VISUAL REVIEW | Vol. 18, No. 6, 2026 | ISSN 2695-9631
International Visual Culture Review / Revista Internacional de Cultura Visual
https://doi.org/10.62161/revvisual.v18.6450

Between Truth and Aesthetics
Public Perceptions and Controversies Over Data Art on X

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KEYWORDS
Data art
Data visualization
Visual communication
Data narrative
Data manipulation
Aesthetic bias

ABSTRACT
Data art on X represents a hybrid form of communication that integrates data, aesthetics, and visual narrative, generating debates about its informative legitimacy. This study analyses the perception of data art through thematic analysis of textual conversations on X, identifying opinion patterns and controversies. The results evidence a dichotomy: users who value it as a pedagogical tool versus critical discourses that denounce manipulation and bias. The research proposes that public perception of data art operates as an indicator of trust in contemporary data-based communication, revealing tensions between groups over the use of visual evidence.

Recibido: 03/ 07 / 2026
Aceptado: 05/ 10 / 2026

1. Introduction

In recent years, the growth in data volume, primarily generated by users and the digitization process, has driven new forms of visual representation. In this context, data art emerges as a hybrid field between scientific visualization, graphic design, and artistic practice that uses datasets (statistical, social, affective, or algorithmic) as raw material for new aesthetic approaches.

On all social media platforms, these visualizations are not only used as striking images or potentially viral elements, but also fulfil a pedagogical, political, and emotional function: they translate complex information into accessible visual narratives, transforming the way users understand global phenomena (climate, consumption, elections, public health, digital behaviour, etc.).

Unlike traditional data visualization, which focuses more on achieving clarity and precision, data art more concretely pursues interpretation, subjectivity, and aesthetics—that is, it not only shows data, but signifies and communicates it in a highly pedagogical manner. Its rise is mainly due to the current functioning of algorithms, which reward clarity and beauty, and the emergence of new visualization and editing applications (Canva, Flourish, RawGraphs, Adobe Express, among others), which enable non-expert users to produce highly elaborate aesthetic visualizations.

Visual pedagogy, inspired by visual literacy theory and participatory culture, explains that images teach, guide, and model behaviours. When applied to social media platforms like X, visualizations function as small lessons that simplify concepts to make them shareable, articulate political or activist narratives, or mediate between experts and mass audiences. Data art, with its blend of emotion and data, becomes a perfect bridge between these two logics.

However, it is important to remember that social media relies on visuals to capture attention, making aesthetics a key element of data art. Design, colours, abstract shapes, and dynamism turn data into desirable sharing objects, which can potentially have a positive impact on dissemination, although it may negatively affect information interpretation by exaggerating non-representative relationships, inducing cognitive errors, or prioritizing design over informational clarity.

Yet the extensive use of data art also carries potential negative impacts. Its use as a tool for data politicization, introducing biases in favour of a particular interpretation, and its impact on intellectual property—by transforming data without citing the source in many cases—introduces a highly relevant new element into the discussion.

This research, based on a broad and consistent corpus of messages, analyses the perception of data art through thematic analysis of textual conversations on X, identifying patterns of opinion and controversies, while also exploring users' sensitivity to the ethical aspects related to its use.

2. Methodology

This research adopts a quantitative approach, based on data mining and sentiment analysis extracted from messages, with an interpretation of results theoretically grounded in the qualitative tradition of discourse analysis and framing theory.

The methodological objective was to identify different perceptions regarding the use of data art and the ethical aspects generated on X, motivated by the rise in its use on social media by various users and entities of different kinds.

The analysis corpus consists of more than 9,000 tweets published between January 2024 and December 2025 (24 months), in two data groups that allow exploring, on one hand, perceptions of data art and, on the other hand, sensitivity to the ethical aspects associated with its use.

Data collection was conducted using data mining techniques based on the following hashtags:

- Perception and Opinion on Data Art: #dataart OR #informationvisualization OR #datastorytelling OR #dataaesthetics OR #computationalart OR #algorithmicart OR #proceduralart OR #creativeai OR #digitalculture OR #computationalcreativity OR #newmediaart
- Sensitivity regarding ethical aspects: #dataethics OR #databias OR #fairdata

Messages in several languages were included, although they are predominantly in English.

