




Social Media Data for the Conservation of Historic Urban Landscapes: Prospects and Challenges

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Abstract. This study attempts to frame the contribution of social media data (SMD) to the conservation and management of historic urban landscapes with a focus on the dynamics of heritage co-production. It particularly addresses bottom-up digitally mediated heritage practices aside from institutional structures. To this end, it addresses two key issues: the co-construction of meanings of everyday landscape on social media and the heritage appropriation by online communities. The first employs SMD to study human-environment interactions and provides insights on individuals' encounters with the historic urban landscape. The second explores the contribution of online narratives to heritage conservation. The discussion focuses on the opportunities and challenges in analyzing big data on social media and the implications of knowledge gained for the scope of what is defined as heritage at the intersection of the heritage by appropriation and the authorized heritage discourse (AHD) as well as for sustainable heritage conservation and management.

Keywords: Social media · Historic urban landscape · Heritage co-production

1 Historic Urban Landscape, Digital Technologies, and Social Inclusion

The 2030 United Nations Agenda for Sustainable Development mentioned cultural heritage inter alia in goals 4, 8, 11, 16, and 17. The third and fourth points of goal 11 on sustainable cities and communities highlight the need “to protect and safeguard the world’s cultural and natural heritage” to “make our cities inclusive, safe, resilient, and sustainable” [1]. The integration of policies and practices of cultural heritage conservation into the wider framework of sustainable urban development requires the application of an integrated landscape approach that responds to local cultural contexts and value systems and addresses policies and governance concerns at international and local levels [2]. A landscape approach to urban heritage addresses the city as a living heritage and as a multi-layering of meaning that changes across time and space. Within this approach, the historic urban landscape extends beyond the notion of historic centers and designated heritage to encompass the city as a whole [3] and recognize everyday

landscapes that challenge heritage boundaries and dominant narratives of identity and collective memory. Central to this conceptualization is that cultural heritage is a socio-cultural construct subject to diverse interpretations and associations of meanings related to experiential values, personal perceptions, and knowledge [4, 5]. Nevertheless, capturing users' definition of heritage and the range of cultural values they ascribe to the historic urban landscape, and at the same time ensuring inclusion in the process, appears to be challenging and is often disregarded in practice [2, 6].

In the 21st century, the increased use of digital technologies, online applications, and social media have determined a rapid change in the production and consumption of cultural heritage and these changes have major implications on the conservation of cultural heritage. In the digital age, heritage activities are increasingly extending to online spaces and social media platforms are providing virtual public space for the co-production of heritage knowledge and the co-construction of meanings of everyday landscapes. Within this context, social media is providing a window to non-expert perceptions of heritage and alternative narratives to the "official" heritage discourse. Many cultural institutions have invested in crowdsourcing to increase audience engagement with heritage collections. In parallel, many digital grassroots initiatives have popped up to shape the dynamics of heritage production and foster inclusion and civic engagement [7]. In addition to active contributions, people passively engage in the co-construction of heritage by posting comments and sharing content on social media. In this context, the AHD is challenged as users engage as consumers and producers of heritage content.

Although the above-mentioned practices are often associated with participatory heritage praxis, some scholars argue that (1) digital platforms may reinforce hegemony depending on the mediated interaction between users and the platform [8, 9]; (2) the digital divide – the differential access and use of information and communication technologies – prevents some social and economic groups from contributing to collective expressions of identity [10]; and (3) the dependence of SMD retrieval and analysis on application programming interfaces (APIs) – the platform technical architecture that reflects the operational goals of a company – can exert significant influence on research design and outcome [11, 12].

In this article, I aim to frame the contribution of SMD to the conservation and management of historic urban landscapes. It is worth mentioning that this study is not an attempt to address top-down participatory heritage initiatives nor digital transformation in authorized cultural institutions, but to examine bottom-up digitally-mediated heritage practices aside from institutional structures. Within these processes, the public creates its own digital heritage landscapes, where sharing photos and narratives in the present leads to a collective interpretation of the past, and where communal views, experiences, and meanings evolve to construct what may be recognized as the cultural landscapes of tomorrow [13–16].

In this paper, I ask what are the opportunities and challenges in analyzing big data on social media and how can experts employ the knowledge gained to serve sustainable urban development and heritage conservation? Furthermore, what forms of grassroots heritage co-production are enabled by social media? Finally, what are their implications for the scope of what is defined as heritage at the intersection of the heritage by appropriation and the AHD?

