


Reproducibility review of: Advancing Forest Monitoring and Assessment Through Immersive Media

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Reviewed paper

Zürcher, R., Zhao, J., Lau Sarmiento, A., Brede, B., and Klippel, A.: Advancing Forest Monitoring and Assessment Through Immersive Virtual Reality, AGILE GIScience Ser., 4, 15, <https://doi.org/10.5194/agile-giss-4-15-2023>, 2023

Summary

The data of the paper under reproduction is partially published on Zenodo under a CC-BY-4.0 license. Data on the selected plots displayed in Figure 1 is not available due to intellectual property concerns. The developed VR application is not available due to size and time constraints, therefore neither Figure 1 or 2 could be reproduced. Statistical analyses presented in Section 2.2 and Section 3 have been successfully reproduced. The authors showed dedication to support reproducibility of their work.

Reproduction was *partially successful*.

Reproducibility reviewer notes

The submission contains a Data and Software Availability section which originally linked to a SWITCHdrive repository. After raising citation and longevity concerns, the authors quickly migrated to a Zenodo repository at <https://doi.org/10.5281/zenodo.7661268>. Version 2, created on 21.02.2023, was used for reproduction.

The developed VR application could not be shared due to technical issues. During communication, the authors provided a video link showing a demonstration of the app. The authors mention that screenshots of this video were used to create Figure 2.

During communication with the authors, a README was added to the repository, which describes the provided data. The only relevant file for this reproduction is an Excel spreadsheet containing raw and aggregated results of the presented survey. In addition, the repository contains height map data, raw point cloud data, panoramic images and videos, the protocol regarding user evaluation, raw output of the survey tool, as well as several R script files labelled by the authors as unrelated to the paper.

The README documents the survey result Excel file `Data_Questionnaire_modified.xlsx` in folder `Raw Excel Sheets` in detail, which was the main source for reproducing the data presented in the survey.

In total, three paragraphs containing aggregated data have been reproduced.

Section 2.2 contains a brief overview of the participants age and gender distribution. The reproduced values are displayed below.

Table 1: Reproduction of survey participant analysis. Corresponds to data in Section 2.2 of reproduced paper.

Min	Max	Mean	N_female	N_male
24	59	36.143	2	5

The first paragraph of Section 3 contains the mean and median of the survey responses. The reproduced values are displayed below.

Table 2: Reproduction of survey responses. Corresponds to data in the first paragraph of Section 3 of reproduced paper.

Topic	Mean	Mean_rounded	Median
Technology Adoption	3.667	3.7	4
Natural Engagement	3.952	4.0	4
Flow	3.857	3.9	4
Sense of Presence	4.048	4.0	4
Immersion	3.571	3.6	4
Experience Consequence	1.679	1.7	1
LiDAR Representation	3.810	3.8	4
360 Degree Images and Tools	3.833	3.8	4
Measurement Tools	3.349	3.3	3
PlantNet Species Recognition	3.000	3.0	3
Overall Usability	3.536	3.5	4
Overall User Experience	3.810	3.8	4

The second paragraph of Section 3 contains the measurement average from participants measuring tree heights in VR and the average deviation from the actual heights. The reproduced values are displayed below

Table 3: Reproduction of measurement average and deviation. Corresponds to data in the second paragraph of Section 3 of reproduced paper.

Type	Average (m)	Deviation (%)
Tree 1	26.739	-3.334
Tree 2	28.659	-2.866
Tree 1 DBH	0.644	0.665
Tree 2 DBH	0.671	0.213

For the purpose of this reproduction, an R script was written, which automates data extraction and aggregation, which is given in file `analysis.R` in the accompanying OSF repository.

Comments to the authors

Reproduction of the presented data aggregation was comparatively straight-forward after receiving the README from the authors. Without proper documentation, this partial reproduction would not have been possible. *I recommend adding documentation for provided data and code*, similar to what has been added during reproduction, for future submissions.

Reproducing the data presented in Section 2.2 and Section 3 involved simple aggregation steps, which would either have to be done by hand, using a spreadsheet tool as in this submission, or ideally be done automatically using a script similar to what has been written for the scope of this reproduction. For future submissions *I recommend to automate the data aggregation steps* for example using a script file.

A central contribution of the reproduced paper is the developed VR app. During communication, the authors explained that this application could not be shared due to size and time constraints, which is unfortunate. For future submissions *I strongly recommend to publish such central components* as it would greatly improve the contribution of the submission, especially regarding reproducibility and applicability.

Data and Software Availability

All data and software developed for this reproduction is published under a CC-BY-4.0 license in the OSF repository accompanying this report at <https://osf.io/27wzp>.