To conduct the automatic sentiment analysis, each message was classified according to the overall sentiment (positive, negative, or neutral). Additionally, variables were used to measure the real impact of the publications, such as the number of likes, reposts, and views, thereby creating an impact indicator. Lastly, segmentation was performed by days, authors, and language, allowing the evolution of the conversation around key events to be observed.

Although the analysis is based on automated quantitative techniques, the interpretation of the results is articulated from a qualitative theoretical approach. Reference is made, fundamentally, to framing theory (Entman, 1993), which enables the contextualization of how certain discursive frames—artistic expression, commercial value, educational learning, ethical concern, scientific research, social impact, or technical tool—structure the meaning of the debate. This analysis is reinforced by cluster segmentation and the identification of specific themes in Data art.

2.1. Framing Theory

Framing theory, originally developed by Goffman (1974) and systematized by Entman (1993), posits that frames function as cognitive structures that select and emphasize certain aspects of reality while obscuring others. According to Entman, a frame operates when it "selects some aspects of a perceived reality and makes them more salient in a communicating text, in such a way as to promote a particular problem definition, causal interpretation, moral evaluation, and/or treatment recommendation" (Entman, 1993, p. 52).

In the context of data art, this theory adapts in a particular manner. Data art is not merely a means of textual information: it is an act of visual and/or numerical construction that encloses a concrete meaning. Each data visualization represents interpretive choices regarding which data to display, how to scale them, which relationships to highlight visually, and which colour palette to use. These technical-aesthetic decisions are analogous to the selection and emphasis operations described by Entman, but they operate at a visual and representational level in addition to a textual level.

In the data art used on social networks such as X, each visualization functions as a visual micro frame: a compressed unit of meaning that not only informs but interprets reality from a particular perspective. The characteristic brevity of X (spatial limitation) intensifies the framing operation, compelling artists to compress complex narratives into highly codified images.

3. Objectives

This research has as its general objective the analysis of the public perception of data art on X, exploring whether it operates as an indicator of trust or distrust in contemporary forms of data-based communication, and identifying the tensions between different user groups regarding the biased use of evidence in visual elements.

- Identify and categorize the most recurrent discursive frames in the tweets that reference Data art.
- Analyse the overall sentiment and its evolution over time.
- Identify the predominant themes and their level of impact.
- Understand the level of sensitivity regarding the ethical aspects linked to Data art.

Regarding the research question posed, it was the following: Is the use of Data Art considered by users as something positive, while being aware of the ethical aspects that must be taken into account?

4. Theoretical Framework

The concept of Data art emerges as a new practice in this century, grounded in the union of art and data-based information, whether public, private, or generated by tools (synthetic data). Roberts (2025) and Lan et al. (2025) establish that data art is not merely a tool for communicating information, but an intentional act of artistic creation where the responsible party always pursues an objective, which may or may not be legitimate. This approach is what distinguishes data art from classical scientific or informational visualization, because while the latter prioritize precision, analytical clarity, and truthfulness, data art seeks to evoke emotional responses, tell complex stories, and provoke critical reflection in the audience. The definition proposed by Roberts (2025) of data art as "the use of data to generate images that not only communicate information but also evoke emotional responses and tell stories" becomes the theoretical foundation upon which all current practice rests.

However, data art not only has communicative potential but also its own educational dimension, where it becomes a powerful tool for transformation and change, thanks to the integration of artistic creativity with analytical thinking, which allows students to develop high-value competencies, including critical thinking. Roberts (2025), Tangredi et al. (2024), and the Moving Visualization Program study demonstrate that when students engage in authentic processes of data-based artistic creation, they simultaneously develop technical skills, critical thinking, and capacities for creative expression. The pedagogical framework structured in eight steps presented by Roberts (2025) provides a replicable model that transcends specific contexts, allowing adaptation to diverse educational levels and disciplines. Additionally, the publication by Tangredi et al. (2024) adds that humanistic artistic visualization of data can significantly improve student self-awareness and understanding of complex processes, especially in contexts such as challenge-based learning, where learning is experiential and student-centred.

