

WalkGIS: Exploring Platial Analysis of Leisure Walks via Linked Video Narratives

James Williams^{*1}, James Pinchin^{†1}, Adrian Hazzard^{‡2}, Gary Priestnall^{§3}, Stefano Cavazzi^{¶4}
and Andrea Ballatore^{||5}

¹Nottingham Geospatial Institute, University of Nottingham, UK

²Mixed Reality Lab, University of Nottingham, UK

³School of Geography, University of Nottingham, UK

⁴Ordnance Survey

⁵Department of Digital Humanities, King's College London, UK

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Summary

Extracting rich contextual information from study participants presents an interesting challenge when the expected results are uncertain. This article presents the design of a contextual geographic information system (GIS) to extract platial information from a multimodal data set (audio, video, and GPS) collected during a ‘think-aloud’ leisure walking study. WalkGIS enables transcriptions, labelling, and platial analysis to be performed within one system, with data being linked and coordinated to form linked video narratives.

KEYWORDS: Visual Analytics; Leisure Walking; Platial Information; Geographic Information Systems; Spatial Video Narratives

1 Introduction

People walk for leisure for a variety of reasons, including physical and mental well-being, experiencing new places, and getting outside (Williams et al., 2021). Walking routes are examples of GIS features which have conventionally been captured, and represented, as precise positional traces. Such spatial representations often fail to capture the richness of the route in terms of people’s experiences along the way. This kind of qualitative information could be considered vague in nature (Miller, 2006) and is usually not handled well within traditional GIS. Notably, Evans and Waters

^{*}James.Williams@Nottingham.ac.uk

[†]James.Pinchin@Nottingham.ac.uk

[‡]Adrian.Hazzard@Nottingham.ac.uk

[§]Gary.Priestnall@Nottingham.ac.uk

[¶]Stefano.Cavazzi@os.uk

^{||}Andrea.Ballatore@kcl.ac.uk

(2007) explored the development of tools like the ‘spraycan’, to illustrate ambiguous, imprecise phenomena, but its adoption has been limited. The aim of this work is to investigate the development of methods for capturing and presenting features of sense of place rather than just spatial representations, which requires tools to handle qualitative data within a spatial framework. We present early work on the development of a GIS tool – WalkGIS – to display experiential features linked to spatial data.

2 Background

The importance of using a mixture of spatial media to promote a deeper understanding of a place was discussed by Caquard (2013), in the context of providing a distinction between story maps and grid maps. Singleton (2021) also considers the potential of using spatial data from qualitative participatory walking interviews. Qualitative data analysis might traditionally be performed separately from any spatial data held within a GIS. More integrated approaches have been explored, for example the geo-ethnographies of Matthews et al. (2005) and the geo-narratives of Kwan and Ding (2008). Curtis et al. (2019) describe the benefits of combining the richness of video with spatial representations through spatial video narratives.

2.1 Study Context



Figure 1: Demonstration video frames from an example walk recording.

This article does not describe the study itself, but a description is necessary to provide context. Our study investigates the rich engagements a user has with the environment while walking through a think-aloud verbal protocol study (Fonteyn et al., 1993). The think-aloud method has previously been used by Samson et al. (2017) to characterise how thought processes occur while running long distances. During our study, participants undertook a leisure walk of their choice for between 30-60 minutes wearing a chest-mounted GoPro camera (e.g. Figure 1) and a GPS watch to capture visual and spatial data, in addition to a prompt sheet to ‘think aloud’ from. Participants were asked to describe what they attended to and why along their walk.

3 Development of WalkGIS

WalkGIS is a standalone application using web-based technologies. Bootstrap is used for the user interface, and JavaScript for packages, such as Leaflet to display maps and Turf.js to perform spatial analysis. Internal project data is stored in GeoJSON format, enabling the possibility of rapid access and export to other platforms. WalkGIS is compatible with most modern web browsers, allowing analysis to be performed without specialist installations.