To inspect these questions I carried out two investigations. The first reviews passive contributions to the interpretation of historic urban landscapes by looking at the application of SMD for extracting human-environment interactions. The second examines the various uses of social media in claiming heritage, building narratives about collective identity, and generating citizen heritage interpretation. In both investigations, I highlight the opportunities, challenges, and the way forward regarding the application of SMD in the conservation of historic urban landscapes.

2 Social Media and the Dynamics of Heritage Co-production

The extended use of smartphones and social media apps has changed many aspects of everyday practices as they have now become largely mediated by digital technology. Socio-cultural interactions and discussions about heritage are increasingly transferred to the digital sphere, whether in the form of discussion forums or the sharing of photos, videos, experiences, and opinions via social networks [17]. Social media apps provide analysts access to a wide range of shared data such as check-ins, geo-tagged images, tags, or reviews [18]. When people share content on social media, their online practices convey a collective image of landscapes and heritage values within the community realm [19]. The process of sharing affirms the online space as a socio-cultural space, creating a bridge between real and digital worlds and providing innovative tools to understand people's interests, preferences, motivations, and behavior [20–22]. As new knowledge about cultural heritage is co-created out of user-generated photos and folksonomies, virtual communities mediate the co-production of heritage knowledge. The following section provides insights into how we can harvest this knowledge and unveil everyday practices and cultural values from SMD.

2.1 Everyday Heritage on Social Media

The important role of social media for performing real-time analytics on people's interpretation of, and interaction with, the historic urban landscape is evidenced by the growing number of papers analyzing SMD. A Scopus search reveals that the number of heritage studies that use social media as a data source has grown exponentially from 5 in 2010 to 261 in 2020. Most of these studies explore the emerging role of social media in tourism and hospitality [18]. This field of research is very wide in scope and addresses visitors' experiences, behavior, visitation patterns, and spatial distribution. Moreover, some authors addressed online heritage practices outside the institutional domain, such as alternative narratives to heritage and the heritage-making form below [23, 24]. Within urban and environmental studies, scholars have also been exploring the use of SMD for landscape characterization, assessment of values ascribed to urban landscapes or cultural ecosystem services, landscape perception and preferences identification, and sustainable urban development. This field of research is growing gradually and publications increased from 4 in 2011 to 54 in 2020.

Given the wide scope of research and the increased number of papers, various systematic reviews were conducted to provide an overview of methods applied so far for

the analysis of SMD and to identify knowledge gained from different social media platforms. For instance, Vassiliadis and Belenioti [25] reviewed 54 papers to present the opportunities of social media to museum experience and communication, its enhancement to museums' learning process as well as the problems and barriers associated with social media integration in museums. Whereas, Stock [26] analyzed 690 papers across 20 social media platforms, focusing particularly on the method used for the extraction of location information to discuss and compare extraction methods, and consider their accuracy and coverage. In tourism studies, Zeng and Gerritsen [27] reviewed and analyzed 279 papers focusing on social media in tourism, while Teles da Mota and Pickering [28] conducted a review of 48 publications that focused on the use of social media for the assessment of nature-based tourism.

In urban and environmental studies, Ilieva and McPhearson [29] reviewed 105 articles to address the emerging opportunities of using SMD in urban sustainability research. Bubalo et al. [30] reviewed more than 500 papers to assess the different crowdsourcing modes applied to collect geo-information on landscape perception and preferences and cultural ecosystem services. Calcagni et al. [31] conducted a systematic review of 29 publications to explore the extent to which relational cultural ecosystem services are inferable through social media. Toivonen et al. [32] reviewed 35 papers to present analytical approaches to mining and analyzing SMD for conservation science. Kong et al. [33] reviewed 224 papers amongst which 90 use SMD for urban sustainability research. These papers mainly address urban mobility, land use, environmental sustainability, social equity, and tourism. Zhang et al. [34] reviewed 58 articles using geolocated SMD to evaluate cultural ecosystem services, such as aesthetics, recreation, sense of place, and local identity. Liang et al. [35] reviewed 19 articles on digital community engagement to illustrate the contribution of social media in the process of cultural heritage management.

To provide a comprehensive reading on the application of social media to sustainable heritage conservation, I investigated the above mentioned systematic reviews and extracted the opportunities as well as methodological limitations and proposed solutions in the analysis of SMD. Table 1 presents the main findings. SMD are mostly derived from Twitter, Flickr, Facebook, Foursquare, Instagram, Sina Weibo, and Panoramio [18, 29].