Returning to the communicative potential of data art, its great capacity to generate impact on urgent social and environmental issues must never be separated from adherence to a series of ethical standards in representation

and communicative intent. De Souza Oliveira and De Melo Filho (2022) demonstrate how data art can be an instrument for environmental awareness regarding climate change, enabling the "making visible of the invisible" through creative transformation of complex scientific data. However, as Baynes (2023) emphasizes, this communicative capacity entails an ethical responsibility of representation: biases in data selection, visual transformations, or accompanying narratives can amplify disinformation or partial perspectives presented as universal truths. All communications that are conducted, regardless of the channel used, that employ data art addressing critical socio-environmental themes must comply with rigorous standards of data integrity, methodological transparency, and clarity regarding limitations and representational perspectives.

However, we cannot overlook the impact of technology on data art and, therefore, it is key to introduce how Artificial Intelligence is changing everything. The integration of AI in artistic processes introduces new ethical-legal dimensions that data art must address explicitly. Then et al. (2023) and Wang & Song (2024) document how AI has significantly transformed artistic creation, with more than 71% of artists utilizing AI algorithms in some aspect of their work. However, this technical revolution generates substantive ethical concerns regarding authorship, originality, copyright, and the dilution of individual artistic styles. Data art that incorporates AI systems must confront fundamental questions: Who is responsible for the representational decisions produced by the algorithm? How is it ensured that the model's training data do not perpetuate historical biases? In what manner is the role of AI in artistic production communicated to the audience? Wang & Song (2024) underscore that the future evolution toward "explainable AI" is critical to ensure transparency.

The aforementioned point is one of the major concerns that coexist today: What is true in what is published? The collection and manipulation of data using data art introduce ethical complexities that challenge traditional notions of "objective" truth in the visual representation of information. De Souza Oliveira and De Melo Filho (2022) argue that every data visualization is "a single translation of reality," subject to inherent biases of those who collect and present the data. This critical perspective is fundamental for data art because, unlike scientific visualization that seeks to minimize these mediations, data art can deliberately exploit them to communicate alternative perspectives, marginalized narratives, or critical commentary on social reality. However, this creative freedom requires ethical responsibility: artists must be transparent regarding design decisions, data transformations, and the intent behind their representations, enabling audiences to critically evaluate the presented information.

Therefore, ethics must be considered as a constitutive dimension of the creative experience, not as an external restriction. The Moving Visualization Program study demonstrates that data artists who participate in their own data collection develop deeper and more ethically conscious connections with their artistic material. In the publication by Zhao et al. (2024), it is identified that data collection "emerges as the most essential practice," serving as a focal point that links data practices with artistic production. Understanding its origin, how it was generated, or what methodological decisions were taken during its capture fosters an ethical culture.

Data ethics constitutes an essential element that must be incorporated into all phases of data art, from the initial data collection to its interpretation and artistic presentation. Baynes (2023), Qiu & Hu (2025), and Ramesh et al. (2025) agree that there is a critical gap between the technical sophistication of data visualization tools and the practical integration of ethical considerations in their use. Baynes (2023) identifies those illicit practices in data visualization, including misleading representations, deliberate biases toward specific stakeholders, or incorrect data transformations, arise both from lack of knowledge and deliberate intent, underscoring the urgent need to integrate design ethics from the earliest stages of training for students and users in general. This concern becomes more critical when considering that, as Qiu & Hu (2025) state, data security and privacy protection comprise the central elements of all ethical data governance, regardless of national or cultural context.

Data privacy and informed consent represent fundamental pillars in data ethics and acquire special relevance when personal or sensitive data are transformed into artistic material. Ramesh et al. (2025) and Qiu & Hu (2025) emphasize that the central concept of informed consent, which is based on users having a clear understanding of how their personal data are collected, stored, and used, is frequently compromised by ambiguous privacy policies and lack of transparency. In the specific context of data art, the article by Raheb et al. (2023) demonstrates how the collection of biological signals and body data for artistic purposes poses unique ethical dilemmas that require specialized user-centred design methodologies, respecting the dignity and autonomy of participants. The transformation of personal data into artistic experiences, whether through sounds or interactive visualization, must follow genuine consent, where participants are truly aware of the collected information, its processing method, and subsequent uses.

