Media and Communication
2024 • Volume 12 • Article 8215
https://doi.org/10.17645/mac.8215

cogitatio

ARTICLE

Open Access Journal

Mapping Geomedia Studies: Origins, Trajectories, and Future Directions

André Jansson and Christian S. Ritter

Department of Geography, Media and Communication, Karlstad University, Sweden

Correspondence: André Jansson (andre.jansson@kau.se)

Submitted: 2 February 2024 **Accepted:** 17 April 2024 **Published:** 4 June 2024

Issue: This article is part of the issue "Geomedia Futures: Imagining Tomorrow's Mediatized Places and Place-Based Technologies" edited by Karin Fast (Karlstad University), Cornelia Brantner (Karlstad University), and Pablo Abend (Burg Giebichenstein University of Art and Design Halle), fully open access at https://doi.org/10.17645/mac.i448

Abstract

This article explores the formation of and future avenues for geomedia studies. Drawing on a citation network analysis, we map the development of the interdisciplinary research terrain from its origins and identify central citation clusters. The term "geomedia" has been used in the humanities and social sciences since at least the early 2010s. Subsequently, geomedia studies have been advanced through an interdisciplinary scholarship from human geography, media and communication studies, and other related research areas, assessing the increasingly complex interplay between media technologies and the production of space. To detect the origins and growth of geomedia studies as an emerging field, we conduct a bibliographic citation and keyword analysis of 57 references from the Web of Science core collection. The generated charts and network graphs reveal that research on geomedia has mainly evolved within media and communication studies. A citation cluster analysis shows how two sub-communities and approaches have emerged, tentatively called "visual geomedia studies" and "urban-sociological geomedia studies." A keyword cluster analysis reveals how the approaches are entangled with different theoretical perspectives. Given the societal relevance and the growing vitality of present-day geomedia studies, this article discusses the prospects of both approaches.

Keywords

citation networks; communication geography; geomedia; keyword clusters; locative media; media geography

1. Introduction

In recent years, we have seen the publication of several monographs, edited volumes, and special or thematic issues (including the current one) that address the term "geomedia" in various ways. Obviously, the semantic

joining of the Latin words for "Earth" and "in-between" speaks to the culture of our time and the ongoing fusion of our everyday life environments and means of communication. As a condition, geomedia denotes something similar to what Deuze (2011) calls media life—a *life in media*—where media and environment are inseparable. In a certain sense, this means that the term geomedia is tautological. If we consider the deeper history of media, as Peters (2015) suggests, media were *elemental* from the start, grounded in the natural elements—smoke, fire, water, clay, and so forth—and the meanings they could convey. Today, new technology prompts us to rediscover the *geo*—in media. With innovations such as global positioning systems (GPS) and the Internet of Things, we have come full circle and reached a condition where media are again interlaced with the Earth in increasingly intricate ways. Thus, while geomedia is sometimes used as a shorthand for certain space-contingent technologies or platforms, more or less synonymously with "locative media," the term can also have a wider purchase. This is what McQuire (2016) argues when he draws the contours of geomedia as a digitalized, socio-technologically convergent urban condition (see also McQuire, 2018) and what Jansson (2022) means when describing geomedia as an environmental regime.

Our point of departure is that geomedia represents a significant and promising reorientation in the study of human communication and its conditions. However, this article does not aim to "come to terms" with geomedia. Given the growing academic interest in geomedia *and* the fact that the term itself is relatively open-ended and multi-faceted (at worst, redundant), we find it important to produce an overview of how the term "geomedia" has been used in academic writing and what type of research terrain this terminology represents. Our aim is to bring about the very first systematic mapping of how "geomedia" has made its way into the social sciences, which publications have been significant in defining the research area, and how the term is clustered with other keywords. To fulfill this aim, we conducted a citation network analysis based on a meta-analysis of 463 references from the Web of Science (WoS) core collection. Citation analysis can be a pertinent tool for assessing the status of a field and its subfields (Wei et al., 2023, p. 364). This article provides an unprecedented computational mapping of geomedia research (limited to work that explicitly addresses geomedia), revealing the bibliographic connections between the various research texts, their authors, and schools.

Assessing a data set from the WoS core collection, we raise the following questions: To what extent can the analysis of direct citations provide insights into the differentiation of geomedia studies and the formation of bibliometric communities? In what ways can the keyword analysis reveal the entanglement of research communities with topic areas and theoretical perspectives suggested by geomedia scholars? Furthermore, we ask what conclusions can be drawn from the outcomes of the citation and keyword analysis in terms of future research avenues and new directions for future methodological and theoretical challenges.

Our analysis is structured as follows: First, we illustrate how the usage of the term geomedia has evolved quantitatively over time, both in direct usage and citations. Here, we also provide a comparison with two related concepts: locative media and media geographies. Second, we present citation networks that trace the emergence of bibliometric communities of scholars sharing an explicit interest in geomedia. Third, we visualize semantic clusters to find out which other key concepts are combined with geomedia and thus define the research terrain of geomedia studies thematically and theoretically. The article ends with a discussion about the future of geomedia studies as a prospective research field, focusing on whether we are dealing with a sustainable research community or a more transitory trend.

2. Mapping Geomedia Studies as an Emerging Field

Before turning to the analysis, let us briefly reflect on the meaning of "field"—a geographical term—and what it stands for in our investigation. In 1999, Robert T. Craig argued that communication theory was not yet to be called an academic field. Most communication scholars, he argued, did not recognize one another but referred to other theorists from various disciplines. There was no corpus of canonical texts and a rather disorderly terrain of almost uncountable "theories" (see also Craig, 1991). However, given the practical significance of communication in people's lifeworlds, Craig argued that there could and *should* be a field of communication theory if researchers gathered around shared questions and goals while also recognizing controversies. The potential of communication theory was to become "a coherent field of metadiscursive practice, a field of discourse about discourse with implications for the practice of communication" (Craig, 1999, p. 120). This is a rather concise way of understanding the meaning of an academic field and serves as inspiration for the current analysis.

One thing is clear from the start, however. If communication theory did not qualify as a field in 1999—when Craig could identify seven significant approaches—we must dismiss any idea of calling geomedia studies a field. When we embarked on this analytical endeavor, we did not expect to find a field nor intend to promote geomedia studies as a field (which it is not). A field cannot revolve around one concept alone. Nevertheless, we argue it serves a valid purpose to adopt the idea of (meta)discursive practice to assess if there are key works and shared research topics that keep research on media together *and* if there are signs of debate around media research as such. Only based on such analyses of current discursive conditions can we allow ourselves to speculate about the future. While acknowledging the difficulties of defining a field in media and communication studies and its theoretical connections to other disciplines, Campbell (2013) suggests that demarcating the key contours of a field and its central characteristics allows its scholars to develop a shared identity. As such, what follows is an attempt to chart geomedia studies as a potentially emerging field or a quasi-field (following the ANT notion of the quasi-object as something not actually existing but potentially emerging and an entity that social actors relate to; see Jóhannesson & Bærenholdt, 2020) where different research interests come together, united by a shared concept. We hope this endeavor can serve as inspiration for other researchers. Since geomedia is an inherently interdisciplinary notion, there is potential for new constellations of concepts and mindsets and, in the long run, for new approaches to emerge.

3. Methodological Approach and Data Collection

Our analysis of the development of geomedia studies is primarily based on gathering and reading journal articles and book chapters. These interpretations deriving from a textual analysis of the contributions to geomedia studies are complemented by a computational citation network analysis. The digitalization of libraries and citation indexes has provided extended access to large amounts of bibliographical data, allowing researchers to employ new computational tools that can enhance the interpretation of the textual content. This article is grounded in a bibliographical analysis conducted with the visualization software VOSviewer. This software tool made it possible to assess both citation networks of scientific articles and the co-occurrence of the keywords of these articles.