4 WalkGIS

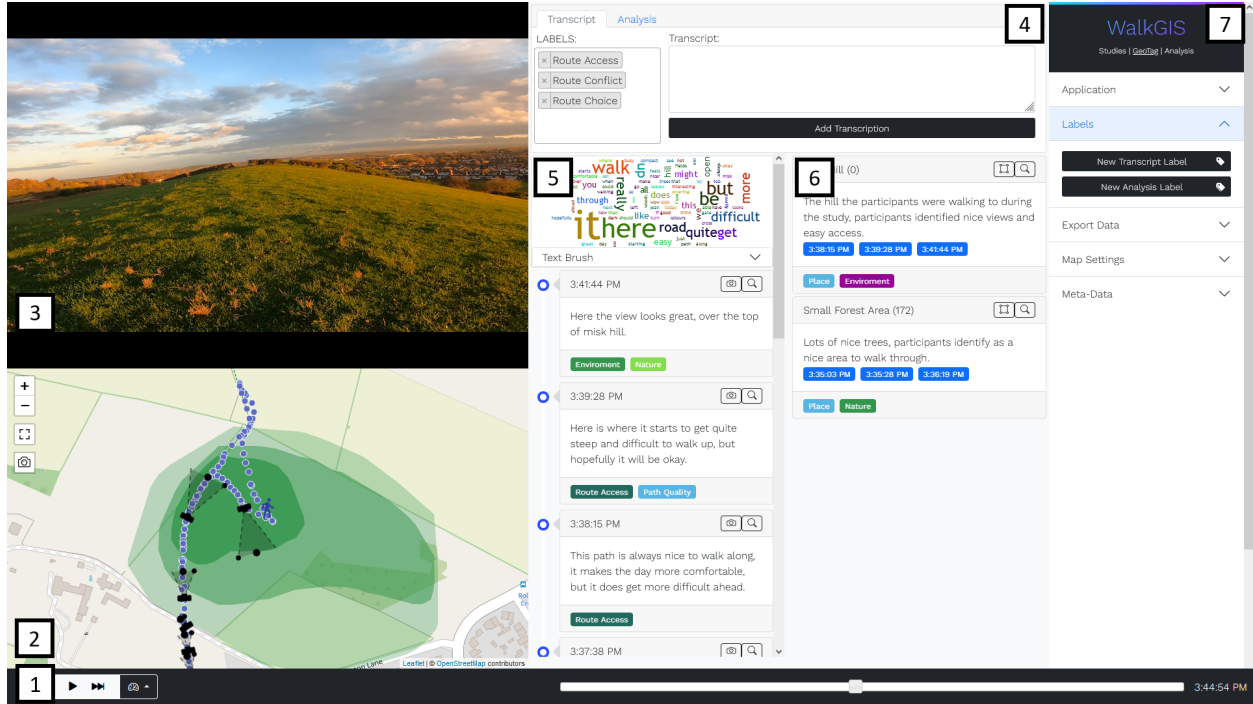


Figure 2: The functional view of the WalkGIS interface: (1) timestamp control, (2) map view, (3) video view, (4) data generation, (5) transcript view, (6) analysis view, and (7) project settings.

The integration of spatial and place-based functionality is presented in the user interface in Figure 2. The system is managed using multiple coordinated views (Roberts, 2007) through the instance timestamp, which allows for exploratory analysis to occur. The analysis can be performed using each view, and linked to enable qualitative spatial analysis to triangulate the results of each study. WalkGIS is therefore able to support the extraction of spatial video narratives, which consider the personal and subjective nature of walking. Where similar work has enabled the analysis of user-identified qualitative spatial data (e.g., Curtis et al., 2019), WalkGIS supports researchers in manually identifying the fuzzy places relevant to the study area.

4.1 Place-Based Visualisation

A spatial-platial approach is necessary to extrapolate the context of qualitative studies (Williams et al., 2022). Figure 3 presents the two fuzzy visualisation mechanisms included in WalkGIS. The first is a fuzzy spraycan, similar to that implemented in Evans and Waters (2007) and Huck et al. (2014), further adapted using randomised sizes, radius, and ranges defined by the researcher to allow richer qualitative analysis and variation between segments. The second is a multilevel gradient transparency contour line tool (Glebova, 2021), which allows multiple definitions of place (e.g., structures, broader context, and local environment) to be identified from the study area.

