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VISUAL CULTURE IN THE AGE OF ARTIFICIAL INTELLIGENCE: A BIBLIOMETRIC STUDY

Mappin Collaborations and Emerging Topins

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ABSTRACT

Contemporary visual culture is undergoing a profound transformation driven by artificial intelligence. This bibliometric study examines the scientific development of the field between 2014 and 2024, based on 93 articles indexed in Scopus. MASHA, VOSviewer, and Biblioshiny were employed to analyse co-authorship networks, thematic trends, publication sources, and geopolitical dynamics. The results reveal exponential growth since 2021, with a particular emphasis on computer vision, generative aesthetics, and cultural criticism. European contributions addressing perceptual biases and algorithmic authorship are especially prominent. The findings also indicate a concentration of knowledge in the Global North and limited representation from the Global South. The study provides a critical mapping of the field and proposes a transdisciplinary research agenda for scholars in the arts, digital humanities, communication, and data science. It further recommends future research adopting mixed-method approaches to examine the ethical, cultural, and symbolic implications of visual AI.

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1. Introduction

Visual culture, understood as the ways in which images are created, circulated, and imbued with meaning within society, has gained prominence in the social sciences, cultural studies, and, more recently, the digital humanities (Ebbrecht-Hartmann et al., 2023). Since the 1990s, when visual studies began to consolidate as a field, the notion of *visuality* has continued to evolve, partly due to the impact of new digital media and interactive platforms that have transformed visual practices. This shift has moved the focus from the analysis of static representations to the investigation of more dynamic and even multisensory forms. The emergence of artificial intelligence (AI) has further altered the ways in which images are produced, distributed, and interpreted (Gjorgjieski, 2024). It is therefore necessary to recognise that society is undergoing a profound transformation of visual culture (Somaini, 2023).

Advances in technologies such as deep learning, computer vision, and synthetic image generators have opened up opportunities at both creative and analytical levels, although the proportions and directions of these opportunities are not always optimal. Current technologies have generated significant tension around issues of authorship, authenticity, and visual credibility (Gülaçti & Kahraman, 2021). Recent research highlights how algorithmic image creation challenges traditional notions of the "author" (Watiktinnakorn et al., 2023) and questions perceptions of authenticity in the digital realm (McCormack et al., 2019). Analysing visual culture in the age of AI is therefore not only a relevant academic exercise, but an urgent necessity for mapping how contemporary forms of perception, representation, and cultural production are being reconstructed (Somaini, 2023).

Although an increasing number of studies are being published on artificial intelligence and its relationship with the visual, significant gaps remain in the academic literature regarding a broad, critical, and well-structured understanding of the subject from a cultural perspective (Mousa-Monser, 2023). Much of the research focuses on technical or practical applications, while humanistic or critical perspectives tend to appear in isolation, often limited to specific case studies (Messer, 2024). This dispersion hinders the development of robust theoretical frameworks and complicates the identification of common trends in the field. A more systematic approach is therefore required to provide a clear, critical, and connected view of how the relationship between visual culture and artificial intelligence is being investigated.

In this context, bibliometric analysis offers a valuable method for exploring diverse fields of knowledge by facilitating the identification of emerging patterns, the mapping of academic collaboration networks, the recognition of relevant publication sources, and the detection of thematic gaps through quantitative approaches and advanced visualisation tools (Di Dio et al., 2023). Based on these considerations, this study examines the evolution of scientific production on visual culture and artificial intelligence over the past ten years and addresses the following research questions:

- How has scientific production related to visual culture and artificial intelligence evolved in terms of publication volume over time?
- Which authors and countries lead research at the intersection of visual culture and artificial intelligence?
- What are the most influential publication sources (journals and publishers)?
- Which key terms and concepts have been most recurrent in studies on visual culture in the age of artificial intelligence?
- What are the main networks of collaboration between countries, and what topics constitute their strategic priorities?
- What thematic patterns and emerging trends can be identified through the analysis of keyword co-occurrence?
- What are the most cited works, and how have they influenced the construction of the field?

Through this bibliometric approach, the study seeks to provide a comprehensive overview of the field's development, identifying both its achievements and its limitations. The article is structured as follows: Section 2 outlines the methodology, Section 3 presents the findings, Section 4 discusses the limitations, and Section 5 offers the conclusions.

2. Methodology

This study presents a systematic overview that combines bibliometric methods to explore the intersection of visual culture and artificial intelligence. A methodical procedure was designed, beginning with literature collection and culminating in a detailed analysis of the scientific record. The following sections outline, step by step, the phases undertaken to address each research question, including the research design, data sources, and the inclusion and exclusion criteria applied to identify relevant studies.

2.1. Research Design

A retrospective descriptive design strategy was adopted to trace the evolution of scientific production related to the topic under study. This approach offers an empirical perspective and enables the monitoring of research developments over time, thereby revealing how disciplines have interacted and evolved in relation to one another (Alvarado-Vargas et al., 2025). The decade 2014–2024 was selected as the period of analysis, as recent years have witnessed significant advances in the field of visual AI. This timeframe also facilitates a clearer understanding of evolving trends and the behaviour of scientific output. Furthermore, a mixed-design approach was employed to measure various dimensions such as the frequency, distribution, and nature of the published studies. The quantitative component allows for the examination of thematic evolution, identifying common patterns and trajectories, while the qualitative component provides insights into the context and significance of the contributions.

2.1. Database Selection

Scopus was selected for the retrieval of academic articles owing to its extensive thematic coverage and recognised editorial rigour, which make it a reliable source for scientific research. The database offers a comprehensive disciplinary repertoire relevant to this study, encompassing the social sciences, cultural studies, digital humanities, and artificial intelligence (Alvarado-Vargas et al., 2025). In addition, Scopus provides analytical tools that facilitate citation tracking and the identification of emerging trends within specific fields of study. Although other databases such as Web of Science, PubMed, IEEE Xplore, and the ACM Digital Library also contain material potentially relevant to this research, the thematic, geographical, and methodological scope of Scopus was deemed sufficiently broad to meet the objectives of the study.

2.3. Inclusion and exclusion criteria

The source selection process was guided by the need to ensure both the thematic and methodological validity of the bibliometric analysis, considering the chronological relevance and conceptual orientation of the studies. The search was limited to publications produced between 2014 and 2024, a period during which academic discussions on visuality and AI-mediated creation intensified. Only original scientific articles and academic reviews written in English or Spanish were included, as these languages represent the majority of international and regional scientific output. Other languages were excluded due to their limited representativeness.

Regarding the type of document, short formats such as conference proceedings, letters to the editor, technical notes, and editorials were deliberately excluded, as they do not allow for a rigorous assessment of argumentative development or methodological robustness. Priority was therefore given to academic publications with a formal structure, complete referencing, and peer review. In terms of thematic scope, the corpus comprised studies explicitly addressing the intersection between artificial intelligence and visual culture, including topics such as

computational aesthetics, digital art, automated visual perception, and algorithm-generated imagery. Works focused solely on technical, mathematical, or engineering aspects without aesthetic, symbolic, or cultural consideration were excluded. Only texts with full availability and a DOI identifier were retained to ensure traceability and access to the cited sources. Table 1 summarises the criteria underpinning this corpus refinement process.

Table 1. Inclusion and exclusion criteria

Criterion	Inclusion	Exclusion
Age range	2014–2024	Before 2014 or after 2024
Language	English and Spanish	Other languages
Document type	Original research articles, literature reviews	Conferences, letters to the editor, editorials, short notes, conference abstracts
Main topic	Visual culture related to artificial intelligence (digital art, visual perception, computational aesthetics, AI-generated image culture)	Articles that only deal with technical AI without any cultural or visual connection
Field of knowledge	Arts and Humanities Social Sciences	Technical AI engineering without a social/cultural focus, pure mathematics, hard computing
Availability	Articles with DOI and accessible	Articles that cannot be located or do not have verifiable full access

Source: Authors elaboration, 2025.

