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Mapping the Evolution of Interactive Media Arts: A Bibliometric Analysis of Paradigm Shifts and Trends in Technological Convergence (2004–2024)

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ABSTRACT

This study presents a bibliometric analysis of the evolution of interactive media arts, with the goal of providing academics with a comprehensive reference for understanding research trends over the last two decades. The primary data source was literature indexed in Web of Science (WOS) and Scopus, with bibliometric visualization tools used to track scholarly advances. Scientific knowledge maps were created using software tools such as VOSviewer, Citespace, and Bibliometrix, with an emphasis on publication timelines, burst detection, cooperation networks, and keyword grouping. The study identified four evolutionary stages in the creation of interactive media arts: technical experimentation, tool popularization, social penetration, and ethical reflection. These stages demonstrate not only the field's technological advancements, but also the paradigm shifts that result from the incorporation of artificial intelligence into co-creative art activities. The findings demonstrate how interactive media arts have evolved from initial technical research to broader social and cultural applications, ending in increased focus on ethical considerations in AI-driven creation. The study underlines the role of multidisciplinary collaboration in generating academic inquiry and practical innovation. By mapping these evolutionary paths, the study adds to our understanding of the dynamics of technological convergence, providing valuable insights for artists, technologists, and politicians. It also lays the groundwork for forecasting future trends and tackling the issues brought by rapid changes in media technologies and creative processes.

Keywords: Interactive Media Art, Bibliometric Analysis, Research Trends.

INTRODUCTION

The growing importance of artificial intelligence and machine learning technologies, as demonstrated by systems such as ChatGPT, Deepseek, and Yushu Robot, reflects broader socioeconomic and technical changes that are changing creativity. In this setting, interactive media art has arisen as an important genre that combines science, technology, and artistic expression. It represents integrative methods that prioritize innovation while reflecting the unique characteristics of current society.

The roots of interactive media art continue to be debated, however its evolution may be traced back to early twentieth-century experimentation. Marcel Duchamp's 1913 work Bicycle Wheel pushed the bounds of creative expression by necessitating audience participation. In the decades that followed, Yaakov Agam's relief works (1953) required participatory interpretation, while Nicholas Schöffer's 1956 cybernetic sculpture included environmental sensors, signaling a watershed moment in the integration of technology and artistic practice.

With developments in electronic technology, interactive media art grew rapidly. The 1968 Cybernetic Serendipity exhibition at London's Institute of Contemporary Arts featured groundbreaking examples of cybernetic and computer-based art. Around the same time, Edward Ihnatowicz developed The Senster, an early computer-controlled interactive sculpture. This huge, lobster-like form responded to sound and movement, emphasizing the role of performance and audience involvement in the genre's development.

Computers revolutionized the creation of time-based interactive artworks and allowed for systematic investigation of generative processes. Stephen Willats, Stroud Cornock, and Ernest Edmonds stressed the importance of organizing concepts and frameworks in computer-generated art, pushing for methodical techniques that incorporated both aesthetic and technological concerns. These innovations created an intellectual framework for further artistic exploration and scholarship.

Against this historical backdrop, the current study investigates the evolution of interactive media arts using bibliometric analysis. It aims to map the field's developmental stages, detect paradigm shifts, and follow the increasing influence of artificial intelligence on artistic co-creation by reviewing research outputs indexed in key academic databases. In doing so, the article emphasizes the importance of technological convergence in influencing the trajectory of interactive media art and offers suggestions for future interdisciplinary practice.

LITERATURE REVIEW

Bibliometric Studies in Art and Cultural Research

Bibliometric analysis offers a systematic approach to assessing how knowledge in art and cultural study evolves. Pritchard (1969) established the notion of statistical bibliography, which laid the framework for evaluating knowledge generation using publication and citation data. This technique has since spread broadly across fields, including the arts. Its strength comes in providing a quantitative and historical perspective on academic advancement. By tracing patterns across time, bibliometrics enables scholars to evaluate how creative research evolves and changes.

One of the most significant contributions of bibliometrics is the use of citation mapping to investigate intellectual structures. Noyons, Moed, and Luwel (1999) demonstrated how mapping and citation analysis might reveal relationships and limits across research communities. This strategy allows you to detect both continuity and change in scholarly activities. It illustrates how ideas spread across disciplines and gain impact in art and culture study. These findings help identify critical intellectual turning points. Citation mapping thus serves as an important foundation for understanding research trajectories.