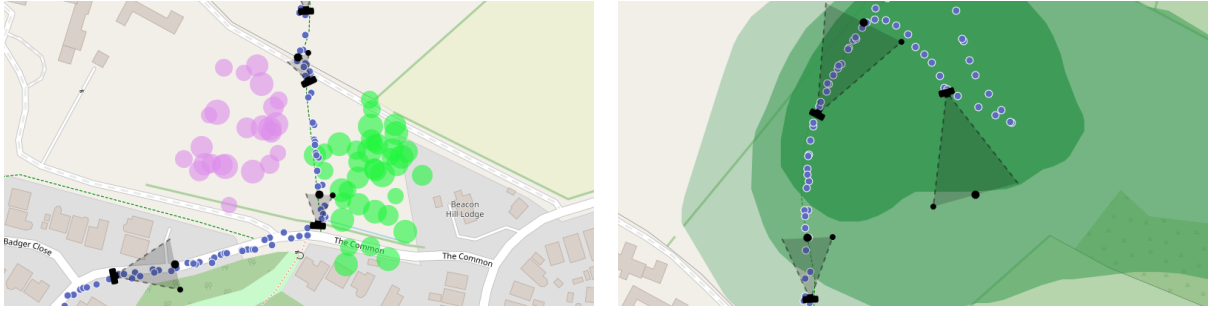


Figure 3: Demonstration of the visualisation analysis tools: (left) spraycan tool and (right) multi-level contour line tool.

4.2 Extended Features

Extended features assist in the extraction of data from the think-aloud study. Figure 2 presents some of these key features, including: A camera geotagging tool that can be aligned by the researcher with the camera orientation and used to identify the variation between transcription segments. And a transcription element, which can assign encodings and labels for more traditional qualitative analysis, and is linked to a word cloud tool that enables dynamic word clouds to be displayed as individual spatial narrative segments. WalkGIS also includes tools for automated screenshots of map and video views, which enables rapid presentation of results.

5 Conclusions and Future Work

WalkGIS development is ongoing, and study data is being analysed using the system to extract spatial video narratives from think-aloud leisure walks. WalkGIS has already revealed some emerging results that can be geolocated, transcribed, and analysed using linked data. The system has enabled spatial analysis of the think-aloud study results to be performed across modalities using novel web-based visualisations and multiple coordinated views. Current challenges for future development include the time demands of manual transcriptions and camera orientation, which we hope to make automatic in future iterations. We plan to make this project available as open source to support similar investigations of contextual study scenarios. We envision that the results of the analysis generated using the system will support the design of a framework to curate engaging leisure walking experiences.

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7 Biography

James Williams is a PhD Student at the Horizon Centre for Doctoral Training and the Nottingham Geospatial Institute at the University of Nottingham. His research investigates how a framework can be designed to curate engaging leisure walking experiences.

James Pinchin is an Assistant Professor in the Department of Architecture and the Built Environment at the University of Nottingham. He undertakes research with the Nottingham Geospatial Institute and is interested in the use of location to measure and understand the behaviour of people.

Adrian Hazzard is a Research Fellow in the Mixed Reality Lab, School of Computer Science at the University of Nottingham. His research is interested in the design of digitally supported experiences in cultural, creative and healthcare settings.

Gary Priestnall is an Associate Professor within the School of Geography at the University of Nottingham. His research interests focus on digital geographic representation in a range of contexts, and utilising a range of technologies including GIS, location-aware mobile devices and projection-enhanced 3D printed models.

Stefano Cavazzi is a Principal Innovation and Research Scientist at Ordnance Survey where he leads the development of GIS and geomatics research programmes.

Andrea Ballatore is a Lecturer in Social and Cultural Informatics at the Department of Digital Humanities, King's College London. He is an alumnus of the Center for Spatial Studies, University of California, Santa Barbara. His research interests include geographic data science, cultural analytics, Internet geography, and geographic information retrieval.

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