Context for Leisure Walking Routes: A Vision for a Spatial-Platial Approach

James Williams[1][0000−0002−6199−4980], Stefano Cavazzi[2], James Pinchin[1], Adrian Hazzard[3], Gary Priestnall[4], and Andrea Ballatore[5]

[1] Nottingham Geospatial Institute, University of Nottingham, Nottingham, UK
James.Williams@Nottingham.ac.uk, James.Pinchin@Nottingham.ac.uk
[2] Ordnance Survey
Stefano.Cavazzi@os.uk
[3] Mixed Reality Lab, University of Nottingham, Nottingham, UK
Adrian.Hazzard@Nottingham.ac.uk
[4] School of Geography, University of Nottingham, Nottingham, UK
Gary.Priestnall@Nottingham.ac.uk
[5] Department of Digital Humanities, King's College London, London, UK
Andrea.Ballatore@kcl.ac.uk

Abstract. Providing recommendations for interesting and engaging leisure walking routes is a complex problem due to the subjective and personal nature of the activity. Existing work has often focused on recommending the quickest or most popular walks. However, these routes often lack detail on the contextual and experiential factors of walks and do not attempt to match the requirements with those of users. This article presents a vision of how more contextual detail can be applied to walking routes. We consider how existing analysis and spatial data mining techniques, including real-time clustering, viewshed analysis, and co-location patterns, could be used to extend a place-based understanding of leisure walking routes. By using spatial methods to extrapolate a rich platial understanding of the locations of a walk, the proposed methods in this article will support an emerging framework for curating engaging leisure walking experiences, recommending routes beyond those of the quickest or the most popular.

Keywords: Leisure Walking · Fuzzy Geospatial Data · Route Recommendations · Platial Information

1 Introduction

Walking for leisure has several potential benefits for both health and well-being purposes and is a low-cost activity to participate in. Leisure walkers can participate in walks for a number of reasons, such as walking the dog (e.g., [21]), well-being (e.g., [12]), and exploring new places (e.g., [8]). The subjective and

personal nature of leisure walking routes should be considered by designers when working on new location based services [22] and provides an impetus for the vision proposed in this article. Research investigating route recommendations for more experiential routes often applies specific contextual attributes to support route generation, a proposed taxonomy categorises these attribute types through a survey of quality-aware route recommendations, including safety, well-being, effort, exploration, and pleasure (SWEEP) categories from existing literature [16]. An example is the use of Flickr photos to generate beautiful, happy, and quiet pedestrian routes [14]. We are interested in how spatial data science methods and existing datasets can be used to support the extraction and curation of new information and characteristics about places of interest, which can then be used to design a framework for leisure walking experiences.

The remainder of this article describes this vision; Section 2 presents the background literature, Section 3 describes the vision for a method of extrapolating context through spatial data mining, and Section 4 describes considerations for using this approach. Finally, Section 5 presents conclusions and future work.

2   Background

Existing literature has identified how points of interest (POIs) are used as a method of curating route recommendations. The literature considers a number of approaches, such as using points of interest alongside user check-in histories to recommend the most popular POIs (e.g., [17]). A commentary on the state of the art in POI research [13] identifies challenges related to the implementation of POIs for academic and commercial purposes, for example, a lack of knowledge of what activities occur at a POI and related dynamic contextual details means data can be static with few changes being represented. Rich contextual detail is important for leisure walking routes, where people are not just interested in travelling between A and B, but the overall experience. We are interested in how a more platial representation can be formed, using spatial techniques to curate and extrapolate context for a place-based approach of fuzzy data and ambiguous boundaries [4]. For this purpose, the term place of interest is used, considering the addition of auxillary content to extend beyond a POI [11].

POIs provide an interesting method to characterise or attribute walking routes, for example, work has previously proposed a definition of a natural POI [9], and explores the datasets that could be used as potential sources. The work presented in this vision considers a similar approach, going beyond individual POIs to curate fuzzy places of interest from disparate sources of existing data. Some approaches consider extracting content from geospatial data to identify urban functional regions using human activity, spatial semantics, and interactions to understand urban areas [6,20]. Previous articles have also identified how spatial data from walking groups could be linked with other datasets to provide a new understanding of the characteristics of places and how these can be further extended using geographic information systems [15].