To map scholarly networks within the research areas of geomedia studies, we retrieved bibliographical data from the WoS core collection. The bibliographical data set was used for both the citation network and

keyword analyses. This database consists of the most relevant bibliographical indexes in the social sciences and humanities, including the Science Citation Index Expanded (1900–present), the Social Sciences Citation Index (1956–present), the Arts & Humanities Citation Index (1975–present), the Book Citation Index for Science (2005–present), Book Citation Index—Social Sciences & Humanities (2005–present), and the Emerging Sources Citation Index (2018–present). The WoS core collection is an adequate data source for identifying research trends and citation clusters in a given scientific field (Tang et al., 2023, p. 2137) since it contains high-level scholarship from around the world. The multidisciplinary database WoS began in 1973 and covers sources going back to 1956. This database indexes about 1,900 journals on a cover-to-cover basis, selectively about 3,000 further journals, and a limited number of conference proceedings and monographs (Norris & Oppenheim, 2007, p. 163). The indexing of research texts on databases such as WoS, Scopus, Google Scholar, and CSA Illumina has played an important role in measuring research outcomes and is often considered by research funding bodies for appraising research quality.

This bibliographical investigation primarily involves WoS as a research tool, committing to the search-as-research approach (e.g., Rogers, 2013). Using a personal WoS account to access the database's search interface, the bibliographic data was assembled with the search query "geomedia" and the parameter "topic," which searches in the titles, abstracts, and author keywords, on January 25th, 2024. We chose this relatively broad search because it allows for tracing discourses revolving around the term "geomedia." Our aim is thus strictly explorative in that we want to map the bibliometric and discursive formations connected to one specific term, "geomedia," rather than trying to reconstruct geomedia studies as a complex research field that incorporates a plethora of other keywords. The latter alternative would have been interesting, of course. However, it would have also required more extensive analyses, for example, tracing the keywords that we identify as closely linked to geomedia or including additional search terms from the start. However, the inescapable downside of such procedures is that the selection of additional terms would have determined the discourses produced. The meaning of geomedia studies would thus have been reliant on our choices, implying, for example, that scholars not identifying with geomedia (studies) would have been subsumed under this label. The terminologies evolving within geomedia studies are semantically related to research labeled, for example, "media geographies" and "locative media," and scholarship within these research areas has been continuously shaped by mutual inspiration.

During the initial search, 197 bibliographic references were found, among which 46 were classified as "environmental sciences," 28 as "communication," and 23 as "engineering environmental" by the WoS database. We went through all of the references manually. We found that many of them did not have any connection to geomedia as an analytical term (such as the GeoMedia GIS software package) or to the type of research implied by geomedia in cultural, societal, or technological contexts (referring instead to minerals and chemical substances). Thus, while ensuring that the selection of articles remained as inclusive as possible, only WoS categories for social science disciplines and the humanities were included in a refined search, and subject areas from science disciplines were excluded (WoS, 2024).

The refined bibliographic data set contains 57 articles from the WoS core collection and 2,257 cited references from the bibliographies of these articles. Amongst the cited references, Scott McQuire's book *Geomedia: Networked Cities and the Future of Public Space* (2016) received the highest number of citations (28), followed by Tristan Thielmann's article *Locative Media and Mediated Localities: An Introduction To Media Geographies* (2010) with 11 citations within the WoS core collection. The data set contains a small number of

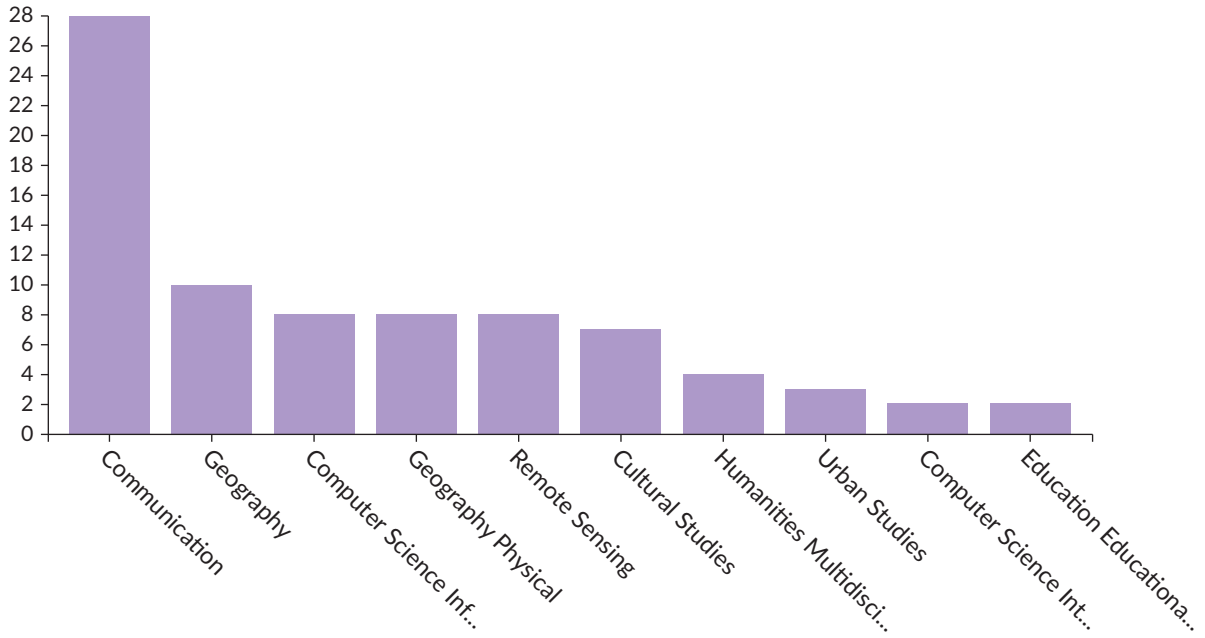

Figure 1. Subject areas related to geomedia studies within the WoS core collection.

book reviews, but these documents do not concern the network clusters discussed below. While 28 documents were classified as "communication," ten were classified as "geography," and eight as "computer science information systems" (see Figure 1). This indicates that geomedia research is predominantly anchored in media and communication studies with strong links to geography, as well as to interdisciplinary research in cultural studies and the social sciences.

To contextualize our analysis, we also examined the terms "locative media" and "media geographies." While "locative media" was cited in 231 articles, "media geographies" appeared in only 31 sources. While the former term predominantly figured in journals classified as "communication," the latter figured above all in sources from "geography." This comparison tells us something about the interdisciplinary position and relatively small volume of geomedia research. Our search also revealed that the use of "locative media" in scientific publications has steadily declined since its peak in 2015, with 35 sources, down to five in 2022 and 2023.

The data set for this investigation was downloaded as a CIW file from the WoS. The text-based tag format for bibliographical references was developed by Research Information Systems and is, for instance, used by the bibliography management software EndNote. The CIW file was loaded in the network visualization software VOSviewer to generate the network graphs displayed in Figures 3 to 5 in the following sections. The purpose of using the VOSviewer visualization is to identify trends and subfields within geomedia studies through citation and keyword clusters.

4. Origins and Expansion of Geomedia Studies

To provide a backdrop to our analysis of citation networks, it is important to reflect on the early years of geomedia studies. In this regard, McQuire (2018, p. 249) has advanced two important points. First, he

contends that the term geomedia started to appear in the social sciences around 2010 when "a certain problematic concerning the way that networked digital media platforms are implicated in reworking the space-time of everyday life became more urgent and insistent." Second, he holds that the term's origins and associated concerns are complex and can be traced to different disciplines and fields. Geomedia studies, McQuire (2018, p. 250) argues, can best be understood as a "space of encounter," even a "creative space" of "unruly conjunctions."