This brief overview makes clear that methods that rely on the use of SMD can complement traditional survey methods to include a variety of data sources and groups of users to unveil the range of values attached to historic urban landscapes to inform decision-making. Moreover, it reveals that the analysis of SMD is a complex endeavor, which draws on a variety of technical-driven and data-driven challenges within the methodological workflow. The majority of heritage studies and urban environment studies deploy social media as a tool for analysis and/or community engagement. In doing so, they raise concerns related to the digital divide and representativeness issues among others, and draw on some solutions to overcome these limitations [19, 36–40]. Nevertheless, the discussion of these critical topics remains abstract and overly general [12]. I argue that rather than envisioning social media as a tool and focusing on what knowledge it might generate as its end product, we might approach it as a paradigm shift in the way the public engages with heritage. This approach requires us to consider the landscape of the

digitally mediated heritage and the potential of digitally mediated interpretation, documentation, dissemination, and mobilization of heritage in actively contributing to the democratization of heritage values as well as in challenging regulatory and institutional systems.

There are different ways in which heritage is digitally mediated, from the digitization of tangible and intangible heritage attributes to audiences' contributions to heritage institutions and grassroots practices. Nevertheless, different forms of public outreach have been highly critiqued [41, 42]. Moreover, Taylor and Gibson [9] argue that even though the digital access to cultural heritage content makes the interpretation of heritage polyvocal and less dependent on experts, the decision of what is heritage and what is commissioned for digitization is not necessarily part of this democratization. Other scholars have argued that participation within official heritage websites is often manipulated and

Table 1. Summary of opportunities, challenges, and way forward in the application of SMD Mapping aspects of the historic urban landscape and extracting human-environment interactions.

Methodological workflow	Opportunities	Challenges	Way forward
Data acquisition	Less costly and time-consuming	Ethics of data acquisition; The use of API might return only a subsample of the requested data; Uncertainty about future data availability; Some platforms, like Twitter and Instagram, have short time span for available data	Use web crawling software, Secure data, and resolve ownership and IP issues
Data quality	Big data (spatial, temporal, textual, & visual); Real-time spatial resolution; Time-specific information	Noise level; The time resolution depends on the user's post frequency; Inadequate population representation; Absence of demographic information; The geographical data is not always accurate; The popularity of platforms change over time as well as their users; Data can be biased towards specific user groups; Spatial bias as a result of data gaps in places with poor data or poor reliability of geotags; Most studies use data from a single social media site	Combine data from multiple social media apps, Quantify biases by comparing results from different platforms and for time-separated datasets from the same platform; Employ different sources of data; Extract metadata from individuals' profile descriptions; Use text-based metadata to verify geotags; Separately analyze photos with upload location errors; Collapse photos taken by a single photographer within a given radius to a single arithmetically centered point

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Methodological workflow	Opportunities	Challenges	Way forward
Data processing	The scale of analysis; Real-time monitoring; First-hand observation; Social sensing	Difficult to pre-process textual data because of no standard spellings, abbreviations, creative language, Sarcasm and metaphors, and multiple languages; heterogeneity of data structure among different platforms; Cleaning and filtering the data; transforming the structure and format of the data. Photos classification and the coding of big textual data are challenging; Absence of a unified coding protocol; Most studies are based on the analysis of one data type-georeferenced data or photographs	Apply more sophisticated analysis methods and examine several elements of data together spatial, temporal, and visual; Apply methods from computer sciences and artificial intelligence that are marking progress with machine learning for analyzing visual and textual data; Develop domain-specific training data sets to assist in machine learning methods
Interpretation of results	Effective source for emotion analysis and personal opinion mining; Effective for environmental monitoring and characterization of land use and land cover; Credible for the assessment of visitation patterns; Analysis of hot and cold spots provide useful information to prioritize areas for conservation and cultural services management; Reveals perspectives that arise from directly experiencing and valuing the environment. Advantageous for retrieving relational values and a wide range of cultural values, including experiential, aesthetic, and spiritual symbolic; A window to people's preferences; Measures space attractiveness	Can't draw generalizations from results as they are representatives of the users of a specific social media platform; Researcher bias; Social media tends to broadcast the heritage value instead of strengthening the collaboration among stakeholders	Results should be compared with results from traditional data sources like surveys and questionnaires; Combine studies with other data sources. Carefully consider the biases; Move from results to action and work on the implication of data for social justice and sustainability; Interdisciplinary interpretation combining expertise in geography, social sciences, linguistics, and computer science