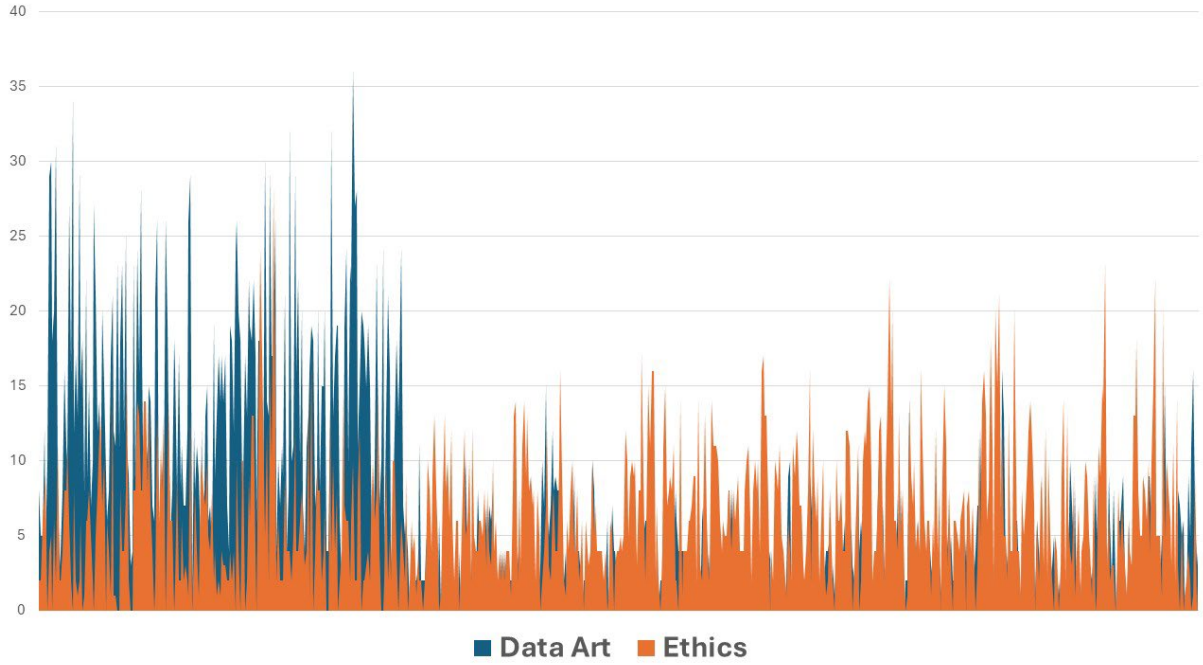
The ethical governance of data art requires a multilevel collaborative model that integrates legal support, ethical guidance, and regulatory mechanisms adapted to specific cultural contexts. The publication by Qiu & Hu (2025) demonstrates that, although ethical principles can be considered known to all, especially regarding privacy, data security, and human rights protection, their implementation must be sensitive to national particularities, cultural values, and institutional capacities. For data art, this means that ethical-institutional frameworks must simultaneously recognize the legitimacy of artistic expression as a fundamental right and the need to protect individuals' data rights whose personal data are used as artistic material. In the article by Raheb et al. (2023), it is proposed that best practice requires genuine collaboration between artists, researchers, ethics specialists, designers, and communities, ensuring that data-based artistic creation processes are inclusive, reflective, and compliant with ethical standards.

Finally, the maturation of data art as a disciplinary field depends on the consolidation of an explicitly formulated "data art ethics" that transcends both instrumental technicism and unrestricted creative autonomy, recognizing data art as a deeply social and political practice. Roberts (2025), Lan et al. (2025), Baynes (2023), and Tangredi et al. (2024) converge on the need for theoretical and practical environments that integrate technical, aesthetic, epistemological, and ethical dimensions. This "data art ethics" must specify principles regarding informed consent from individuals providing the information, transparency in representational decisions, responsibility in communicating complex information, inclusivity regarding marginalized voices in data collection processes, and accountability toward communities affected by artistic narratives. Only through this integrative approach can data art fully realize its transformative potential as a form of knowledge, expression, and social change, avoiding the reproduction of power and representational injustices that characterize current societies.

