume: 70, Issue: 4, Pages: 1063–1069, 29th October, 2024. <https://doi.org/10.24425/ijet.2024.152361>
- 2) Published (2024): **Avrajyoti DUTTA**, Tomasz KONASZYŃSKI, Dawid JUSZKA, Mikołaj LESZCZUK; “**A Crowdsourcing Study of Video Quality.**” Radiocommunication and Teleinformatics Conference (KRiT - 2024), ISSN 1230-3496, Volume: 97, Issue: 4 , Pages 325–328, Poznań, September 11-13, 2024. <https://doi.org/10.15199/59.2024.4.72>
- 3) Published (2024): Tomasz KONASZYŃSKI, **Avrajyoti DUTTA**, Dawid JUSZKA, Mikołaj LESZCZUK; “**Should we restrict an access to QoE experiments for testers in bad psychophysical condition?**” Radiocommunication and Teleinformatics Conference (KRiT - 2024), ISSN 1230-3496, Volume: 97, Issue: 4 , Pages: 321–324, Poznań, September 11-13, 2024. <https://doi.org/10.15199/59.2024.4.71>
- 4) Published (2024): **Avrajyoti DUTTA**; “**A crowdsourcing study of video quality assessment**” Video Quality Experts Group (VQEG Meeting), 1-5 July 2024, Klagenfurt, Austria <https://s.agh.edu.pl/EFFio>
- 5) Published (2024): **Avrajyoti DUTTA**, Mikołaj LESZCZUK “**Video quality assessment framework in a crowdsourcing environment**” 9th ITG/VDE Graduate Summer School on Video Compression and Processing (SVCP - 2024): Rüdesheim, Germany, 30 June - 2 July 2024, <https://s.agh.edu.pl/MJvNY>
- 6) Published (2023): **Avrajyoti DUTTA**, Mikołaj LESZCZUK, Dawid JUSZKA, Michał GREGA; “**Subjective Quality Assessment of Video Summarization Algorithms: A Crowdsourcing Approach.**” Radiocommunication and Teleinformatics Conference (KRiT - 2023): ISSN 1230-3496, Volume: 96, Issue: 4, Pages: 333-336, September 20–22, 2023, Kraków. <https://doi.org/10.15199/59.2023.4.75>
- 7) Published (2023): **Avrajyoti DUTTA**; “**Subjective quality assessment of video summarization algorithms: a crowdsourcing approach.**” Video Quality Experts Group (VQEG Meeting), 26–30 June 2023, San Mateo, USA, <https://s.agh.edu.pl/EVYha>



Thank You !!