Van Raan (2004) also made a significant contribution by identifying "sleeping beauties" in science. This concept applies to research that initially receives little attention but eventually gains significant traction. Within art and culture, early experiments in computer-based creativity followed this pattern. They were formerly disregarded but have since come to be recognized as critical to the development of interactive media. Bibliometrics can assist capture these long-term processes of effect. Such recognition changes the way past labor is valued in the present.

Bordons, Zulueta, Romero, and Barrigón (1999) stressed the value of interdisciplinarity in bibliometric investigations. Their research demonstrates how collaboration across disciplines promotes creativity and reshapes research priorities. This is especially crucial in the cultural and artistic areas, where technology and creativity frequently interact. Interdisciplinary patterns in bibliometric data demonstrate how artistic approaches incorporate scientific methods. This underscores the notion that cultural research benefits from cross-pollination. It also emphasizes the relevance of bibliometrics in measuring collaborative impact.

Bibliometric research emphasizes the importance of visualizing scientific communication. Card (2009) emphasized that information visualization makes complex data patterns more understandable. When used to the arts, visualization not only facilitates bibliometric mapping but also aligns with artistic methods of conveying information. Visualization thus serves as both a research tool and a creative process. This dual purpose makes it especially relevant to interactive media art studies. It combines methodological precision and imaginative interpretation.

Studies on cultural institutions illustrate the importance of bibliometrics in assessing digital transitions. Giannini and Bowen (2022) investigated how museums adapt to digital culture, emphasizing bibliometric tracking as a means of assessing these changes. Researchers can examine how the conversation surrounding digital culture evolves by tracking publication patterns. This has a direct impact on cultural policy and education programs. It also highlights the importance of bibliometrics in current cultural study. These findings show the link between heritage, technology, and research appraisal.

Recent bibliometric research has concentrated on creative technology and their incorporation into artistic production. Tekin, Burkut, and Dal (2024) employed bibliometric software to examine cultural heritage and arts administration, demonstrating how these methodologies can be applied beyond the sciences. Their findings

demonstrate how research priorities shift as new technologies transform the arts. This mirrors major shifts in interactive media art brought about by digital and computational instruments. It also highlights the versatility of bibliometrics in capturing developing cultural activities. These findings set a standard for future research into creative invention.

Evolution of Interactive Media Art

The history of interactive media art may be traced back to early attempts that blurred the lines between artistic practice and technology. Cornock and Edmonds (1973) demonstrated how computers provided artists with not only new tools, but also totally new frameworks for production. Their idea of the artist being "amplified or superseded" by the computer emphasized interactivity as fundamental to the creative process. This idea contributed to the definition of interactive media art as more than a technical novelty, but rather a conceptual shift in artistic authorship. The emphasis was on how systems could work alongside or enhance human creativity, establishing the groundwork for the area.

The subsequent decades saw the advent of interactive installations that actively engaged audiences in meaning-making. Kabisch, Kuester, and Penny (2005) highlighted multimodal works like "Sonic Panoramas," which used sound, visual, and tactile navigation to immerse people in hybrid settings. These installations highlighted technology's expanding role in influencing artistic experience, with the audience participating in the creative process. By combining sensors and computation, the works enabled participants to co-author the result. This development signified a significant shift in the popular acceptance of interactivity as an artistic premise.

The rise of human-computer interaction research accelerated the development of interactive art. Jeon, Fiebrink, Edmonds, and Herath (2019) investigated the historical connections between rituals, magic, and HCI, contending that interactive art has always mirrored broader human endeavors to construct mediated experiences. Their findings revealed that interaction in art was never solely about technology, but also about cultural practices of involvement. By situating interactive art within this continuum, they demonstrated how media artworks both inherit and modify long-standing traditions of participation. Such perspectives connect artistic expression and sociotechnical study.

The global shift to digital culture has hastened the evolution of interactive media art. Giannini and Bowen (2022) investigated museums' adaptations to digital technology, demonstrating how cultural organizations integrated interactivity into their public engagement methods. Their findings show that interactive media art is no longer limited to experimental galleries, but also influences conventional cultural heritage practices. This expansion emphasizes the social legitimacy of interactivity as a means of communication. It also demonstrates how digital culture has evolved into a setting for artistic preservation and innovation.