We reach a similar conclusion through our WoS data (Figure 2). While the origins of geomedia as an *explicit* social scientific research topic can be traced back to 2011, even a bit earlier, the period around 2017–19 marks the beginning of a more expansive and still ongoing stage. Figure 2 reveals that while the number of geomedia-related publications has fluctuated significantly over the years, for example, due to the publishing of special issues and book reviews, there is also an overall positive trend. Similarly, the number of citations—probably a better measure of the quasi-field's expansion—has grown steadily and reached 70 citations in 2022. The data for 2023 and 2024 were not completed at the time of the data collection.

The WoS data suggest that one of the first geomedia articles was Lapenta's (2011) "Geomedia: On Location-Based Media, the Changing Status of Collective Image Production and the Emergence of Social Navigation Systems," published in *Visual Studies*. Lapenta, a sociologist specializing in new media innovations, described geomedia as platforms merging existing electronic media and the Internet, locative media, and augmented reality, a view he elaborated in a book chapter in *Mobile Technology and Place* (Lapenta, 2012). Lapenta's technologically oriented approach constitutes an important starting point for geomedia studies. Notably, it was taken up just a few years later by Chess (2014) in an influential article on mobile gaming technologies.

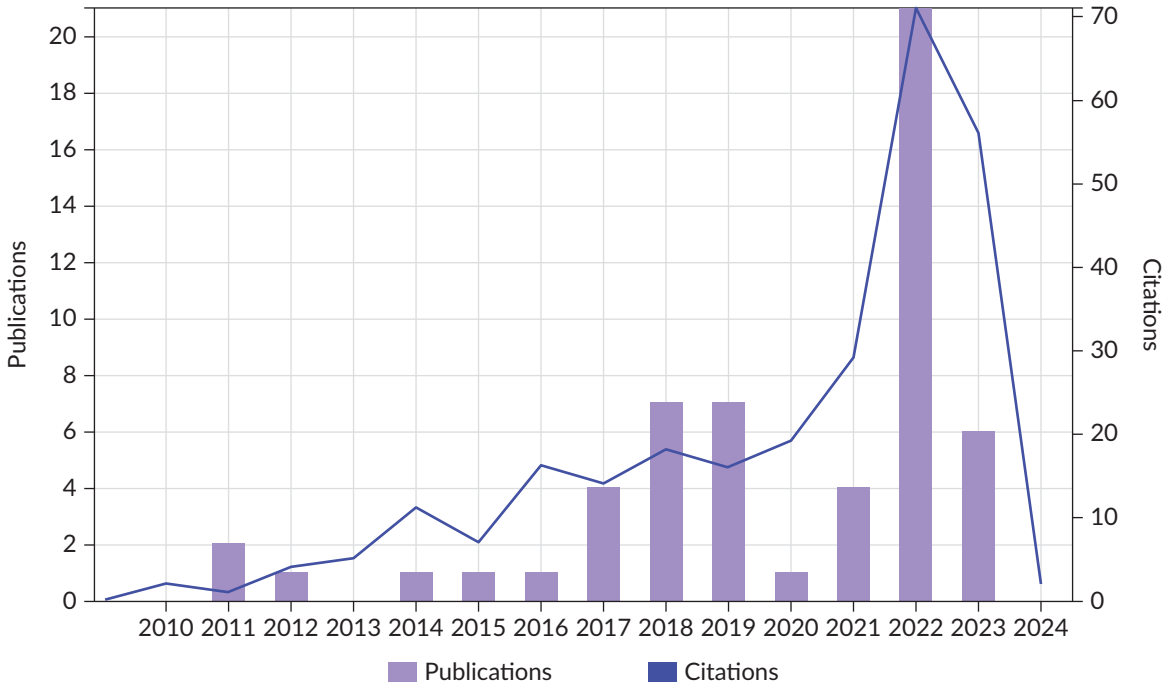

Figure 2. Number of publications and citations referring to "geomedia" in the WoS core collection (2009–2023).

Also in 2011, Richterich published the article "Cartographies of Fiction: Amateurs Mapping a New Literary Realism," which outlines an emerging type of interactive "geomedia fiction." Richterich (2011) does not provide any exact source of the term "geomedia." However, her work draws on Döring and Thielmann's (2009) edited volume *Mediengeographie: Theorie—Analyse—Diskussion*, in which the term geomedia (*Geomedien*) is present (Manovich & Thielmann, 2009). At the time, Richterich was a member of the graduate school Locating Media at the University of Siegen, Germany, where both Döring and Thielmann worked. Neither Döring and Thielmann's edited volume nor Thielmann's earlier articles on geomedia (Thielmann, 2007, 2010) are part of the WoS collection, however. In his article on car navigation systems, Thielmann (2007, p. 63) argues that it "seems appropriate to term media…with converging cartographic and media applications, as the genre of 'geomedia.'" In a subsequent article, which has become very influential, Thielmann (2010) developed his view of geomedia as an expanding technological regime where locative media and mediated localities come together.

There are also (at least) two other "geomedia beginnings," besides Lapenta and the Siegen research group, that are not directly visualized in the WoS material. From 2010 onwards, the term geomedia was repeatedly used in publications on GIS technology in geography education. The first publication that appears in the WoS material is an article by Schulze et al. (2015) entitled "Spatial Citizenship and Digital Geomedia: Composing Competences for Teacher Education and Training." However, the same group of scholars published papers and articles around spatial citizenship several years earlier (e.g., Gryl & Jekel, 2012; Gryl et al., 2010; Schulze et al., 2014), referring to geomedia as a type of interactive web-based applications for geospatial information. In this strand of geomedia studies, while anchored in didactics and geography education, we also find references to Thielmann's media theoretical work as well as to research in social geography (e.g., Felgenhauer & Quade, 2012; Quade & Felgenhauer, 2013). A connecting link to the Siegen research group seems to be conferences and proceedings on spatial citizenship, published in the Austrian journal *GI-Forum*, which is not indexed by WoS (e.g., Abend, 2013; Vogler & Hennig, 2013).

The final starting point can be found in McQuire's ground-breaking work on digitally mediated urbanism. While the WoS collection entails several book reviews of *Geomedia: Networked Cities and the Future of Public Space* (McQuire, 2016), it does not list the book itself nor McQuire's earlier work on geomedia, which was published in 2011 in an edited volume entitled *Urban Interior* (McQuire, 2011). In comparison to other early treatments of geomedia, McQuire introduces a more socially oriented approach to geomedia as a contested (urban) environment. It should also be noted that McQuire had connections to the Siegen researchers and, for instance, contributed a chapter to the above-mentioned book *Mediengeographie* (McQuire, 2009).

Since 2017, we have seen the publishing of several special issues (Fast & Abend, 2022; Fast et al., 2019; Hartmann & Jansson, 2024) and edited volumes (Fast et al., 2018; Felgenhauer & Gäbler, 2018) that have boosted conversations around geomedia. Similarly, if we look at the individual articles and books that engage with geomedia from 2016 and onwards, they typically build explicitly on any of the aforementioned beginnings (e.g., Jansson, 2022; Rodríguez-Amat & Brantner, 2016; Schmuderer et al., 2019). Such patterns—which also testify to the interdisciplinary nature of geomedia studies—stand out even clearer as we turn to the analysis of citation networks.