tends to reaffirm experts' values and the dominant heritage discourse and have questioned the contribution of digital technologies in enabling participative democracy [23, 43]. In this context, grassroots initiatives appear as a constructive mobilizing force that shapes the dynamics of heritage co-production, builds a further appropriation of local heritage values, fosters inclusion, and mediates conflicting interests in an urban context [44, 45]. The resulting broadened scope of what is defined as heritage complicates the process of conservation as it makes it difficult to mediate between diverse representations of history and urban experiences and reach consensus on 'what' to preserve and 'how', giving i) the diversity of values associated with the historic urban landscape, (ii) the conflicting interests among the different stakeholders, and (iii) the dynamic and continually changing character of the urban landscape and its associated values. Nevertheless, it is controversy that contributes to a more collaborative urban governance by providing an arena for grassroots initiatives [45]. Online grassroots communities and their digital exchange are highly localized and provide new prospects for digitally-enabled forms of social production of cultural values and non-experts perceptions of heritage [46–48].

2.2 Heritage Appropriation by Online Communities

Digital media far from being a tool for “holding” versions of the past, as it is not a passive “go-between”, it mediates the construction of memory and past experiences and thereby “intrinsically shapes the way we build up and retain a sense of individuality and community, or identity and history” [49]. Users initiate and join Facebook groups, community pages, and hashtag communities driven by shared values and interests or a common cause [50]. Virtual communities provide a forum for narrating heritage and digitally exchanging memories and photos. Many scholars have addressed grassroots narrative practices on social media and have explored their contribution to heritage conservation. Table 2 provides an overview of these studies. It highlights their scope and opportunities for heritage conservation and, in some cases, challenges expressed by scholars and the way forward.

The different studies presented in Table 2 show how the analysis of the interactions within online communities enables bottom-up interpretations of everyday encounters with the historic urban landscape and provides insights into people's perceptions of heritage that defy the AHD and official conceptions of identity, history, and heritage values. Table 2 also shows that the most frequently used platform for the initiation of online communities is Facebook. People's narratives of identity and cultural heritage within online communities help to explain the processes of change and continuing identity, and these narratives can be identified as the foundation of conservation as the management of change [60]. While addressing grassroots online communities and their contribution to heritage conservation, it is important to differentiate between the digitization and digitalization of heritage.

Digitization and digitalization are often used interchangeably, but they are two different concepts that have different meanings. Digitization is the straightforward process of converting tangible or intangible heritage attribute to digital— like reproducing and representing heritage architecture digitally using the advancement of virtual reality technologies [61]. It is the process of moving from physical to digital— such as replacing the built physical heritage architecture with online 3D representation that acts as a digital

Table 2. Grassroots online communities and the role of social media in enabling inclusion in heritage conservation.

Publication	Scope	Role of Social media
Gregory [51]	Examined a Facebook group concerned with the loss of heritage assets	<u>Opportunities</u> Online communities enhance both awareness of and collective attachment to the past and help to generate the social capital needed to mobilize against the destruction of heritage buildings and places
Morgan and Pallascio [52]	Addressed engagement in digital heritage practices by examining purpose-built and community-created forums of difficult heritage on social media	<u>Opportunities</u> Unofficial virtual communities enable people to remember together and share stories, unfiltered personal testimonies, and unrestricted comments <u>Challenges</u> Authoritative voices are absent in unofficial online discussions of heritage and there is little connectivity apparent between academics, heritage interpreters, and the online stakeholder communities
Baker and Collins [53]	Examined a Facebook group to identify the challenges non-institutional community archives of popular music heritage face in achieving sustainability	<u>Opportunities</u> Generate prodigious amounts of archival content <u>Challenges</u> Minimal attention is paid to the durability of this content. Shared narratives may be lost when websites go offline because of a lack of resources. Arranged unsystematically the fact that challenges its interpretation by experts
Bennett and Strong [54]	Examined the capacity of <i>save the place</i> activists Facebook group to preserve aspects of the local popular music heritage	<u>Opportunities</u> Social media assists in giving a voice to competing discourses of cultural value and in broadening our understanding of the definition, nature, and function of heritage

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Table 2. (continued)