Recent research shows how modern technologies have transformed interactive art into new paradigms. Guo and Wang (2022) investigated style transfer methods used on mobile devices, pushing the bounds of digital innovation. Lafontaine et al. (2023) studied interactive pieces based on pose estimation and deep learning, demonstrating that machine learning can directly influence creative expression. These examples demonstrate the progression from early computational experiments to complex systems powered by artificial intelligence. As a result, interactive media art has progressed from experimental investigation to a mature discipline that is thoroughly integrated with technical advancement. This continued evolution emphasizes the field's dynamic and interdisciplinary nature.

Human–Computer Interaction and Interface Design

Human-computer interaction (HCI) has been critical to the evolution of interactive media art because it specifies how audiences interact with technology systems. Card (2009) stressed the importance of visualization and interface design in transforming complex information into user-friendly experiences. This idea is immediately compatible with interactive artworks that rely on audience participation. Artists broaden the scope of involvement by creating systems that respond intuitively to human input. Interfaces serve both functional and creative goals, allowing users to design and collaborate on artistic products.

Scholars in HCI have investigated new types of interactivity that go beyond traditional usability. El-Shimy and Cooperstock (2016) described user-driven approaches to evaluate musical interfaces, emphasizing how design processes can prioritize innovation and exploration. This method shows how usability in art differs from usability in productivity software, as the goal is frequently aesthetic discovery rather than efficiency. Their work emphasizes the need to design systems that enable improvisation. Thus, interactive media art benefits from HCI research that emphasizes openness and user expression.

Jeon, Fiebrink, Edmonds, and Herath (2019) positioned interactive art within the larger history of HCI. They suggested that interactive artworks should be viewed not only as technological products, but also as extensions of cultural traditions such as ritual and performance. By combining HCI research with artistic experimentation, they

demonstrated how interface design evolves in response to social expectations of interaction. This viewpoint connects technology systems to human participation traditions. It also discusses how HCI helps make interactive art culturally relevant.

The relationship between human-computer interaction and digital culture has grown in importance. Giannini and Bowen (2022) looked at how museums used interactive technologies to improve visitor experiences. These findings show that interface design in cultural settings is about more than simply functioning; it's also about creating meaningful interactions. For interactive art, such findings legitimize the employment of HCI methods in public and educational settings. Interfaces help improve cultural accessibility by influencing how users perceive and explore digital content. This demonstrates the societal role of HCI in broadening engagement.

Advances in interface technology have enabled more immersive and embodied experiences in interactive art. Lafontaine et al. (2023) illustrated how pose estimation and motion tracking can be used to create creative works that explore the relationship between cognition and action. These systems emphasize the body's function as input and topic in interactive art. The ability of interfaces to capture motions and actions opens up new possibilities for artistic expression. This implies that future interface design will continue to incorporate both physical and digital dimensions. Embodiment appears as an important feature in creative engagement.

Finally, research on style transmission and adaptive design demonstrates how interfaces can become artistic collaborators. Guo and Wang (2022) used machine learning techniques on mobile interfaces, allowing systems to change visual appearance in real time. Such experiments push HCI away from interaction tools and toward co-creation. Interactive systems evolve beyond passive mediators by allowing interfaces to adjust attractively. They actively shape the artistic process using computational input. This invention represents a new phase in merging interface design and creative practice.

Technological Convergence in Interactive Arts

Technological convergence has been a defining aspect in the evolution of interactive media arts, combining tools and ideas from other fields to form unified creative practices. Bordons, Zulueta, Romero, and Barrigón (1999) stressed that interdisciplinary collaboration promotes innovation and changes the direction of research goals. In the arts, convergence has meant combining engineering, computer science, and artistic expression. Such cross-pollination enables artists to transform technological advancements into new aesthetic forms. It also opens up potential for innovation that would not occur inside a single discipline.

Bibliometric techniques have been useful in tracking these convergences throughout time. Noyons, Moed, and Luwel (1999) showed how mapping and citation analysis might reveal patterns of multidisciplinary interchange. In interactive art, these conversations often involve translating technical concepts into artistic expression. For example, visual computing and sensor technologies that were once exclusive to laboratories are now crucial to immersive artworks. The merging of technical and creative systems exemplifies how scientific methods support artistic innovation. This merging also serves to authenticate artistic approaches in academic research settings.

Cultural institutions provide other examples of practical convergence. Giannini and Bowen (2022) demonstrated how museums used interactive systems in their shows to encourage involvement. This integration highlights how technology established in engineering and design domains are repurposed for cultural involvement. The technique not only modernizes historical presentation, but it also blurs the line between instructional and artistic use of technology. These convergences demonstrate interactive systems' versatility in meeting varied societal requirements. They also demonstrate how technology challenges the limitations of conventional cultural places.

