International Cartographic Association
Association Cartographique Internationale

Map Use Challenges in the Digital Humanities: Preliminary Insights through Eye-Tracking Analysis

Francis Harvey [a,b]*, Marta Kuzma [b]*, Izabela Gołębiowska [b], Paulina Wacławik [b]

[a] *Leibniz Institute for Regional Geography, f_harvey@leibniz-ifl.de*

[b] *University of Warsaw, {marta_kuzma,i.golebiowska, p.waclawik3}@uw.edu.pl*

* Corresponding author

Keywords: map use, eye-tracking, digital humanities

Abstract:

For a preliminary study in an ongoing research project, which develops spatial and cartographic approaches to historical research, we conduct an eye-tracking study to identify and assess the challenges of map usage for social scientists working in the digital humanities. We report on this research at an early stage to engage other researchers working on similar issues. In this part of a larger research project, we aim to identify challenges in map use and improve cartographic visualisation methods and techniques to fit the digital humanities context better. We present early results based on a pilot study involving thematic maps supplemented with other visualisation types like tables, graphs and tables. We present the challenges (task difficulties, problems with the interfaces, errors in retrieving information etc.) that study participants had using visualisations applied in an interactive environment. Our anticipated results suggest that prior experience with maps and interactive tools significantly impacts the challenges. We expect the speed at which participants mitigate challenges depends on their experience. The quality of resolving tasks involving map use initially varies, but differences in later tasks referring to maps decrease, which suggests map use can be readily learned and applied. This suggests that user interfaces based on maps with some elementary usage tips help users who need to learn the specifics of that interface for maps rapidly. We look forward to discussing these results.

Maps in digital humanities are used for many types of tasks. We selected several types of operations tested in the context of geovisualization. We are interested in how researchers identify items and places on maps, locate thematic distributions, distinguish quantities of items, and visually organise and cluster items and places using spatiotemporal data visualised with various forms. Eye-tracking data is collected to get an insight into task-solving and participants' cognitive effort (fig. 1) since the eye-tracking technique has been successfully applied to digital humanities research (Saparova 2020, Zen et al. 2020). For the tested visualisations, we use a software package called Nodegoat, widely used in the digital humanities for network analysis (fig. 2). Its design and functionality integrate database, interpretative research and visualisation tools, making it readily accessible and usable in the digital humanities. The mapping abilities are part of the provided visualisation functions. The tasks emphasise the use of maps and consider how different academic backgrounds influence the use of maps in tasks for historical analysis. We have focused on questions with a distinct geographical dimension for study purposes. Nodegoat allows us to contrast map-based approaches to specific tasks using tabular and chart visualisations.

In the work-in-progress study, users are given tasks referring to analytical operations involving interpreting historical information. Specifically, we use data from the George Sand and Fryderyk Chopin correspondence collection of the National Institute of Fryderyk Chopin in Warsaw, Poland. Participants are asked to complete 10 tasks in randomised order, for example: How many letters were sent from Fryderyk Chopin in Paris to George Sand? Or Who sent the letter from Paris in April of 1838? Each participant uses the software with prior instruction. This creates a baseline of abilities in using the software and allows us to compare the task-solving steps using the map-based, graphical and tabular interfaces of Nodegoat.

As this is a pilot study, we are very interested in discussing the findings and our plans for the full study with conference participants.

Acknowledgement:

We would like to express our thanks to the Polish National Agency for Scientific Exchange (NAWA) and to the Faculty of History at the University of Warsaw: "The Polish National Agency for Academic Exchange (NAWA) co-financed the

project within the NAWA Chair programme.” Thanks as well to the study participants for their generous time and willingness to discuss with the research team.