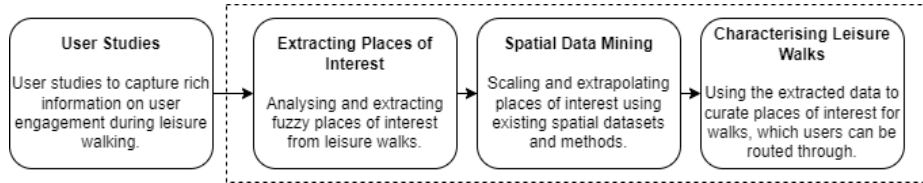# 3 Method for Extrapolating Context

Fig. 1. An overview of the proposed approach in the context of the larger research project being conducted.

Leisure walking is a subjective and personal experience that is related to the personal interests of the user. Recommending walking experiences through meaningful interactions is therefore a complex problem. Our vision describes a method for extrapolating the context of leisure walks, presented in Figure 1, investigating how the personal nature of leisure walking can be considered using the richness and scalability of the data collected initially. Using this proposal, we hope to explore how spatial methods and data can be used to extrapolate experiential information about leisure walks.

3.1 User Studies and Extracting Places of Interest

Our vision for better understanding leisure walkers begins with a grounded theory approach, conducting a verbal protocol user study to investigate the rich engagements that occur while walking and extracting the identified places of interest. The places of interest will then be represented using a fuzzy spraycan tool [10], which produces a cluster of points to be attributed and further analysed using the techniques proposed in this vision.

3.2 Spatial Data Mining

The approach to scaling the data will be completed by extrapolating the context from the user study. We envision the use of spatial data mining techniques to identify new places of interest derived from spatial methods and datasets. Our vision for these methods includes the potential use of a real-time implementation of density-based spatial clustering of applications with noise (DBSCAN) [7], to cluster personalised POIs and events in real time to support the generation of dynamic places of interest. Spatial co-location (e.g., [6]) and extraction of known useful features (e.g., benches, toilets, parking) are also considered as possible context from attributes identified in the user study. Viewshed analysis [5] will also be considered to detect appealing views from scenic paths (e.g., [18]), or views of specific places of interest.

Leisure walking also provides an interesting scenario of a closed feedback loop. At any stage of the walk, implicit and explicit interactions [1] can be collected and used to potentially help in identifying new places of interest. This approach would require the collection of GPS traces from leisure walking and would allow techniques such as stop detection [19] to be used, which could support new rules for determining places of interest and a better understanding of where walkers are stopping.

3.3   Characterising Leisure Walks

A walk is individual to each user, with different interests, decisions, and experiences for every instance. This presents an interesting challenge in regards to characterising or attributing walks, with different experiential factors needing to be represented. These complexities require a more subjective and personal approach; for example, POIs are well understood and often reference specific functions and locations, but they do not represent user experiences. A consideration in this regard is to design a taxonomy of leisure walks that can be used to understand route characteristics.

4   Considerations

The use of subjective and fuzzy data in the vision means that the challenges of crowdsourced geospatial data should be considered (e.g., [3]). Existing datasets and user-generated content have varying density and representativeness about a chosen location, which has been linked to socio-demographic factors and the types of activities that take place in a location [2]. Considerations will need to be made to ensure data richness and scalability in generated places of interest, highlighting our interest in considering implicit and explicit interactions [1].

5   Conclusions and Future Work

This article presents a vision as to how spatial data mining can be used to extrapolate context, for the purpose of route categorisation and scaling of places of interest for leisure walking. Our vision describes several opportunities for existing spatial data to be used in the extrapolation of new places of interest. We consider how existing analysis and data mining techniques, including real-time clustering, viewshed analysis, and co-location patterns could be used to extend a place-based understanding of leisure walking routes. We hope to continue developing the work proposed in this vision to influence the design of a framework for curating engaging leisure walking experiences.

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