Emerging technologies like virtual reality and augmented reality demonstrate the intersection of art and powerful computers. Wang, Zhang, and Zhao (2020) used virtual reality to transform classic Peking Opera masks from static cultural artifacts into interactive artistic experiences. This demonstrates how interactive art uses digital technologies to recontextualize heritage. Similarly, the style transfer approaches proposed by Guo and Wang (2022) demonstrate how machine learning leads to new visual forms. These examples demonstrate how convergence transforms both artistic content and process. They also demonstrate how technical innovation broadens the range of creative expression.

Generative AI has recently accelerated this convergence by framing algorithms as creative collaborators. Lafontaine et al. (2023) demonstrated how deep learning and pose estimation can be combined to create responsive interactive works. Holzner, Maier, and Feuerriegel (2025) conducted a thorough examination of how generative AI influences creativity across fields. The use of AI tools indicates a more general confluence of data science, machine learning, and art. This development marks a new phase in converging scientific and cultural processes. As convergence deepens, interactive media art develops as an example of interdisciplinary innovation.

Generative AI and Creative Practices

Generative AI has emerged as one of the most important technical influences on creative practice in recent years. Holzner, Maier, and Feuerriegel (2025) conducted a comprehensive review to demonstrate how AI systems are increasingly involved in the creation of art, music, and design. Their findings suggest that AI can operate not only as a tool, but also as a collaborator, expanding creative capacity. This reconceptualization challenges established concepts of authorship and originality in art. It also highlights AI's revolutionary power over artistic practice.

The use of machine learning in interactive art demonstrates how algorithms may react in real time to user input. Lafontaine et al. (2023) investigated the use of posture estimation and deep learning in immersive works, resulting in surroundings that respond directly to body movement. These technologies demonstrate how artificial intelligence can moderate the link between human intention and creative product. Artists transform algorithms into responsive agents, shifting the creative process away from static design and toward dynamic interaction. These discoveries demonstrate that artificial intelligence makes technical and conceptual contributions to art.

Previous efforts also created a solid foundation for AI-driven procedures. Cornock and Edmonds (1973) proposed that computers may augment or even replace the artist, anticipating the logic of generative systems. Their perspective positioned computation as crucial to rethinking creativity itself. With today's AI tools, this viewpoint seems more relevant than ever. Generative models advance the historical trajectory of computer art to a new level. The link between early digital experimentation and modern AI confirms the long-term history of artistic collaboration with technology.

The application of artificial intelligence in visual design broadens the palette available to artists. Guo and Wang (2022) introduced style transfer methods to mobile interfaces, resulting in aesthetic outputs that adjust automatically using computational learning. This approach demonstrates how generative approaches can be integrated into common platforms. By making adaptive visual systems more publicly available, artists can reach new audiences and circumstances. These applications demonstrate how generative AI is moving beyond experimental art and into mainstream design techniques.

Generative AI also influences how cultural institutions interact with their audiences. Giannini and Bowen (2022) showed that museums use interactive technology to promote engagement and accessibility. While their work focuses on digital culture in general, the rise of AI adds another layer of change. Museums can now utilize generative technologies to create adaptive content in real time, changing the visitor experience. Such activities blur the distinction between curating and creating. They also show how AI-driven creativity is integrated into existing cultural settings.

Scholars have also identified the ethical and conceptual implications of AI in artistic production. Jeon, Fiebrink, Edmonds, and Herath (2019) linked interactive art to ritual and magic, implying that artificial intelligence will continue to pursue mediated experiences like humans do. Generative AI introduces new problems about control, agency, and audience involvement. As systems assume a bigger amount of authorship, the interaction between man and machine grows more complex. These difficulties underline the importance of achieving a balance between innovation and introspection. They also make AI art a space for both exploration and criticism.

Finally, bibliometric research has begun to investigate how generative AI alters artistic discourse. Tekin, Burkut, and Dal (2024) examined cultural heritage research and established the effectiveness of bibliometric approaches in detecting technological trends. Applying comparable methodologies to generative AI reveals a fast developing body of literature in both the scientific and creative spheres. This expansion underscores AI's transdisciplinary appeal as a field of study and practice. It also implies that artificial intelligence is not just altering art, but also becoming crucial to academic research into creativity itself. The trajectory indicates that generative AI will be a dominating issue in cultural study for many years to come.