2.4. Search Strategy

The search strategy was specifically designed to identify documents that articulated the relationship between visual culture and artificial intelligence. To this end, a structured query was developed, combining two thematic blocks. The search was conducted in the Scopus database on 5 March 2025, restricting the results to publications produced between 2014 and 2024, written in English or Spanish, and classified within the subject areas of Arts and Social Sciences. Table 2 provides a detailed breakdown of the search criteria applied.

Table 2. Breakdown of the search criteria applied

Component	Terms used	Objective
Concepts related to visual culture	"visual culture" OR "visual studies" OR "visual media" OR "image culture" OR "visual communication" OR "digital aesthetics"	Capture studies related to contemporary visual and aesthetic phenomena.
Concepts related to artificial intelligence	"artificial intelligence" OR "AI" OR "machine learning" OR "deep learning" OR "creative AI" OR "AI-generated art" OR "LLMs" OR "LLM" or "ChatGPT" or "Generative AI" or "GHIBLI"	Include works related to the impact of AI technologies on the production, perception and development of visual products.
Boolean operators	AND between thematic blocks, OR within each block	Ensure that documents deal simultaneously with visual culture and artificial intelligence.
Years of publication	2014–2024	Ensure scientific output is up to date.
Type of document	Original articles and reviews	Maintain focus on primary research and state-of-the-art analysis.
Languages	English and Spanish	Facilitate understanding and critical analysis of the retrieved texts.
Subject areas	Arts and Humanities Social Sciences	Limit the search to disciplines relevant to the visual-technological cultural intersection of the study.

Source: Own elaboration, 2025.

Subsequently, based on these criteria, a composite search equation was formulated and executed in the Scopus database. This query combined the selected thematic blocks and filters with precision to ensure the relevance and specificity of the retrieved documents. Table 3 presents the final search equation employed.

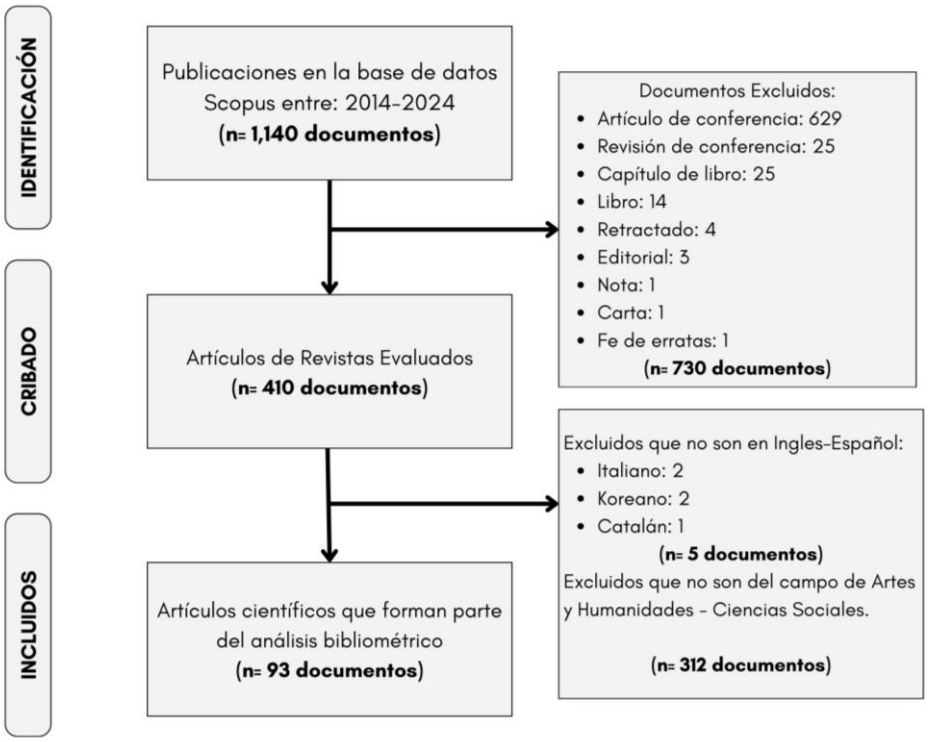
Table 3. Search equation in Scopus

Equation
(TITLE-ABS-KEY("visual culture" OR "visual studies" OR "visual media" OR "image culture" OR "visual communication" OR "digital aesthetics") AND TITLE-ABS-KEY("artificial intelligence" OR "AI" OR "machine learning" OR "deep learning" OR "creative AI" OR "AI-generated art" OR "LLMs" OR "LLM" or "ChatGPT" or "IA Generative" or "GHIBLI")) AND (PUBYEAR > 2013 AND PUBYEAR < 2025) AND (LIMIT-TO (DOCTYPE, "ar") OR LIMIT-TO (DOCTYPE, "re")) AND (LIMIT-TO (SUBAREA,"ARTS") OR LIMIT-TO (SUBAREA,"SOCI")) AND (LIMIT-TO (LANGUAGE,"English") OR LIMIT-TO (LANGUAGE,"Spanish"))

Source: Authors elaboration, 2025.

Figure 1 presents the flow chart corresponding to the document selection process applied in the bibliometric analysis. In the first phase, 1,140 publications were identified in the Scopus database for the period 2014–2024. Subsequently, 730 records that did not meet the criteria established for scientific articles, such as conference proceedings, reviews, book chapters, complete books, editorials, notes, letters, retracted documents and corrections, were excluded.

Figure 1. Flow chart of the article selection process in Scopus



Source: Own elaboration, 2025.

Subsequently, 410 journal articles were evaluated. In this phase, additional filters were applied, excluding five documents that were not written in English or Spanish (Italian, Korean, and Catalan) and 312 further documents that did not belong to the subject areas of Arts, Humanities or Social Sciences, which constitute the focus of this study. As a result, 93 scientific articles that met all the inclusion criteria were retained, forming the final corpus for bibliometric analysis.

Figure 2 summarises the main general bibliometric indicators of the corpus, corresponding to scientific output during the period 2014–2024. A total of 93 documents published across 78 different sources were identified, produced by 213 authors, of whom 32 contributed more than one document. The annual growth rate of 45.32% confirms the emerging nature of the field, with a sustained increase in academic interest over the last decade.

Figure 2. Flow chart of the article selection process in Scopus

Source: Own elaboration, 2025.

2.5. Tools for Bibliometric Analysis

The bibliometric analysis was conducted using three tools that enabled a rigorous and multidimensional exploration of the dataset retrieved from the Scopus database. The first tool employed was MASHA (Metrics - Analysis - Science - Hub - Analytics), an open-source platform designed to support bibliometric analysis using datasets exported from Scopus. MASHA facilitates the interactive exploration of scientific results through graphs, co-occurrence networks and citation analyses, offering a powerful and user-friendly interface. It is particularly suitable for non-STEM bibliometric research owing to its modular structure and analytical philosophy oriented towards the study of non-STEM disciplines (Peña-Cáceres, 2025).

The second tool used was VOSviewer, widely recognised for its capacity to construct and visualise bibliometric maps. This software was applied to map co-authorship frequencies and keyword relationships, identify thematic clusters and trace emerging trends within the field under study. Descriptive indicators and thematic evolution were further supported by Biblioshiny. Finally, the identification and categorisation of relevant keywords in the analysed articles were complemented by a qualitative semiotic approach based on the interpretative reading of the material, taking into account individual modes of expression following the contributions of Sommer (2020).