5. A Citation Network Analysis

In this section, we examine how direct citations of research texts within the WoS core collection can provide insights into the prospective formation of bibliometric sub-communities within geomedia studies. Again, we focus on articles that refer to the term "geomedia." In network science, citation networks are generally understood as networks of relatedness to a given subject matter (Newman, 2010, p. 64). According to Small (1973), citation network analysis is a review methodology that allows researchers to map the structure of a scientific field quantitatively. It makes visible clusters indicating the constellation of nodes and significant sub-components within a given network. Ever since citation network analysis was established in the 1970s, the three main approaches that evolved for investigations into scholarly citation networks have been co-citation analysis, biographical coupling, and direct citation analysis (Boyack & Klavans, 2010, p. 2390).

This investigation into the quasi-field of geomedia studies is based on the tracing of direct citations. Citation networks comprise two fundamental elements: nodes related to scientific research texts and directed edges denoting a citation relationship among the research texts. Suppose a research text A cites research text B. In that case, an edge can be drawn from A to B. Citation network analysis can thus be used to identify research clusters with common themes (Aryadoust, 2020, p. 3), where clusters are described as sub-components or identifiable groups (González-Teruel et al., 2015, p. 692).

The predominant cluster, which we analyze in greater detail, contains 28 articles represented by 28 nodes (Figure 3). The node labels contain the last name of the author or the last name of the first author in multi-author articles. The size of the nodes refers to the frequency of citation for the article within the WoS core collection until the day of the data collection. The 28 articles displayed in Figure 3 form the largest cluster among the 57 articles included in the data set and contain almost all of the most cited articles of the data set: Lapenta (2011) with 58 citations, Chess (2014) with 28 citations, Jansson (2019) with 19 citations, Rodríguez-Amat and Brantner (2016) with 17 citations, and Fast et al. (2019) with 16 citations. The articles reflect crucial moments in the development of geomedia studies as they introduce different topic areas.

Exploring the cluster in-depth, we argue that the distribution of the 28 articles reveals a conceptual tension that has fuelled the emergence of two bibliometric sub-communities within geomedia studies. The first consists of the nodes in the lower-left part of the diagram. This star-shaped subsection of the cluster revolves around Lapenta's (2011) article. This node has 11 edges. All the surrounding nodes that cite Lapenta's work engage with his initial idea of geomedia and are mainly concerned with the visual aspects of such technologies. The analysis of the cluster section forming around this article is particularly insightful as it is an early contribution to geomedia research and serves as a starting point for tracing the evolution of different approaches.

Lapenta's article provided an initial conceptual framework within geomedia studies and outlined the social and perceptual shifts caused by early geomedia technologies. In another early contribution, Lapenta (2012) emphasized the geolocational re-aggregation of the digital image, circumscribing a new socio-economic order for social production and information exchange. Many of the citing authors refined Lapenta's initial conceptualization and introduced the geomedia terminology to new topic areas. Chess (2014, p. 1105) borrows Lapenta's definition of geomedia and expands the concept to the study of the mobile phone game Ingress, assessing how it restructures the relationships between community and space. In their assessment

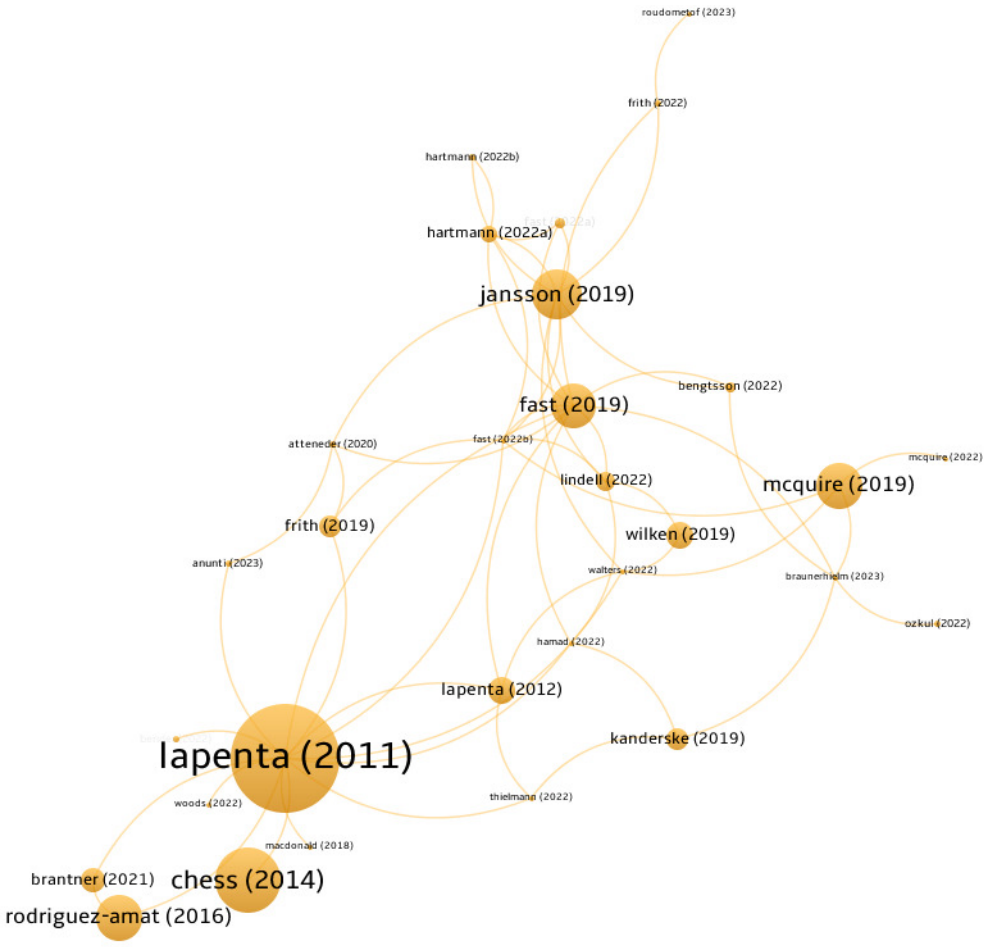

Figure 3. Citation cluster of WoS articles referring to "geomedia."

of Yelp and Foursquare, Frith and Wilken (2019, p. 134) make use of Lapenta's initial concept of geomedia as an umbrella term capturing larger urban, technological, and social transformations facilitated by locative media and other location-based services. Drawing on Lapenta's (2011) concepts of composite imaging and geolocation-based representation, Rodríguez-Amat and Brantner (2016) introduce geomedia perspectives to media research into social movements. This article is another significant contribution to geomedia studies and is cited in the subfield of digital activism. Brantner et al. (2021) refine public sphere theory while mobilizing the socio-organizational principle of self-other and the world (following Lapenta) to analyze social media interaction and political action for occupying urban space. MacDonald (2018, p. 149) draws on Lapenta's analysis of photo collage techniques and puts his claims on the fractured temporality of photographic mapping into question. Woods (2021) applies Lapenta's concept of geomedia to the study of scale and time in the Anthropocene. Thielmann (2022) assesses the infrastructural, environmental, and practical conditions of geomedia, tracing their origins back to the first aerial imagery in the late 18th century. Bender and Kanderske (2022) historicize the idea of geomedia technologies by assessing three consecutive modes of aerial seeing. Finally, Anunti et al. (2023) introduce Lapenta's concept of geomedia to research sustainability education and digital story mapping. Between 2011 and 2024, Lapenta's basic concept of geomedia mainly spread across the thematic areas of gaming, the Anthropocene, aerial imagery, political activism, and visual culture. The different articles contribute to a sub-community that we may tentatively call "visual geomedia studies."