RESEARCH METHOD

This study employed bibliometric analysis to look at the research landscape for interactive media art and determine the most influential contributions. Literature was gathered from the Web of Science (WOS) and Scopus databases, both of which are known for providing broad coverage of worldwide publications. The investigation covers studies conducted between 2004 and 2024, with a concentration on English-language documents. Bibliometric analysis was chosen because it allows for a systematic assessment of the structure, dynamics, and research outputs in a certain topic. This approach also helps predict future trajectories based on citation and collaboration patterns.

The data collecting procedure produced an initial dataset of 78 articles from WOS and 2,209 from Scopus, for a total of 2,387 records. Duplicates were deleted using a multi-stage cleaning method, and the final dataset included 2,209 publications produced by 3,706 scholars from 767 sources, with 41,070 references. Standardization was used

to overcome ambiguities in singular and plural terminology, capitalization, and abbreviations like "Virtual Reality" and "VR." To maintain consistency, terms were combined from both databases into a single dataset. This provides a solid platform for future analyses of research patterns and theme development.

Data cleaning entailed numerous technological processes to prepare the dataset for analysis. CiteSpace was utilized to convert Scopus data to WOS format and perform basic deduplication. To maintain integrity, files were merged using terminal commands before being consolidated into a text database. Keywords were exported to Excel and processed to create word lists for elimination and synonym control, resulting in less noise and inconsistency. Manual corrections corrected errors, incomplete entries, and extraneous phrases. This guaranteed that the dataset appropriately represented the structure of interactive media art research.

A variety of bibliometric methodologies were used to investigate both quantitative and qualitative features. Authors, institutions, journals, and keywords were investigated using frequency, co-occurrence, and cluster analysis. CiteSpace assisted in the creation of co-occurrence networks, cluster detection, burst term recognition using the Kleinberg algorithm, and thematic timeline graphs. VOSviewer was used for density mapping and cooperation network visualization. The R program Bibliometrix offers flexibility for calculating metrics like the h-index and citation networks. Together, these methodologies enabled a thorough understanding of research development.

Visualization techniques were used to improve the interpretation of results and provide clear representations of thematic development. Gephi and Charticulator were used along with Excel and R to generate network diagrams and charts that showed changes in collaboration patterns and topic shifts over time. CiteSpace, VOSviewer, and Bibliometrix together to form a systematic framework for phase division, hotspot discovery, and network validation. This framework enabled the study to trace the evolution of interactive media art. It also shed light on upcoming research directions and the interdisciplinary nature of the discipline.

RESULTS AND DISCUSSION

The bibliometric analysis summarizes the growth, topics, and directions in interactive media art research during the last two decades. The data from Scopus and Web of Science show a large increase in the quantity of research, with noticeable variations in topic focus as technology and artistic practices have evolved. This comprehensive perspective emphasizes both the field's historical roots and the rise of fresh paradigms influenced by artificial intelligence, extended reality, and human-computer interaction.

The analysis indicates that interactive media art has followed a similar path to other interdisciplinary subjects, beginning with limited foundational studies and then undergoing periods of significant expansion. These developments reflect not only advancements in underlying technologies, but also changing artistic approaches and social circumstances. The balance between experimental creativity and technological innovation is still a defining feature of this subject, supporting its dual identity as creative expression and scientific investigation.

Beyond quantitative growth, the findings suggest changing research objectives. Early research focused on multimedia systems and interaction techniques, whereas later work progressively incorporated immersive technologies like virtual and augmented reality. Most recently, the rise of generative AI has opened up new possibilities and problems for artistic expression, changing production and interpretation approaches. These topic shifts indicate that the discipline is always adapting to technical capabilities while also dealing with broader cultural and societal challenges.

The collaborative aspect of interactive media art research has developed gradually over time. Patterns of publication and co-authorship reflect increased international cooperation, connecting institutions and scholars from many regions. This reflects the field's inherent interdisciplinary nature, in which knowledge from art, design, computer science, and engineering are merged to answer common challenges. The evolution of the area shows a shift from exploratory experimentation to a mature stage of research, aided by technical developments and strengthened by global collaboration.

Temporal Distribution and Publication Trends

The temporal distribution of articles depicts the overall evolution of interactive media art research between 2004 and 2024. Following a slow start with few outputs, a significant surge occurred beginning in 2007, reflecting increased academic interest in interactive technologies. This acceleration was heightened after 2012, coinciding with substantial advancements in extended reality (XR) technologies and their incorporation into artistic practice. Although annual production fluctuates, the long-term tendency indicates that research effort will continue to expand.