5. Analysis

Firstly, it is important to examine the level of interest in initiating conversations about Data art or its ethical aspects. As can be seen in Figure 1, there is greater interest in Data art up to August 2024, at which point conversations equalize with those initiated on ethical topics.

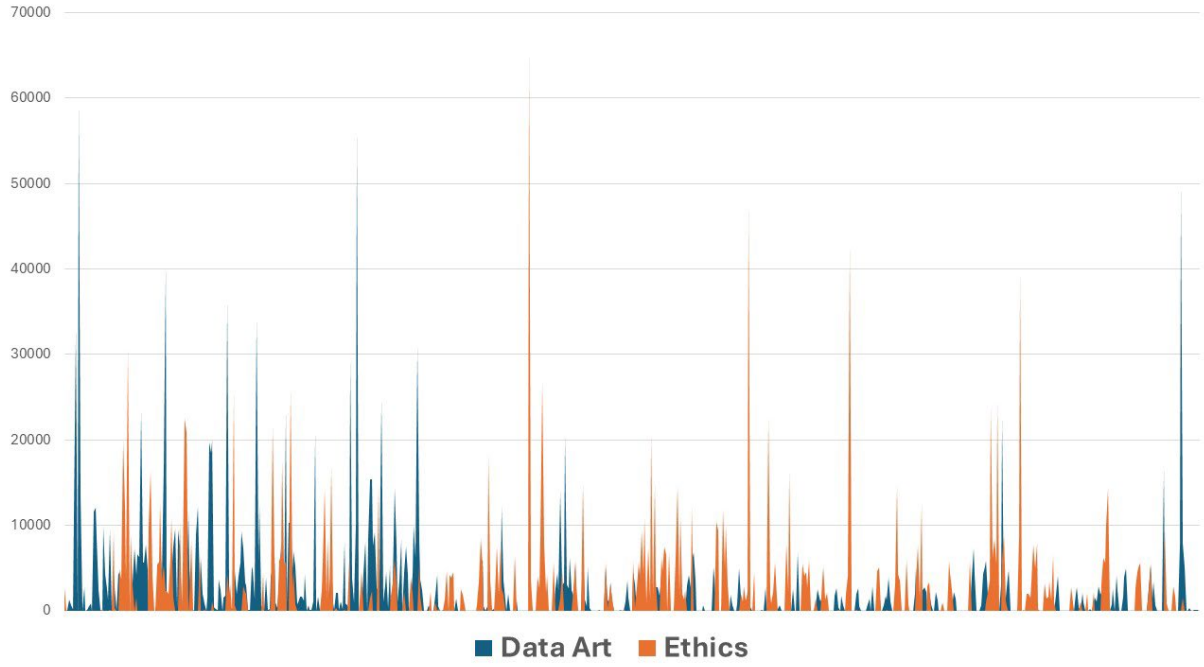
Figure 1. Analysis of activity on X regarding messages on Data art and ethics



Source(s): Own design, 2025

If the real impact of the publications is analysed, the trend regarding loss of interest is confirmed, although certain temporal moments are perceived where significant impacts are generated by the publications, both of Data art and associated ethics.

Figure 2. Analysis of the impact of messages on Data art and ethics



Source(s): Own design, 2025

Delving into the most significant peaks of Data art, it is appropriate to highlight some of them:

- January 10, 2024: An intense discussion was generated about what is and is not AI art, with more than 2.2 million views.
- March 3, 2024: The discussion focused on how theoretically easy it is to identify what was created with AI, with more than one million views.
- June 29, 2024: The debate was more focused on the sustainability of using AI for this type of activities, given its environmental impact. The interest it aroused, although less than the previous one, was significant (more than 400,000 views).

