Accounting for Data Uncertainties in Visualisations for Humanistic Research: the Case Study of SiteVis for Archaeological Settlement Data

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Abstract of the answer to the call for proposals

Data visualisation is commonly used by (digital) humanities researchers to interact, explore, and analyse data as it can successfully support new readings into otherwise known data. Nevertheless, visualisations also tend to transmit a false sense of objectivity and finality in their depictions (Kennedy et al. 2016), as their design and their use of conventions, unwillingly hide underlying data issues and uncertainties from their user-readers. Accordingly, as historical datasets often contain partial, incomplete, biased or even contradictory data points, their visualisation can bring misguided confidence in the analysis. Accounting for data issues and uncertainties in data visualization is therefore a crucial challenge the humanities overall (Windhager, Salisu, and Mayr 2019).

In this paper, we present SiteVis, an interactive visualisation for data analysis that tries to account for underlying data uncertainties of the archaeological dataset it represents. SiteVis was developed as part of the Sagalassos Archaeological Research Project and was the result of a two year-long collaboration between archaeologists and data visualization researchers.

Located in south-west Turkey, the archaeological site and 1200 km2 wide study region of Sagalassos has been the focus of intensive interdisciplinary research for over thirty years. During this time, by means of excavation, extensive and intensive surveying, and geophysical and remote sensing research the project sampled over 300 locations in the region and assembled a comprehensive settlement dataset indicating past periods of human activity as well as the ecological contexts of these. SiteVis, was meant to facilitate the exploration of this dataset for insights and help answer questions such as why settlements were built at specific locations and what drove their continuity or instability over time.

Underlying data issues, however, related to the project's deployment of discrepant data collection methods, the contextual field settings as well as various interpretational assumptions made in the data collection process, brought uncertainty to the emerging insights and provoked a critical stance from the archaeologists. Rather than overlook these issues, we instead encoded the archaeological methods alongside the core settlement dimensions, added features to make the interpretations transparent and allowed data to be viewed under different levels of assumption.

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We thus discuss the process of creating this visualisation, our design choices in relation to the issues we encountered as well as lessons learned from the deployment. We close with a critical reflection on how *interfaces* for the digital humanities can become more transparent and account for inherent uncertainties of humanities data. We believe that this paper will be of interest to humanities projects that use visual analytics as part of their research process and, just as archaeologists, only have access to partial, incomplete or even contradictory datasets.

Kennedy, Helen, Rosemary Lucy Hill, Giorgia Aiello, and William Allen. 2016. "The Work That Visualisation Conventions Do." *Information Communication and Society* 19(6):715–35. Windhager, Florian, Saminu Salisu, and Eva Mayr. 2019. "Uncertainty of What and for Whom - And Does Anyone Care? Propositions for Cultural Collection Visualization." *Workshop on Visualization for the Digital Humanities (VIS4DH), Part of IEEE VIS.*

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