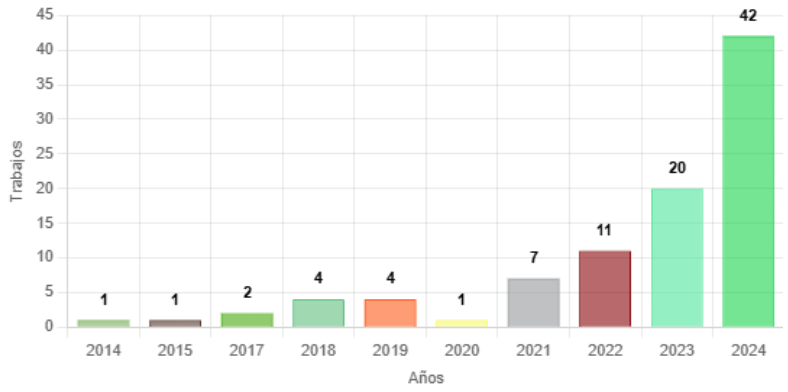
3. Results

This section presented the findings of the bibliometric analysis of Scopus publications on visual culture and artificial intelligence. The results are organised according to research questions addressing the temporal evolution of scientific production, leading authors, countries, publication sources, recurring thematic and conceptual approaches, collaboration networks, emerging thematic trends, most cited works, and currents and gaps in the literature. This structure provides a comprehensive perspective on the development and current state of the field.

3.1. Evolution of Scientific Output Over Time

The evolution of academic production reveals how research interest in this field has developed over time. Such temporal analysis is crucial for identifying trends in the growth and consolidation of the topic. As illustrated in Figure 3, scientific output between 2014 and 2020 remained low and relatively stable, averaging fewer than five papers per year, which reflects an initial stage of thematic exploration and limited consolidated development.

Figure 3. Scientific output between 2014 and 2024



Source: Own elaboration, 2025.

From 2021 onwards, a turning point becomes evident: the number of publications begins to increase steadily, doubling between 2021 and 2022, and then rising more sharply in subsequent years. In 2023, over 20 papers were published, and in 2024, this figure peaked at more than 40 publications, indicating exponential growth.

Complementing the graphical analysis of temporal trends, Table 4 presents an annual breakdown of the number of publications, their percentage of the total corpus analysed, and the corresponding annual growth rate. This quantitative perspective allows us to observe not only the annual volume of production but also the rate at which academic interest in visual culture and artificial intelligence has grown or declined, reflecting changes in the ways people move, perceive, and interact (Zhang et al., 2024).

Table 4. Number of articles per year and percentage of the total

Year	Articles (n=0)	Percentage (%)	Annual Growth Rate (
2014	1	1.08	Not calculated, no previous year.
2015	1	1.08	0
2017	2	2.15	100
2018	4	4.30%	100
2019	4	4.30	0
2020	1	1.08	-75
2021	7	7.53	600
2022	11	11.83	57.14
2023	20	21.51	81.82%
2024	42	45.16	110
Total	**93**	**100**	**Not applicable**

Source: Own elaboration, 2025.

The annual growth rate (AGR) was calculated using the classic percentage change formula, in which *ArtCurrent* denotes the number of articles published in the current year, and *ArtPrevious* represents the number of publications in the immediately preceding year. The result is multiplied by 100 to express the variation as a percentage, as shown in Equation 1.

Equation 1. Calculate annual growth rate

$$TC = \left(\frac{ArtActual - ArtAnterior}{ArtAnterior}\right) \text{x } 100$$

Source: Own elaboration, 2025.

The above equation enables the measurement of the percentage change between two consecutive years, thereby reflecting the dynamics of expansion (when the value is positive) or contraction (when it is negative) of scientific production. For example, Equation 2 illustrates the calculation of the AGR between 2017 and 2018, during which the number of articles published increased from 2 to 4. Applying the formula:

Equation 2. Example for calculating annual growth rate

$$TC = (\frac{4-2}{2}) \text{ x } 100 = 100\%$$

Source: Own elaboration, 2025.

As shown in Table 4, annual growth rates exhibit an uneven trajectory, with periods of accelerated growth followed by phases of stagnation or decline. This variability suggests that, during the first half of the analysed period, the field had not yet achieved sustained thematic or methodological consolidation. From 2021 onwards, however, production increased considerably, with growth rates exceeding 50% in some years, reflecting not only an expansion in the volume of publications but also a progressive strengthening of academic interest in the intersection of visual culture and artificial intelligence. It should be noted, however, that this growth has not been linear, and fluctuations persist in certain years.

3.2. Leading Authors and Countries in the Field of Study

Recognising the most productive authors and the regions with the highest research activity is essential for mapping the structure of the field, identifying academic leadership, and understanding the geographical distribution of knowledge at the intersection of visual culture and artificial intelligence. Table 5 lists the researchers with the highest publication output, highlighting, in particular, the case of Offert and Bell (2021), whose work, in collaboration with other authors, has accumulated a total of twenty-four citations. This figure indicates a notable influence and strong resonance of their contributions within the current academic debate. To facilitate traceability in the analysis, each article has been assigned an alphanumeric code (e.g., A1), which is maintained consistently throughout the subsequent tables.

Table 5. Most productive authors

Code	Author	Articles	Country	References	Total Citations
A1 A2	Caldeira, W. Simões, J.M.	2	China	(Gomes-Caldeira & Simões, 2024; Simões, 2024)	1
A3	Laba, N.	2	Australia	(Laba, 2024a, 2024b)	4
A4	Offert, F.	2	Germany	(Impett & Offert, 2022; Offert & Bell, 2021)	24
A5	Wasielewski, A.	2	Sweden	(Wasielewski, 2023, 2024)	1

Source: Own elaboration, 2025.

An additional element of interest is the geographical diversity reflected in Table 5. Researchers from China, Australia, Germany, and Sweden are among the most productive, confirming the international reach and transnational character that this emerging field is beginning to acquire. However, citation analysis indicates that the most significant impact remains concentrated in contexts with established trajectories in visual studies and digital humanities, such as Germany, highlighting the role of local academic infrastructure. Table 6 summarises the conceptual and critical contributions currently being addressed within the field.

Table 6. Contribution of the most productive authors

Code	References	Contribution
A1 and A2	(Gomes-Caldeira & Simões, 2024; Simões, 2024)	They propose a dual approach to generative AI as a creative force and a risk to authenticity. They introduce the concept of steady dissemination as a disruption in visual production. They highlight the importance of human intervention and reflect on the ethical and aesthetic challenges in a context of rapid change.
A3	(Laba, 2024a, 2024b)	They explore the use of generative models such as Midjourney in the creation of images about wars and visual aesthetics, analysing their role as a socio-technical practice that reflects cultural narratives and limits originality. They highlight how prompting conditions representation, generating homogeneous results that reproduce pre-existing aesthetics and reduce the complexity of the phenomena represented.
A4	(Impett & Offert, 2022; Offert & Bell, 2021)	They critically analyse computer vision from a transdisciplinary perspective, proposing that bias in computer vision systems stems not only from data, but also from their perceptual topology. They argue that large-scale vision models not only reproduce exclusionary visual canons, but also shape new ways of seeing, positioning the history of digital art as a key avenue for unmasking the visual ideology of contemporary AI.
A5	(Wasielewski, 2023, 2024)	Both works examine the ontological status of the digital image in the context of artificial intelligence, addressing how low-resolution formats are functional for deep learning and how AI-generated images challenge traditional notions of the photographic and the authentic. They propose a redefinition of the value, authenticity, and category of "photography" within the framework of computational visual culture.

Source: Own elaboration, 2025.

Thus, the research does not focus solely on quantification but also addresses qualitative aspects. There is a shared interest in the ethical, aesthetic, and epistemological concerns arising from engagement with generative technologies, alongside a clear emphasis on transdisciplinary approaches that bring together visual studies, critical theory, and computational science. Authors such as Gomes-Caldeira and Simões (2024) propose a dual reading in which artificial intelligence is understood as a creative instrument that interrogates the concept of authenticity, introducing concepts such as “steady dissemination” to analyse the disruption of traditional visual flows. Conversely, Laba (2024a) investigates the aesthetic homogenisation resulting from “prompting”, demonstrating how AI reproduces simplistic narrative devices even in adverse scenarios, such as war conflicts.