In the upper part of the citation cluster (Figure 3), various articles are also closely connected through citations. This subsection of the cluster is little connected to Lapenta's work. These contributions can be considered a second sub-community within geomedia studies that mainly assesses geomedia in urban contexts. The first sub-cluster evolved around a special issue introduction in *Communication and the Public* by Fast et al. (2019), which has eight connections to other articles within the cluster section. The node around Jansson's (2019) article (appearing in the same special issue) has seven edges. Another special issue introduction, Hartmann and Jansson's (2024, available since 2022) "Gentrification and the Right to the Geomedia City" is also part of this dense polycentric cluster section. The three sub-clusters, which can be institutionally linked mainly to the Centre for Geomedia Studies at Karlstad University, Sweden, demonstrate the formation of "urban-sociological geomedia studies" as a prospective approach through opening up avenues for researching socially-oriented topics such as gentrification and tourism through geomedia lenses.

The urban-sociological approach is constituted by articles that are internally linked through citations and (in several cases) by appearing in the same special issues. In bibliometric terms, however, an even more important common denominator is that all publications in the upper part of the diagram (13 articles) cite McQuire's (2016) book *Geomedia: Networked Cities and the Future of Public Space*. While this legacy is not visualized in the figure, since the book is not covered by the WoS core collection, some illustrating examples can be provided. Hartmann and Jansson (2024) explicitly build their understanding of the "geomedia city" on McQuire's approach and link it to gentrification. In a related vein, Fast (2024, available since 2022) deploys McQuire's framework to study how urban coworking spaces, understood as hyper-connected elite territories, play into gentrification. McQuire (2019) extends his notion of geomedia by analyzing Google Maps as a technical object that radically shapes and embeds urban experience. Hartmann (2024, available since 2022), in turn, analyzes the public battles surrounding the planning of a Google Campus in Kreutzberg, Berlin, as an instance of urban geomediatization. Lindell et al. (2022) incorporate McQuire's view of geomedia as a technological regime in a Bourdieusian study of people's place-exposing activities on social media. Bengtsson et al. (2022) appropriate McQuire's approach in an action-research study of how participatory design interventions may foster socially sensitive place-based mediated experiences in tourism (see also Braunerhielm & Bengtsson, 2023).

The citation network analysis indicates that geomedia studies have evolved as a heterogeneous research terrain accommodating various location-based phenomena, diverse theoretical perspectives, and empirical case studies from various social and material contexts. Whereas many articles still deploy a rather exploratory approach to geomedia and reflect on different ways of understanding the term, our cluster analysis also identifies the formation of two prospective sub-communities and approaches within geomedia studies: visual geomedia studies, largely building on Lapenta's (2011, 2012) definition of geomedia, and urban-sociological geomedia studies, originating from the work of McQuire (2011, 2016).

Given these two ways of approaching geomedia, however, we must again reflect on the limitations of the WoS data. Our textual analysis of articles and book chapters revealed that early geomedia scholarship was developed by members of the Siegen research group (e.g., Thielmann, 2010). Much of this research was not included in the WoS core collection since it was partially published in German. However, this research tradition has been continued in, for example, the journal *Digital Culture & Society*, which is not represented in Figure 3. Thielmann's articles are also much-cited among adherents of the urban-sociological approach, but not to the same extent as McQuire's (2016) work. One might then hypothesize that the recent trajectories of the Siegen

research group, such as the articles by Thielmann (2022) and Bender and Kanderske (2022; see Figure 3), occupy an intermediary position between, or cut across, the two aforementioned approaches.

6. Keyword Clusters

Following the citation network analysis, we explore the same WoS data set regarding the entanglement of bibliometric sub-communities with theoretical perspectives. Raymond Williams established a canonical classification of keywords for social science research. Tracing the meaning of 131 keywords back to their origins and following their development, Williams (1976) provided cultural researchers with a semantic orientation for key categories used in academic conversation. About 50 years later, adding keywords to scientific papers has become compulsory for academic writing to index research outcomes. The digitization of the dissemination of academic knowledge dramatically transformed the meaning of keywords as they leave digital traces stored in gigantic bibliographic databases. Indexing systems, such as the WoS and Scopus, classify research texts and connect them through keywords.

A facet of citation network analysis is the identification of keyword clusters, which is facilitated by the statistics and visualization features of the VOSviewer. Tracing the co-occurrence of keywords in research texts, this technique allows for the allocation of topic areas (Lee & Zhou, 2022, p. 12) or semantic clusters in a given scientific field (López-Fernández et al., 2016, p. 625). Such semantic clusters refer back to discursive practices evolving in the field as many scholars signal their conceptual approaches while adding keywords to their research texts. Following Lee and Zhou (2022, p. 4), a co-occurrence analysis can detect the "conceptual knowledge structure" of a given research area. Similar to a co-hashtag network analysis that can show the semantic interconnectedness between science communication and conspiracy theories on X, formerly Twitter (Tuters et al., 2023), keyword analysis can unveil the semantic entanglements of sub-communities within geomedia studies with different theoretical perspectives.

The 57 references from the WoS core collection contain 272 different keywords, forming 16 clusters. Figures 4 and 5 show subnetworks that are relevant to the above-described approaches and provide visual evidence for how these approaches are connected with research themes and theoretical perspectives within geomedia studies. The *proximity* of keywords signals how topics are interconnected and can point toward emerging trends. The *size* of the nodes relates to the keyword frequency in the data set generated with the search term "geomedia." The keyword "gentrification" was used seven times, the keywords "location" and "tourism" were each used six times, and the keywords "place" and "locative media" five times each by the 57 references. Various major keyword clusters can be identified in the subnetwork forming around the gentrification cluster (Figure 4). This subnetwork, related to the urban-sociological approach to geomedia, is, in turn, flanked by various isolated clusters regrouping keywords with lower frequencies. One of these disconnected clusters contains the keyword "image" and assembles keywords in the second approach, visual geomedia studies (Figure 5).

The clusters displayed in Figure 4 provide insights into trends and conceptual developments in geomedia studies. The distribution of clusters corresponds, to a certain extent, with the formation of an urban-sociological approach in geomedia studies and its main theoretical perspectives. For instance, gentrification (blue color) is connected with Pierre Bourdieu's notion of "distinction" and research into "busyness." Another example of an emerging trend, shown in green color, is the introduction of action