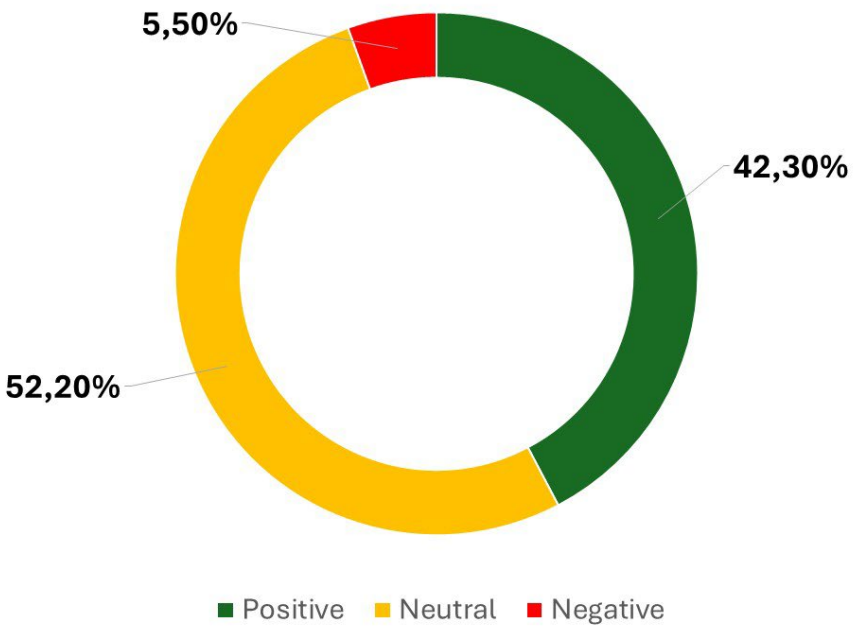
Regarding those specifically related to ethics, the following are highly relevant:

- October 17, 2024: Message focused on the misuse of Data art as a source of disinformation, especially in the political sphere. It had a significant impact of 1.3 million views.
- October 26, 2024: Publication on its use to generate fake news that negatively impact people, although the impact in views was not excessively high (250,000).
- August 19, 2025: Publication on the importance of transparent communication of information, thanks to the use of dashboards and Storytelling. It is also a topic that arouses interest, generating more than 1.3 million views.

5.1. The messages about Data art

If the inherent sentiment in the messages is analysed, there is very little negativity in them, being predominantly positive or neutral, as shown in Figure 3.

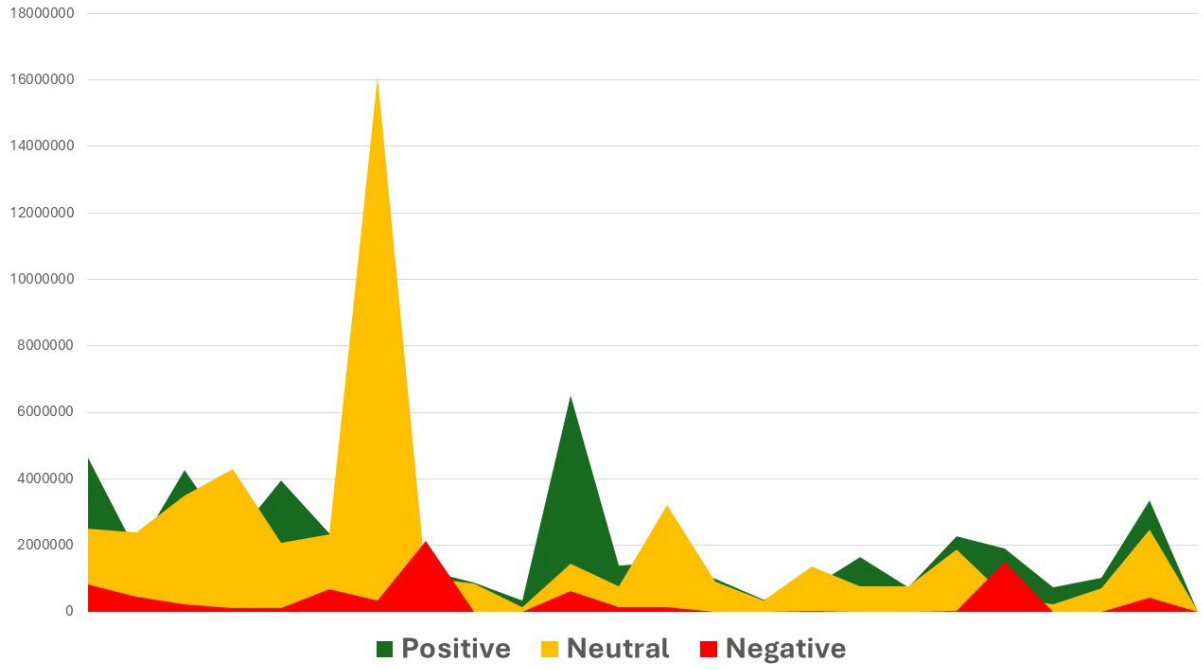
Figure 3. Analysis of sentiment in messages about Data art