The work of Offert and Bell (2021) and Wasielewski (2023) further expands the discussion to the foundational principles of computer vision, problematising not only data-driven biases but also the perceptual structures of AI models. This introduces the notion of *perceptual bias*, suggesting that digital art has the potential to disrupt and critique the visual ideologies embedded in AI systems. Collectively, these contributions indicate that the field is growing not only in volume but also in theoretical sophistication, establishing a critical agenda that challenges traditional categories of authorship, authenticity, and visuality.

Complementing the data presented earlier, Figure 4 illustrates the geographical distribution of scientific production, revealing a highly fragmented landscape with distinct centres of concentration. The United States, the United Kingdom, and Australia emerge as the countries with the highest number of publications and citations, ranking first in terms of both production and academic impact. A notable feature of the United Kingdom is that, despite producing only six publications, it accumulates more than 450 citations, suggesting the presence of highly influential works within the field.

Figure 4. Map of most productive authors and countries

Source: Own elaboration, 2025.

Similarly, Table 7 presents a ranking of the ten most productive countries. In absolute terms, the United States leads with 20 articles, followed by the United Kingdom and Australia, each with six publications. However, when citations are taken into account, the United Kingdom stands out with 456 citations, representing over 56% of the total and indicating a strong concentration of academic impact. Other countries, such as Germany, France, and Norway, despite a lower volume of publications, also demonstrate a notable average impact, reflecting the presence of highly influential works even in contexts of comparatively lower productivity.

Table 7. Most productive countries

No.	Country	Articles	%	Citations	%	Average impact (Avg)
1	United States	20	0.3571	99	0.1231	4.95
2	United Kingdom	6	0.1071	456	0.5672	76
3	Australia	6	0.1071	94	0.1169	15.67
4	Germany	5	0.0893	43	0.0535	8.6
5	Spain	4	0.0714	5	0.0062	1.25
6	Canada	3	0.0536	6	0.0075	2
7	France	3	0.0536	66	0.0821	22
8	China	3	0.0536	4	0.005	1.33
9	Italy	3	0.0536	3	0.0037	1
10	Norway	3	0.0536	28	0.0348	9.33

Source: Own elaboration, 2025.

The analysis of average impact (Avg) provides a more nuanced perspective on scientific influence. France leads this indicator with an average of 22 citations per article, followed by the United Kingdom (76) and Australia (15.67), reflecting more specialised production that is highly cited in specific contexts. Conversely, countries such as Italy, China, and Spain, although present in the ranking by publication volume, exhibit a considerably lower average impact, highlighting challenges in the visibility and influence of their contributions.

3.3. Most Influential Publication Sources

This subsection examines the main publication sources to understand how and where specialised knowledge is produced, validated, and disseminated. In this context, Table 8 presents the most active journals, taking into account the number of articles, the total number of citations received, and the average impact per publication.

Table 8. Most productive scientific journals

No.	Journals	Publishers	Articles	Total Citations	Average Impact (Avg)
1	AI and Society	Springer Science and Business Media Deutschland GmbH	5	49	9.8
2	Archives of Design Research	Korean Society of Design Science	3	4	1.33
3	Eikon Imago	Complutense University of Madrid	3	1	0.33
4	Convergence	SAGE Publications Ltd	2	22	11
5	Studies in Aesthetics	Mimesis International	2	0	0
6	Visual Resources	Routledge	2	3	1.5
7	International Journal of Emerging Technologies in Learning	International Association of Online Engineering	2	29	14.5
8	Frontiers in Communication	Frontiers Media SA	2	2	1
9	Visual Communication	SAGE Publications Ltd	2	14	7
10	Political Communication	Il Mulino Publishing House	1	2	2

Source: Own elaboration, 2025.

The scientific journal *AI and Society*, with a total of five articles and an average citation rate of 9.8, can be regarded as a benchmark in the field of convergence between visual culture and artificial intelligence. It is closely followed by the *International Journal of Emerging Technologies in Learning* and *Convergence*, which, despite publishing fewer articles, achieve even higher average citation indices (14.5 and 11, respectively), highlighting their capacity to bring relevant research into contemporary academic discourse. This pattern demonstrates that scientific prestige and influence are not determined solely by productivity, but also by the ability to transfer impact to specific theoretical and methodological agendas through substantive, well-articulated research.

Conversely, journals such as *Eikon Imago* and *Studi di Estetica*, while maintaining stable output, do not attain comparable visibility, raising questions about the alignment of their editorial strategies with current dynamics of academic impact. Similarly, publications such as *Visual Communication* and *Frontiers in Communication* offer moderate output, placing them in an intermediate range in terms of production and impact, which, although significant, does not rival the influence of field-leading journals. These differences underscore the need to critically assess editorial criteria, internationalise contributions, and strengthen the capacity of these platforms to facilitate debates that resonate beyond their immediate disciplinary spheres.

In the same vein, Table 9 presents the most productive scientific publishers. SAGE Publications Ltd, ranked first, accounts for a total of eleven works, representing 23% of the corpus analysed,

thereby emerging as the most influential publishing platform in the field. Following SAGE are Routledge, Elsevier Ltd, and Springer Science and Business Media Deutschland GmbH, each of which has produced a notable number of scientific articles in the social sciences and digital humanities. The Complutense University of Madrid is the only university to appear in the top ten, highlighting the active role of this institution within the field of study.

Table 9. Most prolific scientific publishers

No.	Publisher	Number of articles	%
1	SAGE Publications Ltd	11	0.23
2	Routledge	7	0.14
3	Elsevier Ltd	6	0.12
4	Springer Science and Business Media Germany GmbH	6	0.12
5	Complutense University of Madrid	4	0.0851
6	Taylor and Francis Ltd.	3	0.0638
7	Korean Society of Design Science	3	0.0638
8	SAGE Publications Inc.	3	0.0638
9	International Association of Online Engineering	2	0.0426
10	Frontiers Media SA	2	0.0426

Source: Own elaboration, 2025.

The publishing landscape revealed by these data indicates a strong concentration in high-impact Anglo-Saxon publishers, a trend that may be reinforced by the high visibility of their journals and their English-language publishing policies. In this context, specialised publishers, such as the Korean Society of Design Science and the International Association of Online Engineering, also demonstrate growing interest from regional scientific communities. This editorial representation reinforces the notion that the field is being structured around established platforms that facilitate not only the dissemination but also the academic legitimisation of research spanning the visual, technological, and cultural spheres.

3.4. Key Concepts and Recurring Terms

Exploring the most frequently used keywords provides insight into the dominant concepts, methodological approaches, and conceptual frameworks that shape academic discourse on visual culture and artificial intelligence. In this regard, Figures 5, 6, and 7 offer a visual representation of the lexical evolution of the field between 2014 and 2024, enabling the identification of both thematic continuities and conceptual shifts over time. As illustrated in Figure 5, the period 2014–2019 witnessed a gradual transition from educational and cultural approaches to more complex technological concerns.