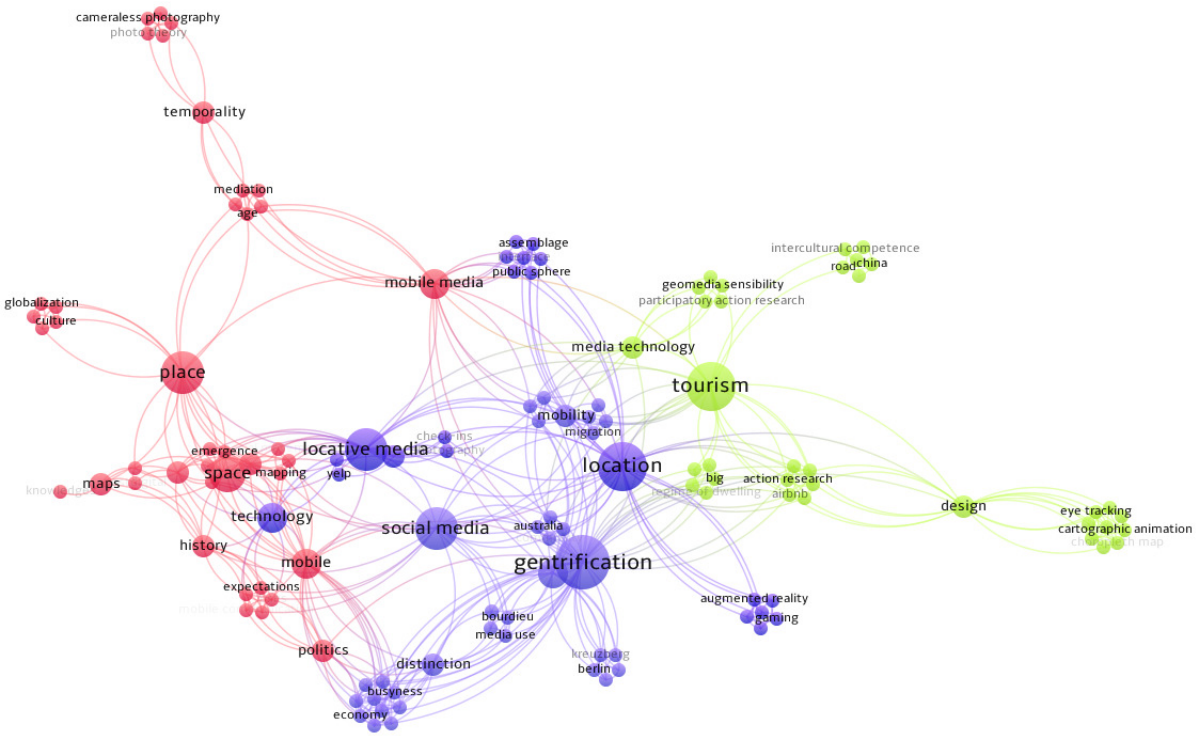

Figure 4. Keyword cluster from WoS articles around gentrification in geomedia studies.

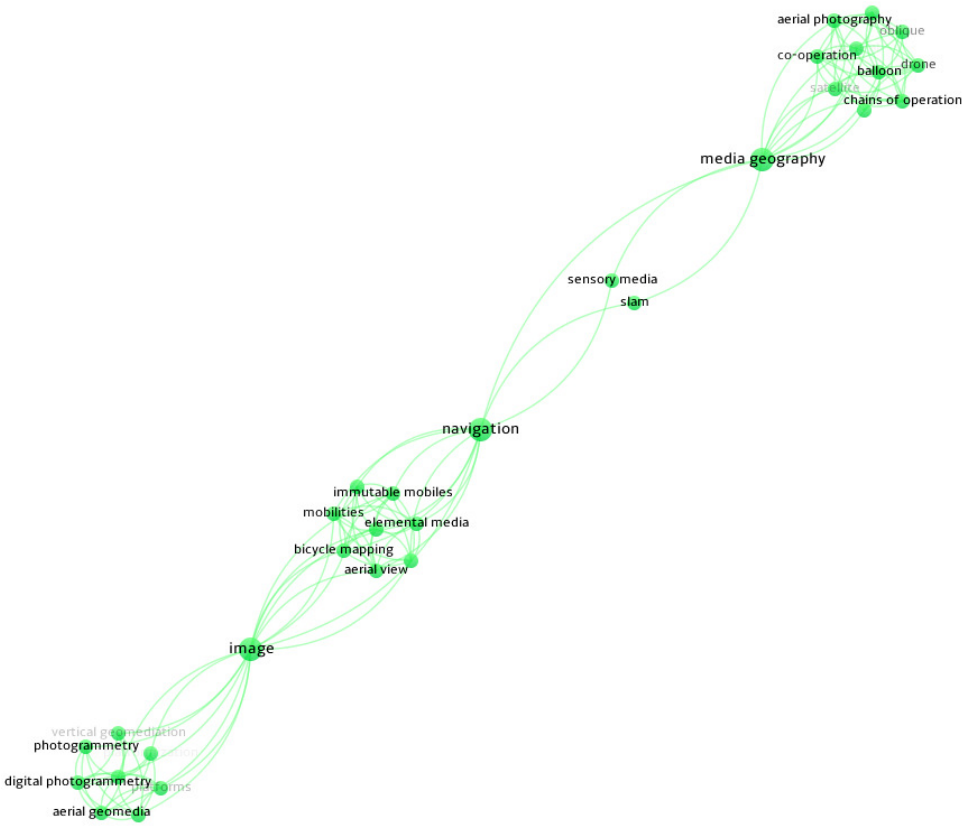

Figure 5. Keyword cluster from WoS articles around visual research in geomedia studies.

research related to geomedia design, which is closely connected with the keyword "tourism." At the same time, semantic proximity can be stated for the keywords "gentrification," "tourism," and "location," indicating that these research topics are closely related. The emphasis on location seems to provide a common ground for both gentrification and tourism research.

In a separate keyword cluster (Figure 5), we can see how geomedia scholars develop new perspectives on the issue of the "image." This cluster is not connected to the gentrification cluster, which again can be interpreted as an indication of a differentiation within geomedia studies. Whereas the gentrification cluster entails mainly sociological perspectives on urban space and social class, recent visual scholarship in geomedia studies draws on theories related to "navigation" and "immutable mobiles" (i.e., actor-network theory). The keyword cluster analysis also demonstrates how the visual approach is entangled with particular research objects, such as "aerial geomedia," "balloons," and "drones." This is an interesting development. As the scholarship in geomedia grows, the research communities draw on various theoretical traditions and contribute to central thematic discourses such as mobilities and navigation (Figure 5) versus location and social media (Figure 4).

7. Concluding Discussion: The Future of Geomedia Studies

As we stated from the outset, it is too early to speak about geomedia studies as a field in the established sense. Geomedia studies can more properly be understood as a creative "space of encounter" (McQuire, 2018). Nevertheless, inspired by Craig's (1999) view of how fields emerge through (meta-)discursive practice, we have deployed two different types of network analysis (charting citation and keyword clusters, respectively) to draw the contours of geomedia studies as a potentially emerging field, or a quasi-field. This type of mapping exercise, we argue, is important not just to understand the evolution of a certain research area but also to assess its future directions.

There are some limitations to our study. Besides the limited amount of research dealing explicitly with geomedia, the citation network analysis is also limited by its choice of material, as the network visualization and citation counts are based on the WoS core collection. The 57 references on which the analysis is based include only English-language research texts, published in "top tier journals" or in books with certain publishers. However, what is considered a top-tier journal or publisher may vary according to the academic culture. Most authors are based in universities in the Western hemisphere, and voices from, for instance, South America or Asia are less heard. Future bibliographic investigation into the field of geomedia studies could address such omissions and include further languages and different citation indexes. Furthermore, the narrow search query implicitly excluded related publications about media geographies, spatial media, and locative media, which constitute a large and expanding research area. This was a deliberate choice, which we discuss in the methodology section.

These limitations aside, we have crystallized interesting patterns that show what keeps geomedia studies together *and* how the quasi-field is differentiated. As to the former, we identified three particularly important origins that still make their mark on geomedia studies. These are related to the early works of Thielmann (2007, 2010), Lapenta (2011, 2012), and McQuire (2011, 2016). While we could also detect a fourth important development related to geomedia technologies in geography education (e.g., Gryl & Jekel, 2012), these publications do not seem to attain the same general significance among geomedia scholars when it comes to navigating or positioning oneself in the potentially emerging field. In our citation network

analysis, we could also identify a tension between scholars building on either Lapenta's work, dealing with visual culture, or McQuire's research on geomedia as part of data-driven urban environments. The fact that we can observe common denominators *and* anticipate the coming of two sub-communities and approaches to geomedia—visual geomedia studies and urban-sociological geomedia studies—shows that geomedia research thus far has evolved in ways that are quite symptomatic of how fields come about. We should also keep in mind that there have been regular conferences, symposia, workshops, and other academic exchanges (including special issues and edited books) that have contributed to building the conceptual platform and sparked conversations around geomedia studies. However, it is beyond the scope of the current article to analyze these dynamics.

This leads us to the future of this quasi-field. Given that geomedia studies is a research area searching for its identity, still gathering a relatively small number of scholars, any attempt to sketch the road ahead may seem premature. Currently, it takes just one or two special issues around a certain theme to make an imprint on the research area at large. It is too early to say something conclusive about the two prospective approaches we identified in the WoS material for 2009–2023. However, if we allow ourselves to extrapolate from the analyses—which provide a systematic overview of tendencies that have not been discussed before—there are three points to make.