Source(s): Own design, 2025

When analysed monthly, neutral messages are predominant throughout the series, as well as those that had the greatest real impact on the audience, although there were some months where positive ones were majority.

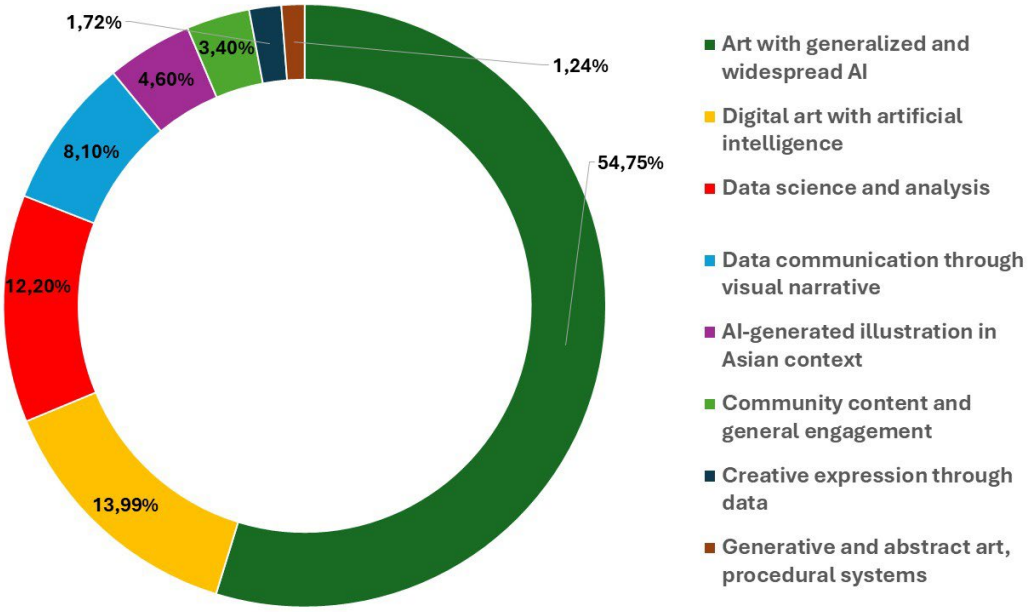
Figure 4. Monthly analysis of sentiment in messages about Data art



Source(s): Own design, 2025

If the identified discursive frames and their weight in the conversation on X are analysed, based on the impact of the publications, it can be evidenced that users focus the majority of conversations on creations generated by AI, grouped into three thematic frames (73.35%), with the distribution shown in Figure 5.