In recent years, publishing numbers have stabilized at more than 140 articles per year, indicating that the topic has reached a mature stage of research. The forecast of roughly 160 publications by 2024 shows that interactive media art will become a recognized topic of investigation. The constant expansion over the last two decades

illustrates that this interdisciplinary topic has progressed from peripheral experimentation to mainstream scholarly attention, with research consistently contributing to creative and technological advancement.

Keyword Co-occurrence and Research Hotspots

Keyword co-occurrence analysis helps to understand the field's thematic priority. From the dataset, 468,838 keywords were extracted and displayed, resulting in the identification of many main clusters. These include human-robot interaction, projection mapping, virtual reality, generative AI and art, machine learning, augmented reality, physical computing, and data visualization. The silhouette values of these clusters were close to one, indicating their reliability as representative themes. These clusters indicate that interactive media art research includes not just technology innovation but also creativity, user interaction, and social engagement.

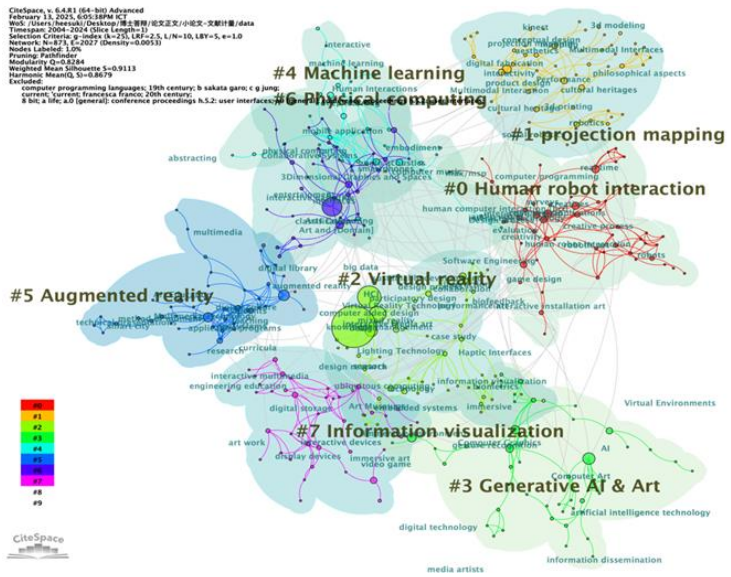

Figure 1. Keyword Clustering Network

Burst Keywords and Technological Shifts

The burst keyword analysis shows how research themes in interactive media art have evolved over the past two decades. Between 2004 and 2011, concepts like "multimedia technology," "interactive computer graphics," and "animation" placed an early emphasis on fundamental interaction approaches. Keywords such as "interactive computer systems," "computer music," and "user interfaces," which rose between 2006 and 2012, reflected a growing interest in usability and the design of creative experiences. These early bursts represent the field's formative stage, when academics focused on developing technical infrastructures to support new artistic practices.

From 2013 to 2020, the introduction of words like "human engineering," "HCI," and "exhibitions" signaled a significant shift toward immersive and user-centric techniques. This decade also saw a surge in virtual and augmented reality, which revolutionized the possibilities of interactive environments and expanded the scope of artistic engagement. The rising use of these phrases indicates that the field has progressed beyond technical experimentation to develop multimodal and socially relevant applications. This intermediate phase saw the establishment of interactive media art as both a technology and experiential discipline.

In the last five years, new buzzwords like "machine learning," "arts computing," "creatives," and "deep learning" have highlighted the impact of artificial intelligence on creative practices. These phrases emphasize the growing importance of data-driven and generative processes in the creation of artworks, pushing the limits of human-computer collaboration. The prevalence of AI-related notions reflects the incorporation of algorithms into aesthetic design and critical discourse. This phase indicates a new paradigm in which interactive media art is not only influenced by evolving technology but also contributes to the redefining of creativity in the computational era.