First, we predict that geomedia studies will continue to expand regarding how often it is addressed in research publications and how many citations there are to geomedia-related literature. Given the growing vitality of the research community, which we have demonstrated here, and that the problem areas that are at the very core of geomedia studies will stay on the agenda for the foreseeable future, we assume that geomedia studies will continue to attract new researchers. Notably, there is great potential to grow and diversify the community if more scholars from other disciplines than media and communications also "discovered" geomedia.

Second, we believe there are good chances for the two identified geomedia approaches to keep their positions as the main strands within the emerging field. What brings us to this assumption is that the strands are founded upon shared bodies of literature as well as internally coherent approaches to the phenomenon of geomedia. Further, as we have shown, the dominant trends in geomedia studies (also beyond the two sub-communities) are typically anchored in the activities conducted within and between particular institutional contexts. This grants a certain degree of sustainability to ongoing research developments, inducing further theoretical cross-fertilization for the assessment of emerging geomedia technology, such as that shaping volumetric urbanization or the digital geographies of non-fungible tokens.

Finally, it is reasonable to expect and hope that the amount of meta-discursive practices related to geomedia studies will grow. As Craig (1999) argues, this is what one can and should expect from scientific communities—at least in the long run. While it is too early to estimate what types of debates might emerge, we contend that special issues such as this one are a step in the right direction. We also hope our analysis will work as a stepping stone for further discussion around geomedia (studies) and its future.

Acknowledgments

The authors wish to thank the anonymous reviewers and the editors of the thematic issue for their constructive comments on a previous version of this text.

Conflict of Interests

The authors declare no conflict of interest.

Data Availability

The data set for the citation network analysis is available on the WoS database and cited in the reference list. WoS users who have a subscription to the database can replicate the research.

References

Abend, P. (2013). The uses of geomedia: An object-centered and situated approach. In T. Jekel, A. Car, J. Strobl, & G. Griesebner (Eds.), *GI_Forum* (pp. 338–348). Wichmann; OAW.

Anunti, H., Pellikka, A., Vuopala, E., & Rusanen, J. (2023). Digital story mapping with geomedia in sustainability education. *International Research in Geographical and Environmental Education*, 32(3), 197–216. https://doi.org/10.1080/10382046.2023.2183549

Aryadoust, V. (2020). A review of comprehension subskills: A scientometrics perspective. *System*, *88*, Article 102180. https://doi.org/10.1016/j.system.2019.102180

Bender, H., & Kanderske, M. (2022). Co-operative aerial images: A geomedia history of the view from above. *New Media & Society*, *24*(11), 2468–2492. https://doi.org/10.1177/14614448221122201

Bengtsson, L., Braunerhielm, L., Gibson, L., Hoppstadius, F., & Kingsepp, E. (2022). Digital media innovations through participatory action research: Interventions for digital place-based experiences. *Nordicom Review*, *43*(2), 134–151. https://doi.org/10.2478/nor-2022-0009

Boyack, K. W., & Klavans, R. (2010). Co-citation analysis, bibliographic coupling, and direct citation: Which citation approach represents the research front most accurately? *Journal of the American Society for Information Science and Technology*, *61*(12), 2389–2404. https://doi.org/10.1002/asi.21419

Brantner, C., Rodriguez-Amat, J., & Belinskaya, Y. (2021). Structures of the public sphere: Contested spaces as assembled interfaces. *Media and Communication*, *9*(3), 16–27. https://doi.org/10.17645/mac.v9i3.3932

Braunerhielm, L., & Bengtsson, L. (2023). Geomedia sensibility in media technologies. *Anatolia*. Advance online publication. https://doi.org/10.1080/13032917.2023.2277369

Campbell, S. (2013). Mobile media and communication: A new field, or just a new journal? *Mobile Media & Communication*, *1*(1), 8–13. https://doi.org/10.1177/2050157912459495

Chess, S. (2014). Augmented regionalism: Ingress as geomediated gaming narrative. *Information, Communication & Society*, *17*(9), 1105–1117. https://doi.org/10.1080/1369118X.2014.881903

Craig, R. (1991). Why are there so many communication theories? *Journal of Communication*, *43*(3), 26–33. https://doi.org/10.1111/j.1460-2466.1993.tb01273.x

Craig, R. (1999). Communication theory as a field. *Communication Theory*, *9*(2), 119–161.

Deuze, M. (2011). Media life. *Media, Culture & Society*, *33*(1), 137–148. https://doi.org/10.1177/0163443710386518

Döring, J., & Thielmann, T. (Eds.). (2009). *Mediengeographie: Theorie-Analyse-Diskussion*. Transcript.

Fast, K. (2024). Who has the right to the coworking space? Reframing platformed workspaces as elite territory in the geomedia city. *Space and Culture*, *27*(1), 48–62. https://doi.org/10.1177/12063312221090429

Fast, K., & Abend, P. (2022). Introduction to geomedia histories. *New Media & Society*, *24*(11), 2385–2395. https://doi.org/10.1177/14614448221122168

Fast, K., Jansson, A., Lindell, J., Bengtsson, L., & Tesfahuney, M. (Eds.). (2018). *Geomedia studies: Spaces and mobilities in mediatized worlds*. Routledge.

Fast, K., Ljungberg, E., & Braunerhielm, L. (2019). On the social construction of geomedia technologies. *Communication and the Public*, *4*(2), 89–99. https://doi.org/10.1177/2057047319853049

Felgenhauer, T., & Gäbler, K. (Eds.). (2018). *Geographies of digital culture*. Routledge.

Felgenhauer, T., & Quade, D. (2012). Society and geomedia, some reflections from a social theory perspective. In T. Jekel, A. Car, J. Strobl, & G. Griesebner (Eds.), *GI_Forum* (pp. 74–82). Wichmann; OAW.

Frith, J., & Wilken, R. (2019). Social shaping of mobile geomedia services: An analysis of Yelp and Foursquare. *Communication and the Public*, *4*(2), 133–149. https://doi.org/10.1177/2057047319850200

González-Teruel, A., González-Alcaide, G., Barrios, M., & Abad-García, M. (2015). Mapping recent information behavior research: An analysis of co-authorship and co-citation networks. *Scientometrics*, *103*, 687–705. https://doi.org/10.1007/s11192-015-1548-z

Gryl, I., & Jekel, T. (2012). Re-centring geoinformation in secondary education: Toward a spatial citizenship approach. *Cartographica: The International Journal for Geographic Information and Geovisualization*, *47*(1), 18–28. https://doi.org/10.3138/carto.47.1.18

Gryl, I., Jekel, T., & Donert, K. (2010). GI and spatial citizenship. In T. Jekel, A. Koller, K. Donnert, & R. Vogler (Eds.), *Learning with geoinformation V* (pp. 2–10). Wichmann Verlag.

Hartmann, M. (2024). "Google is not a good neighbor": The Google campus protests in Berlin. *Space and Culture*, *27*(1), 110–126. https://doi.org/10.1177/12063312221090601

Hartmann, M., & Jansson, A. (2024). Gentrification and the right to the geomedia city. *Space and Culture*, *27*(1), 4–13. https://doi.org/10.1177/12063312221090600

Jansson, A. (2019). The mutual shaping of geomedia and gentrification: The case of alternative tourism apps. *Communication and the Public*, *4*(2), 166–181. https://doi.org/10.1177/2057047319850197

Jansson, A. (2022). *Rethinking communication geographies: Geomedia, digital logistics and the human condition*. Edward Elgar Publishing.