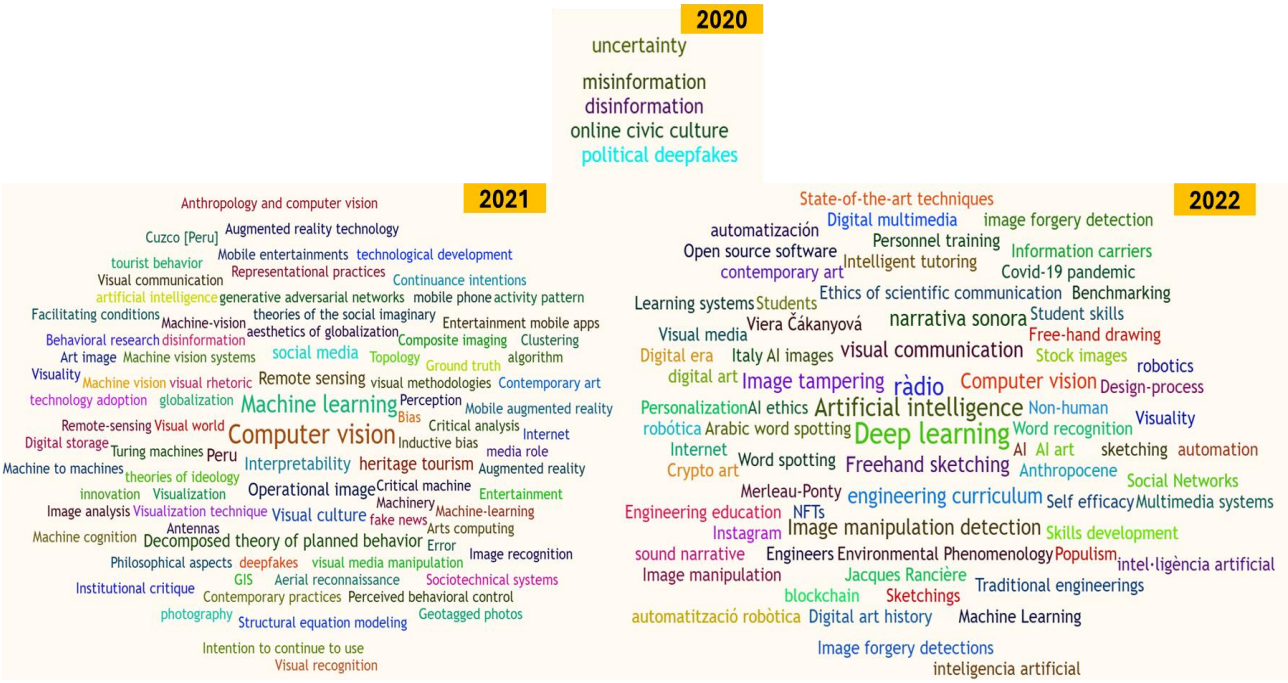
Figure 5. Keyword cloud between 2014 and 2019

Source: Own elaboration, 2025.

In the early years (2014–2015), the discourse revolves around concepts associated with education (e.g., "transformative learning", "students' perspectives"), the visual from a cultural perspective (e.g., "visual culture", "intertextuality"), and critical reflection (e.g., "reflective journals", "Pier Paolo Pasolini"). By 2017, "artificial intelligence" emerges prominently alongside terms related to "education", "feedback", and "visual feedback", marking the beginning of the intersection between educational technology and user experience. In 2018 and 2019, the technification of discourse becomes more pronounced, with expressions such as "advanced driver assistance systems", "eco-driving", "user acceptance", and "computer vision", indicating a growing interest in AI applications within mobility, simulation, and automation environments. During this period, the concept of "visual communication" is also established, closely linked to the human–machine interface and the design of interactive experiences.

For 2020–2022, Figure 6 illustrates a marked intensification of discourse around ethical, social, and technical issues. In 2020, terms such as "misinformation", "disinformation", "online civic culture", and "political deepfakes" emerge, reflecting heightened concern regarding the socio-political impact of automated visual technologies. In subsequent years, "machine learning", "computer vision", and "deep learning" continue to occupy a central role, now integrated with new concerns including tourist behaviour, "visual media manipulation", and the "ethics of scientific communication". Concepts such as "AI ethics", "image tampering", "blockchain", "crypto art", and "artificial intelligence" also appear, signalling an expansion into contexts of information control, visual traceability, and digital artistic creation. Collectively, these trends indicate that the academic vocabulary not only becomes denser and more specialised but also incorporates critical, philosophical, and geopolitical perspectives, enriching the field.

Figure 6. Keyword cloud between 2020 and 2022



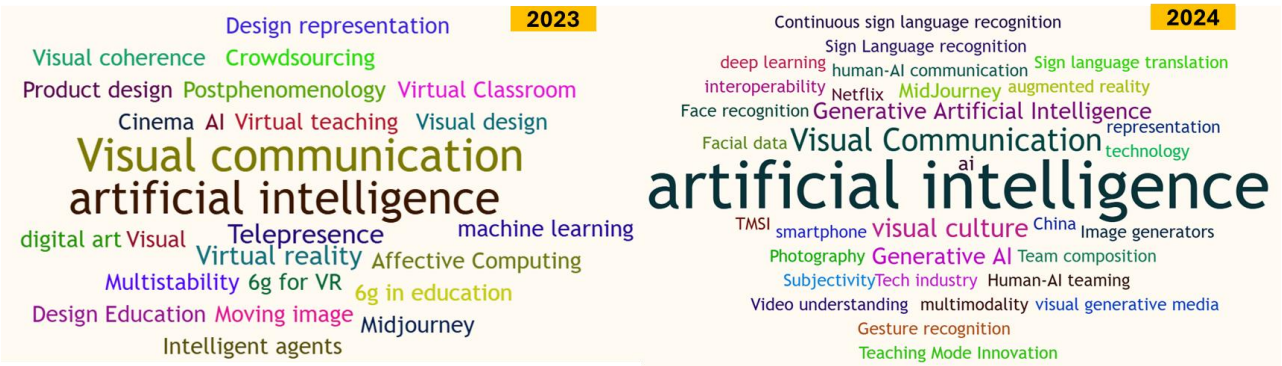
Source: Own elaboration, 2025.

In line with trends observed in previous years, Figure 7 shows that during 2023 and 2024, a vocabulary consolidates that more explicitly articulates the connection between artificial intelligence, visual communication, and cultural production mediated by generative technologies. Terms such as "artificial intelligence", "visual communication", "virtual reality", and "telepresence" remain central, but are now accompanied by emerging notions such as "virtual teaching", "affective computing", "design education", and "*MidJourney*", reflecting the

incorporation of creative and expressive tools into educational and artistic environments. In 2024, this trend intensifies with the appearance of "generative AI", "image generators", "gesture recognition", and "human–AI teaming", signalling a shift towards collaborative interaction models and the automated generation of visual content.

Simultaneously, terms such as "sign language recognition", "video understanding", and "teaching mode innovation" highlight a focus on accessibility, personalised learning, and multimodal communication. Taken together, this phase represents a turning point in which artificial intelligence ceases to function merely as a tool for analysis or automation and emerges as an active agent in the creation, mediation, and transformation of visual culture.

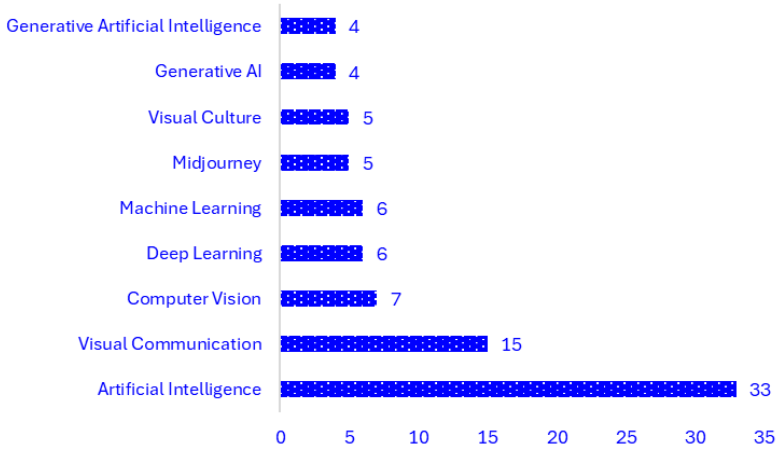
Figure 7. Keyword cloud between 2023 and 2024



Source: Own elaboration, 2025.

