Reproducibility Review of:
Exploring urban polygonal representation learning for complex footprint groups

Item	Value
Title	Exploring urban polygonal representation learning for complex footprint groups
Authors	Luisa Lo Presti, Peter Mooney
Ref. paper	Lo Presti, L. and Mooney, P.: Exploring urban polygonal representation learning for complex footprint groups, AGILE GIScience Ser., 7, 11, https://doi.org/10.5194/agile-giss-7-11-2026, 2026
Codechecker(s)	Carlos Granell (ORCID 0000-0003-1004-9695)
Date of Check	2026-04-06
Summary	Full reproduction
Repository	https://github.com/reproducible-agile/BaselineBuildingRL-AGILE2026
Ref. certificate	https://doi.org/10.17605/OSF.IO/da3z4

Table 1: Reproduction metadata

Output	Comment
No file	Cloud-based execution (Collab) of the original code repo

Table 2: Summary of output files generated

Summary

This paper investigates the use of Non-Uniform Fourier Transform (NUFT)-based spectral methods to learn unsupervised geometric embeddings of urban building footprint groups, addressing a gap in urban representation learning where physical form is typically ignored in favour of mobility and POI data. Using OpenStreetMap building data from Milan, the authors construct building groups via road/waterway partitioning and buffer-based clustering, represent them as 2-simplex meshes, and feed their spectral features through a contrastive MLP trained with InfoNCE loss to produce 128-dimensional embeddings.

Following the instructions, this reviewer was pointed to a GitHub repository where the original python scripts were placed. Authors suggested running the scripts on Google Collab. So, this reviewer cloned the GitHub repository to Google Collab and configured Collab engine according to the authors' recommendations. All scripts were successfully executed, without deviations from the submitted manuscript. Thus, the reproduction was successful.

Full citation of the paper:

Lo Presti, L. and Mooney, P.: Exploring urban polygonal representation learning for complex footprint groups, *AGILE GIScience Ser.*, 7, 11, https://doi.org/10.5194/agile-giss-7-11-2026, 2026.

Reproducibility reviewer notes

The study comes with full code repository, https://github.com/luisalopresti/BaselineBuildingRL, forked in https://github.com/reproducible-agile/BaselineBuildingRL-AGILE2026. The repo included a README file with complete instructions on how to execute the contained python scripts. MIT licence available.

Installation prerequisites and computational environment

As suggested by authors, the GitHub repo was cloned into Google Colab by using this snippet as a Colab Notebook composed of two cells:

```
from google.colab import drive

drive.mount('/content/drive')
```

```
%%bash

cd /content/drive/MyDrive/Colab\ Notebooks/AGILE2026-016

git clone https://github.com/reproducible-agile/BaselineBuildingRL-AGILE2026.git
```

The next step was to configure the colab engine based on the instructions provided in https://github.com/reproducible-agile/BaselineBuildingRL-AGILE2026/blob/main/0_SetUp.ipynb.

Basically:

- to enable GPU in Colab (Runtime -> Change runtime type -> T4 GPU).
- To make sure some dependences were available in the "dependencies/" directory

Data preparation

Data used in the paper was prepared by using the first script "*1_BuildBloack*", which generated a couple of parquet files in the "data/" directory

- building_clusters_Milan_Italy_created_on_2026_03_25_14_48_03.parquet
- disaggregated_clusters_Milan_Italy_created_on_2026_03_25_14_48_03.parquet

Running the code

The second script, "*2_BaselineGroupModel"*, was run as instructed, paying attention to relative path locations.

Outputs and results

The results obtained correspond exactly to the original results reported in the article, particularly the plots in Figures 2, 3, 4 and 5.

Recommendations

The authors did a commendable job at providing information about reproducing the analysis workflow. As a general observation, authors are recommended to indicate estimated execution time for some of the heavy computational steps, especially that for the "training loop" ("*2_BaselineGroupModel"* script) which took some hours to execute scattered in different sessions due to restricted TPU time per session.

Acknowledgements

Citing this document

This report is part of the reproducibility review at the AGILE conference. For more information see https://reproducible-agile.github.io/. This document is published on OSF at https://doi.org/10.17605/OSF.IO/da3z4

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