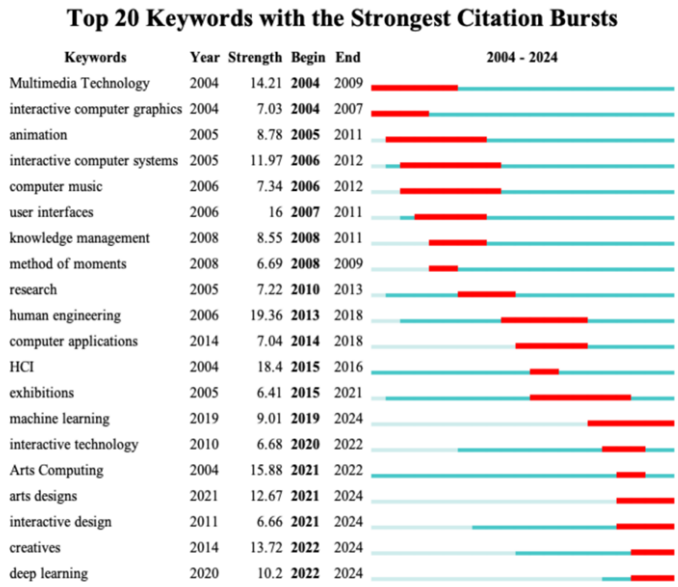

Figure 2. Top 20 Burst Terms (2004–2024)

The burst term distribution underlines that technology adoption in interactive media art occurs in distinct waves, each of which is linked to larger computing advancements. The increase of AI-related terms illustrates the most recent of these transformations, demonstrating how the sector is constantly adapting to new capabilities. This continuity emphasizes the discipline's dynamic nature, which has progressed from early multimedia experiments to a mature arena in which technology and creativity flourish simultaneously.

Thematic Evolution and Convergence Patterns

The thematic evolution of interactive media art shows the field's response to technology advancement and shifting creative goals over the last two decades. Early research focused on multimedia systems and interactive visuals, establishing the groundwork for more advanced frameworks. As extended reality and sensor-based technologies progressed, they began to transform artistic practice by increasing immersion and interaction. This transition demonstrates how technology innovation continuously drives new avenues in study while keeping a close connection to creative development.

Clusters such as human-computer interaction, virtual reality, and data visualization have endured over time, while others, such as augmented reality and physical computing, have lately gained prominence. These shifting themes demonstrate the dynamic interplay between stability and originality in the area. Emerging subjects like generative AI and immersive interfaces show how interactive media art may easily incorporate computing and machine learning achievements. The chronology of study topics demonstrates that the field goes through cycles of consolidation and transition.

Convergence across domains has grown more apparent in recent years, with multidisciplinary connections emerging across data visualization, AI-driven creativity, and immersive media design. This convergence shows that interactive media art is no longer limited to certain technology categories, but rather thrives at the intersections of art, computation, and human experience. Scholars can gain a better understanding of the durability of basic topics and the significance of new paradigms in guiding future research by following these overlapping paths.

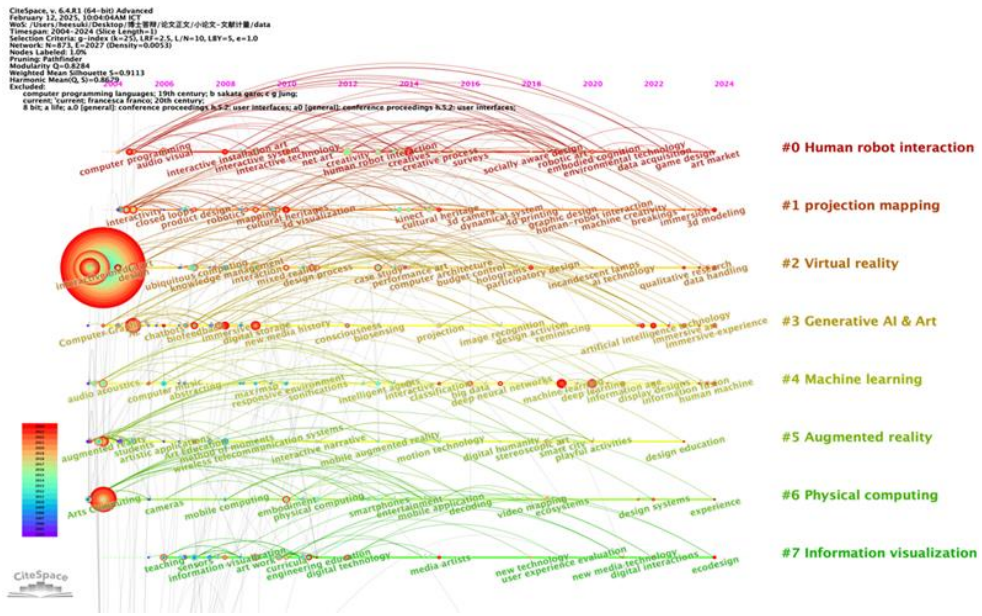

Figure 3. Timeline Chart of Evolution

Leading Journals and Influential Authors

The analysis of published channels demonstrates how interactive media art has gradually established itself across many academic platforms. Early research was scattered over technology-oriented proceedings, but as time passed, journals focusing on human-computer interaction, digital creativity, and design research gained prominence. This convergence demonstrates how the discipline has progressed from marginal experimentation to accepted academic discourse, aided by specialized venues that provide continuity and validity.