To complement the foregoing analysis, Figure 8 maps the ten most recurrent keywords over the period 2014–2024, highlighting the conceptual axes with the greatest prominence in the academic discourse on visual culture and artificial intelligence. "Artificial intelligence" emerges as the most frequent term (33 mentions), consolidating its position as the dominant thematic core that links technical, methodological, and theoretical developments in the field. It is followed by "visual communication" (15 mentions), underscoring its cross-cutting role in symbolic mediation, the human–machine interface, and the generation of meaning through automated visual technologies.

Figure 8. Frequency of keywords



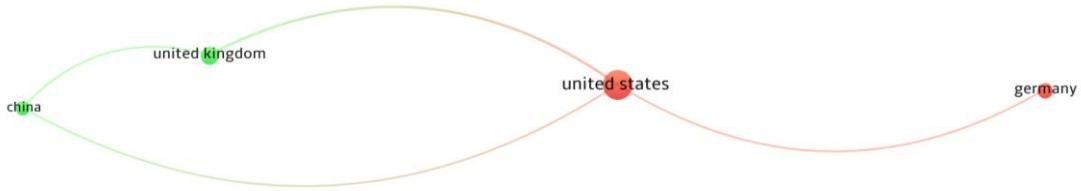
Source: Own elaboration, 2025.

Other frequently occurring terms, such as "computer vision" (7 mentions), "deep learning" (6), and "machine learning" (6), highlight the prominence of algorithmic architectures applied to image analysis and interpretation. Meanwhile, "MidJourney" and "visual culture" (both with 5 mentions) signal a shift towards creative, expressive, and critical concerns, particularly in the context of generative intelligences. Finally, the presence of generative AI and "generative artificial intelligence" (4 mentions each) indicates an emerging trend in the literature towards systems capable of autonomously creating visual content, raising new questions regarding authorship, ethics, and aesthetics in hybrid environments where tools such as ChatGPT, DALL·E, or *MidJourney* already function as creative agents. Consequently, the expansion of these technologies in cultural and academic contexts carries implications ranging from symbolic production to the integrity of intellectual work, as recently discussed in relation to their use in higher education (Cáceres et al., 2025).

3.5. Network of Collaboration Between Countries and Thematic Strategies

This section examines international cooperation between countries, with the aim of analysing academic alliances and understanding the collective dynamics that drive knowledge development in this field. Figure 9 presents an international collaboration network in which the United States functions as a central node, establishing significant links with the United Kingdom, Germany, and China. The network illustrates a transnational articulation of knowledge, predominantly led by the countries with the highest scientific output. These findings reveal a geopolitics of knowledge in which the global North continues to dominate, while the global South remains underrepresented in this field. The implications underscore the need to promote inclusion and diversity in discussions of AI and visual culture, both geographically and epistemologically.

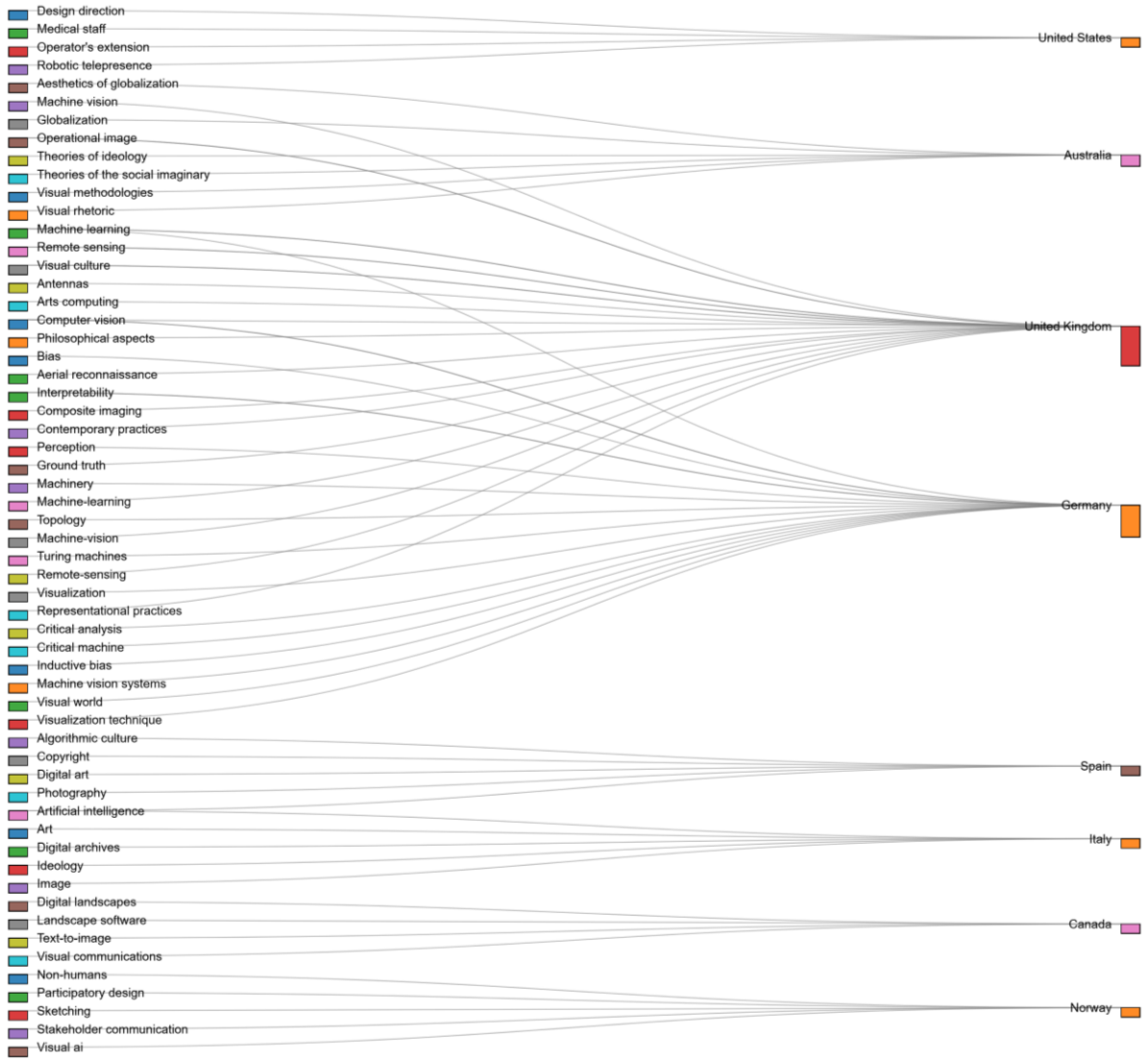
Figure 9. Network of collaboration between countries



Source: Own elaboration, 2025.

As the analysis progresses, Figure 10 illustrates collaborations along an axis linking each country with the scientific themes that guide its research. This representation not only highlights academic networks between countries but also reveals the strategic priorities each nation has established in relation to visual culture and artificial intelligence. The United Kingdom emerges as a particularly significant node due to the breadth and thematic complexity of its contributions, which encompass topics such as "machine vision", "bias", "visual rhetoric", "critical analysis", and "representational practices", reflecting the distinctions between critical, multidisciplinary, and reflective approaches. For instance, the focus on "algorithmic bias" and "visual rhetoric" indicates concern with how artificial intelligence represents, interprets, and shapes cultural subjectivity through structures of power, language, and aesthetics. Moreover, the inclusion of themes such as "visual methodologies" and "theories of ideology" signals a critical orientation aligned with digital humanities and visual cultural studies.

Figure 10. Topics prioritised by countries most productive in citations



Source: Own elaboration, 2025.

Germany, by contrast, demonstrates a balance between technical and philosophical approaches. The emergence of terms such as "interpretability" and "composite imaging" indicates an interest not only in the mechanisms of representation in artificial vision systems but also in their capacity to be understood, audited, and explained. These topics intersect with ongoing debates on the explainability of AI models, particularly in contexts where automated visual decisions have ethical implications, such as surveillance, medicine, or justice.