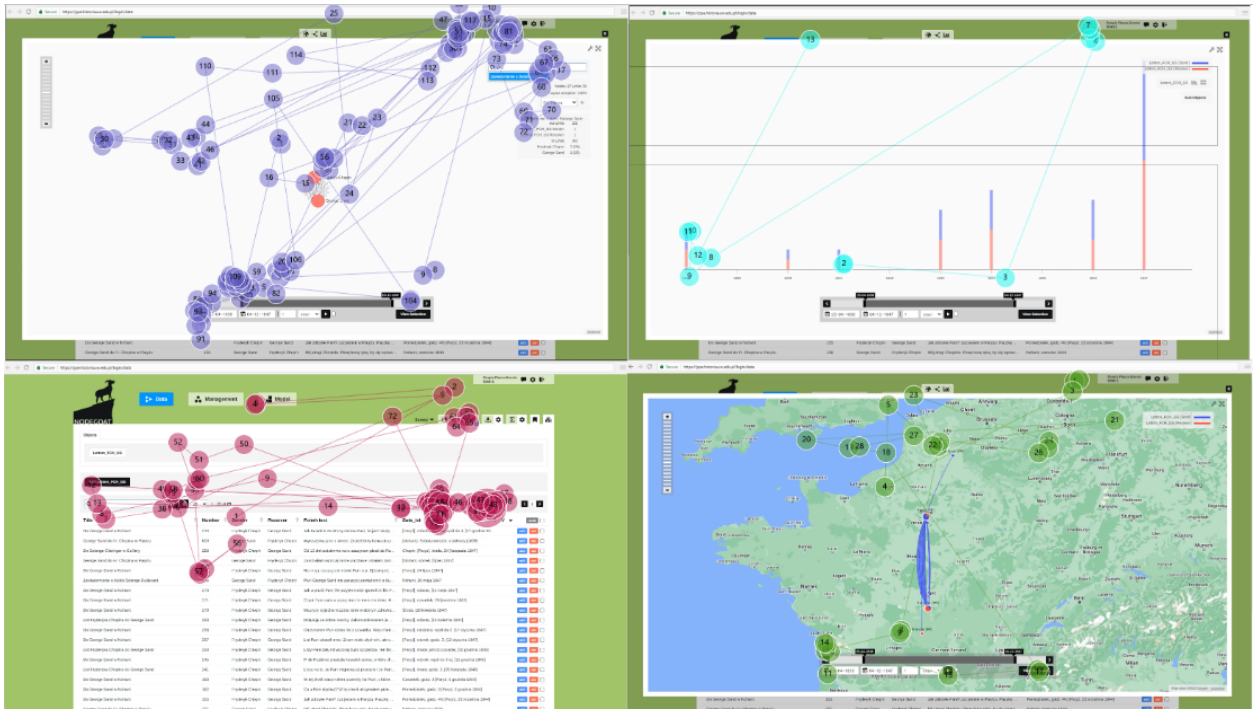

Fig. 1. Gaze plot of a single participant. Locations on fixations on different tested visualisation types: network, bar graph, table, and map when solving a given task.

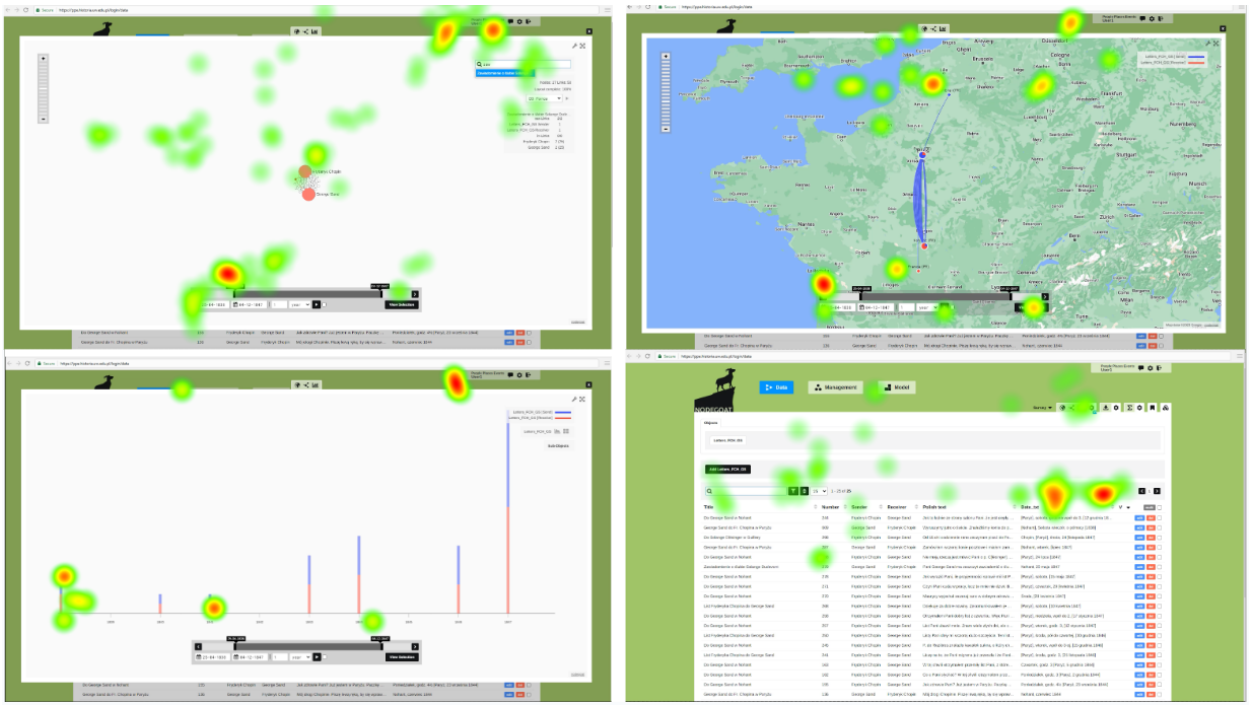

Fig. 2. Heatmap showing fixation duration on different tested visualisation types: network, bar graph, table, and map when solving a given task.

References

Saparova, D. (2020). Eye Tracking for the Evaluation of Digital Tools and Environments: New Avenues for Research and Practice. *In Routledge International Handbook of Research Methods in Digital Humanities* (pp. 399-415). Routledge.

Zheng, S., Chen, Y., & Wang, C. (2020). Application of eye-tracking technology in humanities, social sciences and geospatial cognition. Spatial Synthesis: Computational Social Science and Humanities, 431-448.

Abstracts of the International Cartographic Association, 6, 87, 2023.
31st International Cartographic Conference (ICC 2023), 13–18 August 2023, Cape Town, South Africa.
https://doi.org/10.5194/ica-abs-6-87-2023 | © Author(s) 2023. CC BY 4.0 License.