INTERACTIVE GEOVISUALISATION FOR ECODESIGN OF URBAN PROJECT

POST DOC – ANR ECOCIM – 2025

We are offering a post doc position in the field of computer sciences or geographical information sciences. We are looking for a candidate with experience in information visualization or cartography and willing to propose novel geovisualisation tools.

KEYWORDS

Digital City Models, Geovisualisation, 3D City Information Models

Life Cycle Analysis, Spatialisation, Ecodesign of urban projects

CONTEXT

The ANR ECOCIM project aims at improving eco-design approaches for urban projects, both new constructions and renovations, by leveraging the new opportunities offered by the rapid development of geodata and digital city models, commonly known as CIMs (city information models). Eco-design involves integrating environmental considerations into the design phase of a project in order to reduce them as much as possible. The method deemed most relevant to the decision-making process associated with eco-design is the life cycle analysis (LCA) method. The ECOCIM project aims to refine and operationalize LCA-based eco-design tools at the neighborhood level, particularly during the earliest design stages when project data is scarce, yet critical decisions are being made.

Digital city models and opendata can be used to make studies more precise (e.g. territorialised data), to make it possible to model neglected effects (e.g. urban heat island) and to extend the scope of the study by taking into account existing constraints in the area (consequential LCA). The use of geodata by researchers and/or LCA practitioners who do not necessarily have geographical information related skills requires simple tools for exploring and analysing these data, in particular interactive geovisualisation tools designed with their specific needs in mind.

OBJECTIVES

We aim at exploring LCA researchers and practitioners' needs to propose novel interactive geovisualisations for geodata exploration and analysis. Researchers from the ANR ECOCIM project currently working on enhancing LCA methods will be able to help us to understand user's needs.

One potential venue of research is the development of novel visualisations that will allow researchers to explore building stocks at different scales (city, region, country) in order to be able to determine archetypes; i.e. building types that are representative of the existing building stock. This approach is used in particular for LCA studies of a building stock (Mastrucci et al. 2017a, Mastrucci et al. 2017b, Pei et al. 2022, Pei et al. 2024), but also to work on the quantification of other building-related parameters such as urban overheating and its impact on health (Monnier et al., 2024). Current geodata (BD TOPO, BDNB) contain information on buildings on

a national scale. However, LCA researchers and practitioners do not necessarily have the skills to make use of this data because of its size (several tens of millions of buildings) and the lack of knowledge about its attributes (content, modelling rules, etc.). The aim is therefore to provide a tool that enables users who are not geographical information specialists to view and explore building databases interactively (visual exploration and extraction of statistical analyses) so that they can determine archetypes that are as representative as possible of the stock under study, according to their needs.

In any case, the post doc is expected to :

- interview users to understand their way of working and geovisualisation needs,

- propose a prototype that will be tested and iteratively enhanced through exchanges with users.

- publish the results in HCI and Information Visualization venues

The proof of concept can be proposed on one city or region, but the extension at the national scale will have to be explored.

Cited references

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MONNIER, Robin, SCHALBART, Patrick, ROUX, Charlotte et PEUPORTIER, Bruno, 2024. Integrating effects of overheating on human health into buildings' life cycle assessment. The International Journal of Life Cycle Assessment. novembre 2024. Vol. 29, n° 11, pp. 21372150. DOI 10.1007/s11367-024-02353-3.

PEI, W. Y., BILJECKI, F. et STOUFFS, R., 2022. DATASET FOR URBAN SCALE BUILDING STOCK MODELLING: IDENTIFICATION AND REVIEW OF POTENTIAL DATA COLLECTION APPROACHES. ISPRS Annals of the Photogrammetry, Remote Sensing and Spatial Information Sciences. 14 octobre 2022. Vol. X-4/W2-2022, pp. 225232. DOI 10.5194/isprs-annals-X-4-W2-2022-225-2022.

PEI, Wanyu, BILJECKI, Filip et STOUFFS, Rudi, 2024. Techniques and tools for integrating building material stock analysis and life cycle assessment at the urban scale: A systematic literature review. Building and Environment. août 2024. Vol. 262, pp. 111741. DOI 10.1016/j.buildenv.2024.111741.

DETAILS

When ? From March 2025 for 18 months

Where ? The post doc will work with the other members of the team of the ANR ECOCM project. He will work at the LASTIG laboratory, in Champs-sur-Marne.

CONTACTS

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