Although the United States exhibits less thematic dispersion in Figure 10, its research focuses on topics such as "robotic telepresence" and "design direction", reflecting an orientation towards practical and technological applications of visual AI. This focus may indicate a strong connection with the technology industry, where human–machine interaction, visual interfaces, and user-centred design are key areas of innovation. Within this context, artificial intelligence tools can facilitate a more coherent integration of aesthetic styles and the reinvention of traditional concepts in contemporary visual directions (Liu & Liu, 2024). The emphasis on the "aesthetics of globalisation" also provides an insightful perspective on how AI-mediated images are employed in transnational, corporate, or media contexts, reproducing globalised aesthetics with attendant symbolic and cultural implications.

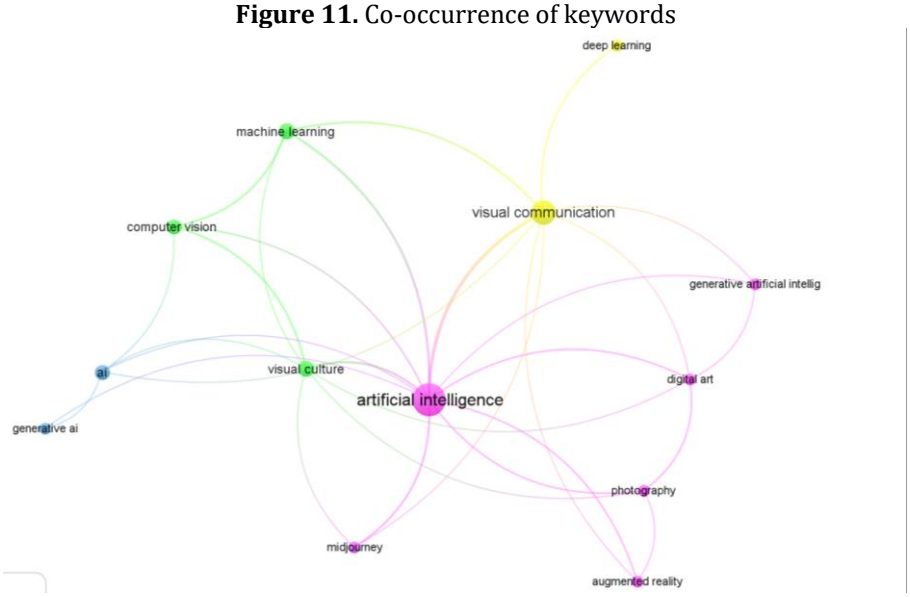
In the case of Italy, the association with topics such as "art", "photography", and "digital archives" reflects an exploration of AI as a tool for artistic experimentation, heritage conservation, and historical reinterpretation of images (Ajuriaguerra Escudero & Di Guglielmo, 2025). Norway, by contrast, is linked to "stakeholder communication" and "non-human actors", introducing a critical perspective on the relationship between AI, non-human agency, and communication ecologies. Canada is associated with "participatory design" and "digital landscapes", indicating an interest in collaborative processes and spatial representation through visual technologies. These findings suggest that international collaboration networks are shaped not only by geostrategic or institutional factors but also by epistemological and cultural affinities. The thematic discrepancies observed are therefore meaningful, reflecting national academic trajectories, funding priorities, and imaginaries concerning the societal roles of artificial intelligence. Consequently, this thematic mapping serves not only to highlight prominent lines of research but also to reveal silences or underexplored areas. For instance, there is limited attention to issues in the global South, such as the representation of marginalised communities, the use of AI among indigenous peoples, or the visual challenges arising in regions with restricted technological access.

3.6. Thematic Patterns and Emerging Trends

Mapping thematic clusters and emerging trends provides insight into areas of research that remain underexplored as well as those that are well established in the field of visual culture and artificial intelligence. From this perspective, keyword co-occurrence analysis is a valuable method for identifying the conceptual relationships that currently dominate scientific discourse in this area. Figure 11 presents a co-occurrence network in which the central term, artificial intelligence, is surrounded by thematic nodes distributed across three interconnected clusters. Each cluster represents an area of growing prominence, indicated by colour, and displays related topics along with the density of their interrelationships relative to the central term.

For example, the green cluster includes terms such as machine learning, computer vision, and visual culture, highlighting a concentration of technical domains that intersect with cultural perspectives in research. This cluster can be considered the traditional core of the discipline, where computational methodologies for visual processing are integrated with sociocultural analysis, reflecting a balance between technical proficiency and visual critique. In this context, the concept of "visual culture" functions as a bridge linking machine learning with cultural criticism, signalling a growing attention to the epistemological and aesthetic implications of automated vision.

Figure 11. Co-occurrence of keywords



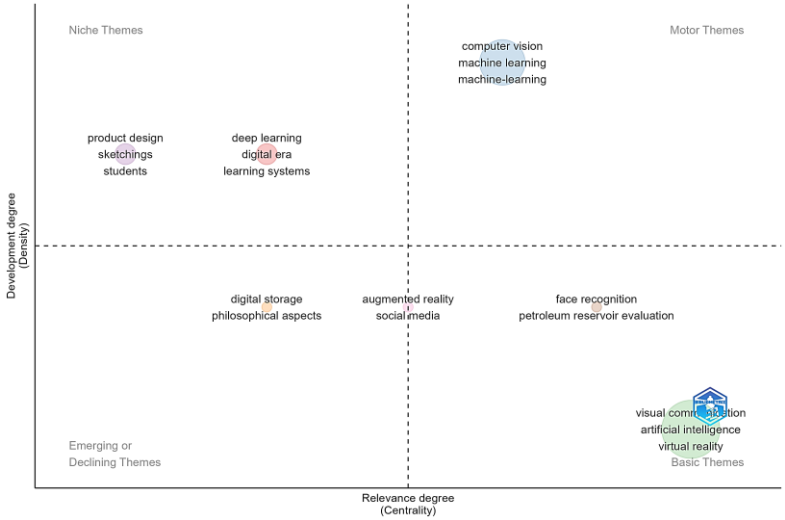
Source: Own elaboration, 2025.

The purple cluster, which emphasises creative practices, includes terms such as “digital art”, “photography”, “augmented reality”, “generative artificial intelligence”, and “*MidJourney”*. This grouping reflects an increasing focus on AI-generated visual production, encompassing phenomena such as synthetic images, digital landscapes, and algorithmic aesthetics. The inclusion of “*MidJourney”*, a specific platform for AI image creation, underscores the influence of commercial tools on shaping the academic agenda. Similarly, the intersection of “photography” and “generative AI” points to contemporary debates surrounding authorship, visual “truthfulness”, and creative manipulation. The yellow cluster, in turn, centres on “visual communication” and “deep learning”, linking accumulated conceptual frameworks with contemporary practices of visuality.

This connection illustrates how emerging research lines employ deep neural networks to generate optimised, persuasive, and sometimes personalised visual messages, thereby raising new ethical and aesthetic challenges. By contrast, the light blue cluster, despite being the most diffuse, represents a general discourse on AI and generative AI, indicating that broader discussions of artificial intelligence continue to serve as a foundational analytical category. Its overlap with more specialised clusters can be interpreted as a progression from general approaches toward increasingly focused and specialised perspectives.

To complement the findings in Figure 12, a structural thematic map has been constructed, organising the topics identified in the study corpus along two dimensions: the degree of internal development of each topic (density) and its relevance within the field (centrality). This representation allows the placement of topics within four quadrants, reflecting different states of maturity and conceptual influence. In the upper right quadrant, corresponding to the driving themes, are “computer vision”, “machine learning”, and “machine learning”, which are highly developed concepts with strong connectivity to other themes. Their position in this quadrant reaffirms their central role as drivers of innovation in the study of visual culture mediated by artificial intelligence, particularly in applications involving automated image analysis and algorithm-assisted visual decision-making.

Figure 12. Structural thematic map of the field of study



Source: Own elaboration, 2025.