High-impact journals not only provide visibility, but they also influence the research agenda by curating specific topics. Their significance in distributing multidisciplinary work demonstrates how the field combines creative arts and computational sciences. A closer look at the top journals reveals that issues including immersive systems, cultural heritage applications, and interactive installations have received constant attention, showing both technological advancement and cultural interest.

Author contributions, like journal analyses, reflect the discipline's intellectual drivers. Certain scholars have continuously produced influential work, establishing theoretical frameworks and experimenting with artistic activity. Their citation effect demonstrates a long-standing influence in shaping research directions, ranging from early multimedia systems to modern investigations in generative AI and extended reality.

The institutional connections of these authors reflect geographic clusters of expertise. European and Australasian universities emerge as focal points, highlighting the collaborative and transnational nature of interactive media art study. The balance between publication venues and major contributors implies that the field's progress is dependent on both strong academic platforms and the vision of pioneering researchers.

Table 1. Leading Journals in Interactive Media Art Research

No.	Sources	Articles	Citations
1	LEONARDO	166	646
2	DIGITAL CREATIVITY	50	485
3	INTERNATIONAL JOURNAL OF ARTS AND TECHNOLOGY	22	176
4	TECHNOETIC ARTS	18	24
5	ARTNODES	16	55

The concentration of publications in these journals indicates how interactive media art has matured into a well-established domain with reliable scholarly sources. These venues promote continuity, maintain quality standards, and help disseminate findings to both the artistic and scientific communities.

Table 2. High-Impact Authors in Interactive Media Art Research

No.	Author	Institute	H-index	No. Of doc	All citation
1	Ernest Edmonds	De Montfort University	10	33	657
2	Steve Benford	University of Nottingham	8	13	201
3	Luigina Ciolfi	University of Limerick	7	7	178
4	Linda Candy	University of Technology Sydney	6	9	107
5	Elisa Giaccardi	Delft University of Technology	6	8	494
6	Matthias Rauterberg	Eindhoven University of Technology	6	11	121
7	Christa Sommerer	University of Art and Design Linz	6	11	87
8	Nick Bryan-Kinns	Queen Mary University of London	5	7	38
9	Jun Hu	Eindhoven University of Technology	5	12	79
10	Letizia Jaccheri	Norwegian University of Science and Technology	5	8	130

The presence of highly cited authors highlights the role of individual leadership in creating the area. Their ongoing contributions and international collaborations ensure that interactive media art stays dynamic and adaptable to cultural and technological changes.

CONCLUSION

This study analyzed the technological evolution of interactive media art from 2004 to 2024 and discovered a three-stage paradigm shift caused by technology breakthroughs. In the early years, multimedia technologies and computer graphics laid the groundwork, with restricted expansion reflecting the early stages of exploration. After 2013, XR and HCI technologies spurred the development of immersive and user-centered experiences, and since 2020, generative AI and deep learning have served as co-creation engines. Together, these advances mark the field's maturation and transition from technological innovation to the incorporation of humanization and intelligence into creative practice.

The systematic bibliometric technique utilized in this study reveals the field's publication patterns, hotspots, and collaborative networks, yet significant limitations persist. The dependence on WoS and Scopus Core Collection databases limited the scope to English-language materials, perhaps underrepresenting culturally distinctive contributions. Including non-English databases, regional sources, and community-driven platforms would give a more complete view of global practices. Future research should also use combined methods, combining bibliometric mapping with qualitative approaches, to gain a better understanding of the relationship between technology, creativity, and cultural setting.

Looking ahead, interactive media art is anticipated to evolve alongside the increasing involvement of intelligent systems in artistic creativity. The focus is shifting away from interactive technology and toward AI-powered agents capable of generating and influencing creative material in real time. This trend not only broadens the options for artistic expression, but it also reimagines how humans perceive, interact with, and understand technologically mediated art. Such trends confirm that collaboration between artists and researchers will remain crucial, paving the path for further integration of innovation, culture, and aesthetics in the next few years.

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