Publication	Scope	Role of Social media
Irimiás and Volo [55]	Investigated the knowledge-sharing process within virtual communities and compared user-generated content with destinations' official communication about heritage sites to identify, original and consumer-oriented narratives	<p><u>Opportunities</u> User-generated content narratives are emotionally engaging. UGC could improve institutional communication on heritage sites</p>
Marinelli and Andò [56]	Analyzed the pragmatic use of Facebook by a social movement, <i>Cinema America Occupato</i> , as an expressive storytelling tool to collaboratively co-produce narratives about cultural heritage, and to reach and mobilize followers	<p><u>Opportunities</u> The strategic use of social media can establish a dialogue with different target stakeholders and promote social engagement and grassroots participation as well as urban action</p> <p><u>Way forward</u> There is a necessity to fill in the theoretical gap between the political-sociological investigations of online and offline movements and the analysis of the symbolic and expressive needs that prompt "connected publics" to constantly rewrite participatory practices</p>
Van der Hoeven [57]	Examined organizations participatory websites and non-institutional heritage-oriented Facebook groups, to discuss how social media contribute to urban heritage conservation through the online narrative practices of storytelling and mapping	<p><u>Opportunities</u> Online heritage practices (1) provide insight into the diverse narratives and values associated with a place; (2) they have more impact when they feed into wider media attention and combine different media types</p> <p><u>Way forward</u> Grassroots online projects should consider collaborations with heritage institutions and vice versa Need a better understanding of how social media can be used in urban planning decisions</p>

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Table 2. (continued)

Publication	Scope	Role of Social media
Ginzarly and Teller [58]	Explored the potential of social media as a framework for people-centered heritage. It examined 3 Facebook community groups to display their interpretation of heritage	<u>Opportunities</u> Provide knowledge on cultural values associated with the historic urban landscape by the users Could Mobilize users to take action against development projects that are considered a threat to cultural heritage <u>Challenges</u> Online activism does not always move beyond the virtual space. Decision-makers and experts do not engage in the discussion even if invited
Jeffrey et al. [59]	Drew on case studies from the ACCORD project, which involved ten community heritage groups, to discuss how community co-production of heritage records facilitate the production and negotiation of new forms of value and significance	<u>Opportunities</u> Digital recording offers a means of co-producing heritage content and capturing social values that challenge existing authorized regimes of significance <u>Challenges</u> Sometimes the focus on the potential future uses and techniques, such as 3D recording, distracts from the production process itself, as an engine for generating new forms of social value

surrogate to protect the loss of tangible and intangible data on the digital platform. Digitalization, on the other hand, is the on-going transformation of contemporary society and the restructuring of social life around digital communication and media infrastructures and encompasses many aspects of everyday practices [62, 63]. It refers to the use of digital technologies to create and harvest value in new ways [64]. In cultural heritage digitalization, digitized data is the basis of knowledge that can be used to take action and generate change. Whereas it is argued that the digitalization of cultural heritage has the potential to deconstruct power structures and existing practices of segregation in society, the process can result in reproduction instead of change. As the participation trends in digitalization within cultural institutions raise questions about the intersections of the authorized heritage discourse and power and the potential transformative character of digitalization [65], grassroots practices and a living heritage approach appear to be the answer to challenge the AHD and ensure co-production instead of re-production.

3 Conclusion

This article provided an overview of the application of SMD analysis to the study of human-environment interactions and perceived landscape character that identify people-centered heritage and collective identity. It showed that scholars from a range of disciplines have developed different methodological approaches to study social media platforms and the social phenomena they are entangled with. It also highlighted the use of social media by community groups to build online communities that promote engagement in heritage narratives and management. These two investigations pointed to a paradigm shift in the way the public engages with heritage. Digital engagement with heritage generates new processes of meaning-making. While the manifold expressions of heritage and the conflicting value systems among the different stakeholders often result in moments of conflict, social media provides a platform for the re-construction of cultural values and identity of place.

To ensure a just and inclusive representation, inter-governmental organizations like UNESCO and Council of Europe, as well as, expert networks like ICOMOS and ICCROM have recommended the application of a value-based living heritage approach that moves the focus of heritage from conservation to maintaining continuity and managing change [66, 67]. This approach also suggests the application of traditional and innovative participation tools, which constitute an integral part of urban governance dynamics, adapted to local contexts to enable cross-cultural dialogue between groups with conflicting interests to promote sustainable development [67]. In this light, cultural values become a means for bringing together diverse groups, experts, and citizens as well as locals and tourists, rather than being an end of heritage conservation and management [58]. However, in practice, the capacity of communities to influence decisions in processes of heritage identification, conservation, and management at the local and national levels is still questionable, especially in developing countries. In that connection, and in moments of controversy with the official heritage discourse, social media plays a major role as it empowers the community and helps to materialize and foster public engagement, especially when ‘online’ movements become influential and mobilize ‘offline’ (urban space) practices.

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