The lower right quadrant contains basic topics such as “artificial intelligence”, “visual “communication”, and “virtual reality”. Although their density is lower, their high centrality indicates that they are fundamental pillars of the field, functioning as general conceptual frameworks or theoretical entry points. These topics are widely used and recognised, and their cross-cutting nature allows them to integrate different lines of research. In the upper left quadrant, niche topics such as “deep learning”, “product design”, “sketching”, and “learning systems” exhibit high internal development but low centrality, demonstrating that they are well-

established within specific communities, yet remain only loosely connected to the main core of the field.

In the lower left quadrant, which represents emerging or declining topics, are “digital storage”, “philosophical aspects”, “augmented reality”, and “social media”. Their low density and centrality suggest that, although currently underrepresented in the literature, they could offer opportunities for critical and creative expansion of the field. In particular, the inclusion of “philosophical aspects” highlights the potential to explore ethical, epistemological, and ontological dimensions that remain underdeveloped, while “augmented reality” and “social media” may gain relevance in educational, communicative, or artistic contexts where interaction with digital images is increasingly prominent.

3.7. Most Cited Works and Influence in the Field

Identifying the most cited publications in a field allows us to understand not only which works have had the greatest academic impact, but also which approaches, topics, and perspectives have played a decisive role in structuring scientific debate. Table 10 presents the ten most cited works within the analysed corpus, ranked by absolute number of citations and their relative proportion (%). This selection highlights the diversity of approaches to visual culture in the age of artificial intelligence, as well as the tensions between technical, critical, ethical, and sociocultural perspectives. Notably, the work of Vaccari and Chadwick (2020) stands out with 414 citations (0.5384%), examining the impact of political deepfakes on public perceptions of truthfulness, disinformation, and trust. This publication represents a milestone by demonstrating that synthetic image generation technologies are not merely a technical issue but pose a genuine challenge to the democratic fabric.

Table 10. Ranking of the most cited scientific articles

No.	Reference	Title	Year	Citations	%
1	(Vaccari & Chadwick, 2020)	Deepfakes and Disinformation: Exploring the Impact of Synthetic Political Video on Deception, Uncertainty, and Trust in News	2020	414	0.5384
2	(Hung et al., 2021)	A new reality: Exploring continuance intention to use mobile augmented reality for entertainment purposes	2021	73	0.0949
3	(MacKenzie & Munster, 2019)	Platform Seeing: Image Ensembles and Their Invisualities	2019	69	0.0897
4	(Payntar et al., 2021)	Learning patterns of tourist movement and photography from geotagged photos at archaeological heritage sites in Cuzco, Peru	2021	60	0.078
5	(Loup-Escande et al., 2017)	Contributions of mixed reality in a calligraphy learning task: Effects of supplementary visual feedback and expertise on cognitive load, user experience and gestural performance	2017	32	0.0416
6	(Vaezipour et al., 2018)	A simulator evaluation of in-vehicle human machine interfaces for eco-safe driving	2018	29	0.0377
7	(Langguth et al., 2021)	Don't Trust Your Eyes: Image Manipulation in the Age of DeepFakes	2021	28	0.0364
8	(Offert & Bell, 2021)	Perceptual bias and technical metapictures: critical machine vision as a humanities challenge	2021	23	0.0299
9	(Sharrab et al., 2023)	Toward Smart and Immersive Classroom based on AI, VR, and 6G	2023	21	0.0273
10	(Romele, 2022)	Images of Artificial Intelligence: a Blind Spot in AI Ethics	2022	20	0.026

Source: Own elaboration, 2025.

Secondly, Hung et al. (2021) examine the intention to use mobile augmented reality in entertainment contexts. With 73 citations (0.0949%), their study occupies the intersection of user experience, immersive technologies, and continuity of use. Although the approach is predominantly applied and focused on consumer behaviour, its inclusion in this list indicates that AI-mediated visual culture is also shaped by commercial and entertainment dynamics, with potential cultural implications. MacKenzie and Munster (2019), with 69 citations (0.0897%), introduce the concept of "image ensembles" and their "invisualities", addressing the visual opacity inherent in automated vision systems. Their work has helped establish a critical perspective on the perceptual mechanisms of algorithmic systems, interrogating what machines "see" and what they omit. This contribution is particularly significant as it raises epistemological questions regarding the nature of visuality in contexts mediated by artificial intelligence.

In fourth place, Payntar et al. (2021) examine tourist movement patterns using geolocated photographs, with 60 citations (0.078%). While the study appears at first to be applied to tourism, its significance lies in demonstrating how the mass collection of images and their processing by AI transform the relationship between space, imagery, and human behaviour. It exemplifies both the potential of AI to generate dynamic representations of territory and the surveillance and control risks inherent in these technologies.

The works of Loup-Escande et al. (2017), Vaeziopour et al. (2018), and Langguth et al. (2021) provide complementary perspectives on AI-mediated visual culture, ranging from psychocognitive approaches to sociotechnical concerns. The first two explore relatively novel topics for visual culture research, including the sensory impact of mixed reality and the aesthetics of visualisations as infrastructure, while the third revisits an established cultural problem in the context of deepfakes. In turn, Offert and Bell (2021), drawing on digital humanities, apply a critical lens to reveal perceptual biases and technical meta-structures in computer vision, framing philosophical questions about the algorithmic gaze. Sharrab et al. (2023) extend visual AI into the educational sphere, proposing smart immersive classrooms as new spaces for visual interaction, and Romèle (2022) concludes the list with a philosophical critique of AI-generated visual imagery, highlighting ethical and symbolic gaps in AI representation. Taken together, these studies demonstrate that visual culture in the age of artificial intelligence encompasses cognitive, technical, educational, critical, and ethical dimensions.

4. Limitations

The study has provided an overview of the field of visual culture and artificial intelligence. However, several limitations should be acknowledged. First, only the Scopus database was analysed for the retrieval and evaluation of scientific output. Although Scopus is recognised for its multidisciplinary scope and editorial quality, the exclusion of other databases, such as Web of Science, Google Scholar, or Dimensions, may have limited the generalisability of the bibliographic corpus, particularly with regard to emerging literature, unindexed open access sources, and contributions published in languages other than English and Spanish. Moreover, the field under study is highly dynamic, so the results should be interpreted as a snapshot of its evolution, which is likely to change rapidly due to the accelerated pace of technological and academic development. Methodological factors, including the search criteria employed, the chosen time period, and the exclusion of grey literature, also influence the structure of the bibliometric map presented. Despite the insights gained through co-occurrence and thematic evolution analyses, future research could benefit from a multimodal and multi-platform approach that integrates different repositories, complementary qualitative methods, and regional perspectives, thereby enriching the understanding of this rapidly evolving field.

5. Conclusions

This research focused on conducting a bibliometric analysis to examine the productive behaviour of visual culture in the era of artificial intelligence. The analysis reveals a shift from fragmented technical approaches towards increasingly critical consolidations, characterised by a growing engagement with concepts such as computer vision, algorithmic aesthetics, and perceptual performativity. The maturation of the field has accelerated markedly since 2021, as reflected in the volume of bibliographic production, confirming its consolidation as a transdisciplinary area of research. Simultaneously, there has been a notable refinement of critical discourse, which increasingly interrogates traditional categories such as authorship, visual authenticity, and representation itself.

However, the distribution of knowledge production exhibits significant imbalances. Countries such as the United Kingdom, Germany, and the United States dominate both publications and citations, giving rise to a thematic agenda largely shaped by critical perspectives from the Global North. Representations of the Global South, as well as non-Western approaches to AI-mediated visual culture and peripheral applications, remain underexplored. The international cooperation network further indicates that epistemic priorities are influenced by uneven geopolitical dynamics and editorial structures. Future research should consider comparative analyses that incorporate qualitative methods and decolonial approaches. It is also necessary to explore the potential of visual AI in educational contexts, rural areas, subaltern communities, and emerging artistic practices.

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