

Spot the *cartographic* difference

Context

When we navigate in an interactive map such as Google Maps or the 'Cartes IGN' application, during the zooming process, the map changes as the scale changes, and on some map views, maps at different scales can appear quite similar or significantly different. The differences can cause cognitive load during the use of the map (Touya et al. 2023). The European project LostInZoom is looking at how people use these maps and studies their mental processes during the use of the map. It includes how they perceive map similarity, in addition to the known factors of similarity between two maps (Yan et al. 2024). We believed that controlling the perceived similarity between two maps at different scales will help map designers to create maps that reduced cognitive load.

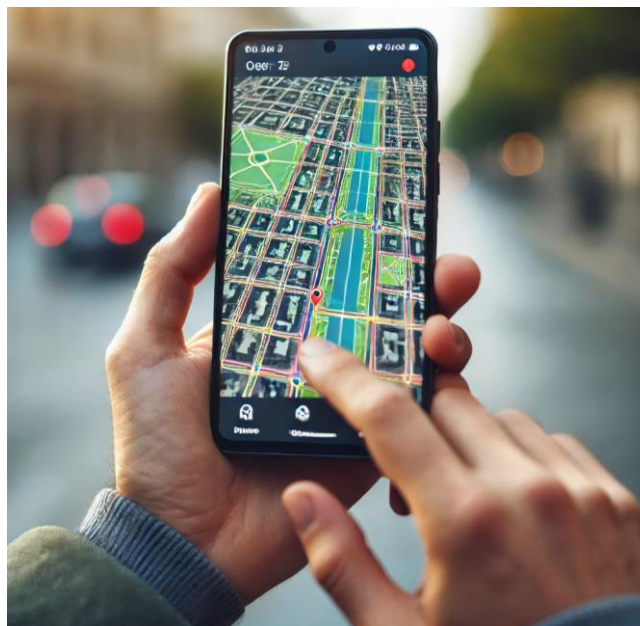


Figure 1. Navigating and zooming into a web map often induces some disorientation.

Internship Topic

This intern will be asked to follow an experimental research approach. The basic idea is inspired from the children game "Spot the difference"¹: we can design a gamified experiment asking voluntary participants to spot the most obvious differences from two maps of the same area, at different scales. Based on the outputs of the experiment, scores could be derived to identify the map elements (e.g. roads, rivers, buildings, toponyms, etc.) that are spotted more by the participants. Those elements will then be used prominently to compute a similarity index, putting aside all the small differences that exist between two maps but are not really perceived by most map readers.

As an example of the potential experimental design the intern is expected to work on, Figure 2 shows the difference in the two map views on different scales at 1:13000 and 1:14000. As in Figure 3, we can also imagine asking questions about specific layers of the map without the context of the map, to understand the role of the complete map in the perception of differences. As an example of questions to ask to participants, for Figure 2/3, we could ask open questions such as "Find the 4 main

¹ « jeu des 7 différences » in French

differences in the map” or closed questions such as “what is the most significant difference between those two maps? (1) roads, (2) point symbols”.

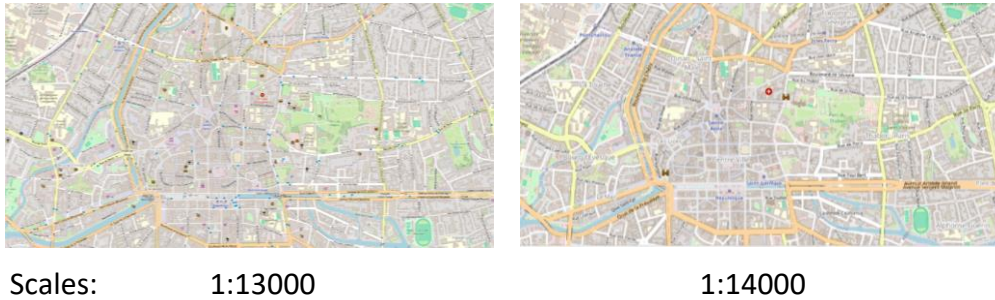


Figure 2. Different scale of tile map view

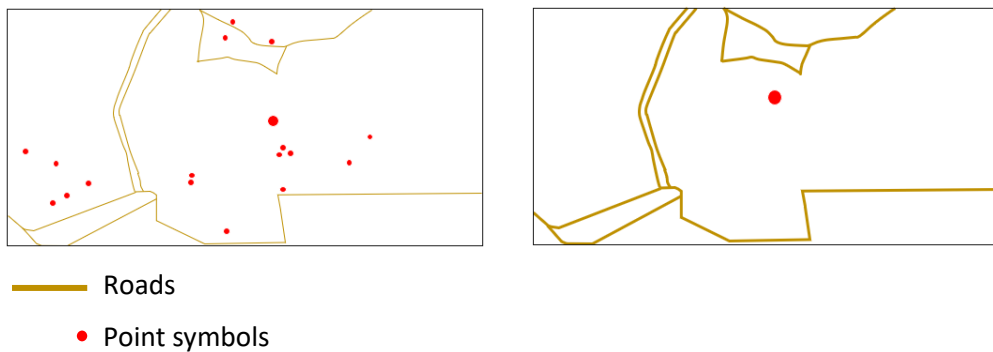


Figure 3. Measure the similarity of the point symbols and roads

The intern will have the responsibility to perform the following tasks:

- Design an experiment (possibly feasible online).
- Recruit on-site or online participants for the experiment.
- collect and analyse data from the experiment.
- Derive knowledge from the experiment on how to compute the similarity between two maps.

Expected student profile

Applicants should be master student in Geographic Information Sciences, with an interest in psychological questionnaires research being advantageous.

Duration

5-6 months, depending on the candidate's constraints.

Workplace

This internship will be based in Champs-sur-Marne, at ENSG-Géomatique, working closely with researchers involved in the LostInZoom project.

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To submit your application, send a CV and a cover letter to the internship manager.

Bibliography

Touya, Guillaume, Maïeul Gruget, and Ian Muehlenhaus. "Where Am I Now? Modelling Disorientation in Pan-Scalar Maps." *ISPRS International Journal of Geo-Information* 12.2 (2023): 62. <https://doi.org/10.3390/ijgi12020062>.

Yan, Haowen. Quantifying spatial similarity for use as constraints in map generalisation. *Journal of Spatial Science*, 2024, vol. 69, no 1, p. 23-42. <https://doi.org/10.1080/14498596.2022.2154713>.