Jóhannesson, G. T., & Bærenholdt, J. O. (2020). Actor-network theory. In *International Encyclopedia of Human Geography* (pp. 33–40). Elsevier.

Lapenta, F. (2011). Geomedia: On location-based media, the changing status of collective image production and the emergence of social navigation systems. *Visual Studies*, *26*(1), 14–24. https://doi.org/10.1080/1472586X.2011.548485

Lapenta, F. (2012). The infosphere, the geosphere, and the mirror: The geomedia-based normative renegotiations of body and place. In R. Wilken & G. Goggin (Eds.), *Mobile technology and place* (pp. 213–226). Routledge.

Lee, S., & Zhou, Y. (2022). The outlook for sustainable development goals in business and management: A systematic literature review and keyword cluster analysis. *Sustainability*, *14*(19), Article 11976. https://doi.org/10.3390/su141911976

Lindell, J., Jansson, A., & Fast, K. (2022). I'm here! Conspicuous geomedia practices and the reproduction of social positions on social media. *Information, Communication & Society*, *25*(14), 2063–2082. https://doi.org/10.1080/1369118X.2021.1925322

López-Fernández, M., Serrano-Bedia, A., & Pérez-Pérez, M. (2016). Entrepreneurship and family firm research: A bibliometric analysis of an emerging field. *Journal of Small Business Management*, *54*, 622–639. https://doi.org/10.1111/jsbm.12161

MacDonald, G. (2018). Traces, tiles and fleeting moments: Art and the temporalities of geomedia. In S. Lammes, C. Perkins, A. Gekker, S. Hind, C. Wilmott, & D. Evans (Eds.), *Time for mapping: Cartographic temporalities* (pp. 138–153). Manchester University Press.

Manovich, L., & Thielmann, T. (2009). Geomedien: Raum als neue Medien-Plattform? Ein Interview mit Lev Manovich. In J. Döring & T. Thielmann (Eds.), *Mediengeographie: Theorie-Analyse-Diskussion* (pp. 383–396). Transcript.

McQuire, S. (2009). Public screens, civic architecture and the transnational public sphere. In J. Döring & T. Thielmann (Eds.), *Mediengeographie: Theorie-Analyse-Diskussion* (pp. 565–586). Transcript.

McQuire, S. (2011). Geomedia, networked culture and participatory public space. In R. Hinkel (Ed.), *Urban interior: Informal explorations, interventions and occupations* (pp. 113–128). Spurbuchverlag.

McQuire, S. (2016). *Geomedia: Networked cities and the future of public space*. Polity Press.

McQuire, S. (2018). Afterword: Geomedia: In praise of unruly conjunctions. In K. Fast, A. Jansson, J. Lindell, L. R. Bengtsson, & M. Tesfahuney (Eds.), *Geomedia studies: Spaces and mobilities in mediatized worlds* (pp. 249–260). Routledge.

McQuire, S. (2019). One map to rule them all? Google Maps as digital technical object. *Communication and the Public*, *4*(2), 150–165. https://doi.org/10.1177/2057047319850192

Newman, M. (2010). *Networks: An introduction*. Oxford University Press.

Norris, M., & Oppenheim, C. (2007). Comparing alternatives to the Web of Science for coverage of the social sciences. *Journal of Informetrics*, *1*, 161–169.

Peters, J. D. (2015). *The marvelous clouds: Toward a philosophy of elemental media*. University of Chicago Press.

Quade, D., & Felgenhauer, T. (2013). Section editorial: Geoinformation and society: Practising and comprehending geomedia. In T. Jekel, A. Car, J. Strobl, & G. Griesebner (Eds.), *GI_Forum* (pp. 262–271). Wichmann; OAW.

Richterich, A. (2011). Cartographies of digital fiction: Amateurs mapping a new literary realism. *The Cartographic Journal*, *48*(4), 237–249. https://doi.org/10.1179/1743277411Y.0000000021

Rodríguez-Amat, J., & Brantner, C. (2016). Space and place matters: A tool for the analysis of geolocated and mapped protests. *New Media & Society*, *18*(6), 1027–1046. https://doi.org/10.1177/1461444814552098

Rogers, R. (2013). *Digital methods*. MIT Press.

Schmuderer, S., Zink, R., & Gamerith, W. (2019). Citizen participation via digital maps: A comparison of current applications. In T. Jekel, A. Car, J. Strobl, & G. Griesebner (Eds.), *GI_Forum* (pp. 34–46). Wichmann; OAW.

Schulze, U., Gryl, I., & Kanwischer, D. (2014). Spatial citizenship: Creating a curriculum for teacher education. In T. Jekel, A. Car, J. Strobl, & G. Griesebner (Eds.), *GI_Forum* (pp. 230–241). Wichmann; OAW.

Schulze, U., Gryl, I., & Kanwischer, D. (2015). Spatial citizenship education and digital geomedia: Composing competences for teacher education and training. *Journal of Geography in Higher Education*, *39*(3), 369–385. https://doi.org/10.1080/03098265.2015.1048506

Small, H. (1973). Co-citation in the scientific literature: A new measure of the relationship between two documents. *Journal of the American Society for Information Science*, *24*(4), 265–269. https://doi.org/10.1002/asi.4630240406

Tang, K., Chang, C., & Hwang, G. (2023). Trends in artificial intelligence-supported e-learning: A systematic review and co-citation network analysis (1998–2019). *Interactive Learning Environments*, *31*(4), 2134–2152. https://doi.org/10.1080/10494820.2021.1875001

Thielmann, T. (2007). "You have reached your destination!" Position, positioning and superpositioning of space through car navigation systems. *Social Geography*, *2*(1), 63–75.

Thielmann, T. (2010). Locative media and mediated localities. *Aether: The Journal of Media Geography*, *5*(1), 1–17.

Thielmann, T. (2022). Environmental conditioning: Mobile geomedia and their lines of becoming in the air, on land, and on water. *New Media & Society*, *24*(11), 2438–2467. https://doi.org/10.1177/14614448221122190

Tuters, M., Willaert, T., & Meyer, T. (2023). How science gets drawn into global conspiracy narratives. *Issues in Science and Technology*, *39*(3), 32–36.

Vogler, R., & Hennig, S. (2013). Providing geomedia skills beyond (post)secondary education. In T. Jekel, A. Car, J. Strobl, & G. Griesebner (Eds.), *GI_Forum* (pp. 317–327). Wichmann; OAW.

Web of Science. (2024, January 14). Search query: Geomedia. https://www.webofscience.com/wos/woscc/summary/23634145-b16b-4e23-b88f-595dd94fc7b2-c86e1b52/date-ascending/1

Wei, R., Fan, J., & Leo-Liu, J. (2023). Mobile communication research in 15 top-tier journals, 2006–2020: An updated review of trends, advances, and characteristics. *Mobile Media & Communication*, *11*(3), 341–366. https://doi.org/10.1177/20501579221110324

Williams, R. (1976). *Keywords: A vocabulary of culture and society*. Oxford University Press.

Woods, D. (2021). Geomedia and Michael Madsen's into eternity. In G. Durbeck & P. Hupkes (Eds.), *Narratives of scale in the anthropocene: Imagining human responsibility in an age of scalar complexity* (pp. 23–38). Routledge.

About the Authors

André Jansson is a professor of media and communication studies at Karlstad University, Sweden, and the director of the Centre for Geomedia Studies. His most recent book is *Rethinking Communication Geographies: Geomedia, Digital Logistics and the Human Condition* (Edward Elgar, 2022).

Christian S. Ritter is a senior lecturer in the Department of Geography, Media, and Communication at Karlstad University, Sweden. He is a co-chair of the working group Migration and Mobility of the International Society of Ethnology and Folklore (SIEF).