CODECHECK certificate 2026-33 for: *Measuring regional accessibility in urban form: A reproducible approach for urban analytics*



Item	Value
Title	Measuring regional accessibility in urban form: A reproducible approach for urban analytics
Authors	Mathias Jehling, Lucie Kluwe, and Caspar Kleiner
Ref. paper	10.5194/agile-giss-7-27-2026
Codechecker	Frank O. Ostermann
Date of Check	2026-10-28
Summary	Partial reproduction of paper, full reproduction of workflow
Repository	N/A
Ref. certificate	10.5281/zenodo.23913180

Table 1: CODECHECK summary

Output	Comment
interpolation_accessibility.tif	Links to Figure 3 top-most map
Barplot_2026-10-23.png	Links to Figure 4 top-most plot

Table 2: Summary of output files generated

Summary

This CODECHECK successfully reproduced the outcomes for a subset of the data (one of four case study areas), hence it is a partial reproduction of the paper. The workflow itself is fully reproducible and can be used to replicate the work for different study areas.

CODECHECKER notes

The paper has an accompanying Github repository[1] that contains the technical documentation and instructions. I am referring to the repository's version at the time of this CODECHECK's date.

Installation prerequisites and computational environment

The repository provides information on the required R packages, Python libraries, and hardware. Regarding the latter, I used a less powerful laptop (Intel Core i5-8265U, 16 GB RAM) but experienced no bottlenecks or increased runtime.

The installation requires access to a local OpenRouteService[2]. I chose to follow the instructions for setting up a Docker instance. The installation of the required R packages also went without problems.

Getting the Python environment to work needed a bit more effort. An initial version of the code used the QGIS Python console to call a QGIS plug-in to make the necessary calls to the ORS API. This legacy detour proved impossible to install for me because of conflicting Python library versions and QGIS installations. At my request, the authors removed this QGIS dependency entirely.

Still, several analysis steps are done via Python scripts that are called from the Rmd main file via the reticulate package. The Rmd includes code that should install the necessary libraries in a new Python virtual environment, but this did not work without problems on my end due to a different Python virtual environment setup (legacy micromamba). I managed to get it to work manually, but I think it could be more straightforward to provide a requirements.txt or environment.yml for a user to create that virtual environment in whatever way they see fit and then manually add it in the Rmd file.

Lastly, a few paths and the ORS URL had to be adjusted in the main Rmd workflow file, but this was well documented and no problem.

1 https://github.com/urban-structure-and-policy/regional-accessibility/releases/tag/v1.1.0

2 https://openrouteservice.org/

Data preparation

The repository provides data for one of the four case studies areas (Aachen) in the form of several gpkg and one csv, as well as a json in an OSM folder (presumably for the ORS-server). However, some files are labeled in German, and not every file's purpose is explained or immediately clear. Especially the input for the ORS server was guesswork, as it cannot directly use the provided json file. Instead, I downloaded the Regierungsbezirk Köln from Geofabrik.de. This area is larger than the output area in the paper, but worked without problems.

Running the code

After solving the above issues, running the Rmd in RStudio 2026.10.0 build 233 with R-4.6.1 and Python 3.11 VE worked without problems and completed roughly within the runtimes mentioned. The presumably larger-than-necessary ORS file did not lead to additional computational time.

Outputs

The scripts create multiple folders with multiple output files each. The one corresponding to Fig 3 in the paper is found in the output\interpolation\CC_mean folder. A visual inspection showed clear similarity of high-low patterns despite different color schemes. The single bar plot corresponds in shape to the one in Fig 4 (although using a differently scaled y-axis). Slight deviations between published and reproduced figures can be attributed to the randomized choice of points of the accessibility calculation.

In summary, the provided code and data allow the reproduction of one of the case study areas. The documentation and revised code are sufficient to attempt reproduction with limited resources and programming skills. A suggestion for improvement would be to clearly state which outputs are linked to the paper's figures, and provide a clear link to a suitable ORS input file.

Acknowledgements

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