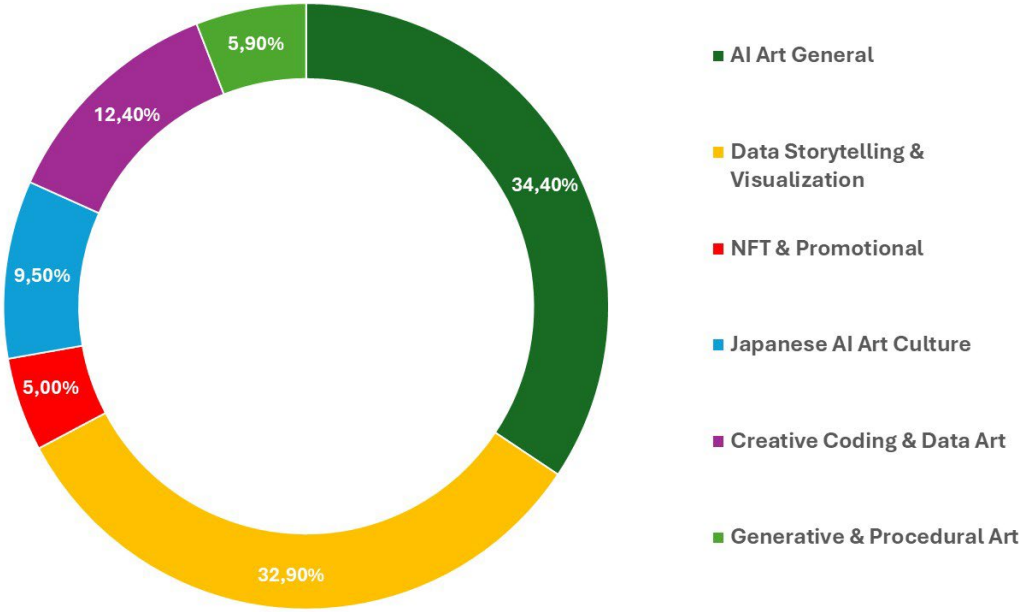
Figure 5. Analysis of the frames of messages about Data art



Source(s): Own design, 2025

Regarding the segmentation of messages into the six identified clusters (AI Art General, Data Storytelling & Visualization, NFT & Promotional, Japanese AI Art Culture, Creative Coding & Data Art, Generative & Procedural Art), 2 out of every 3 messages are about themes associated with AI data art or storytelling, as visualized in Figure 6.

Figure 6. Analysis of the clusters of messages about Data art



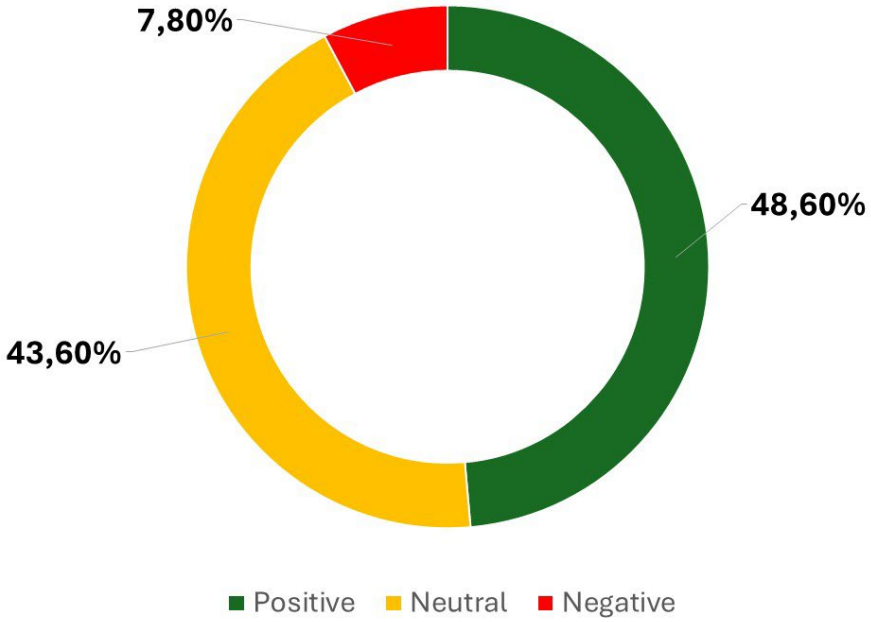
Source(s): Own design, 2025

The most common themes in the messages are those related to the mainstream trend of AI art (23.3%) and the effective communication of data to non-technical audiences (23%).

5.2. The messages about ethics associated with Data art

If the inherent sentiment in the messages related to ethics is analysed, they are also predominantly positive or neutral, as shown in Figure 7.

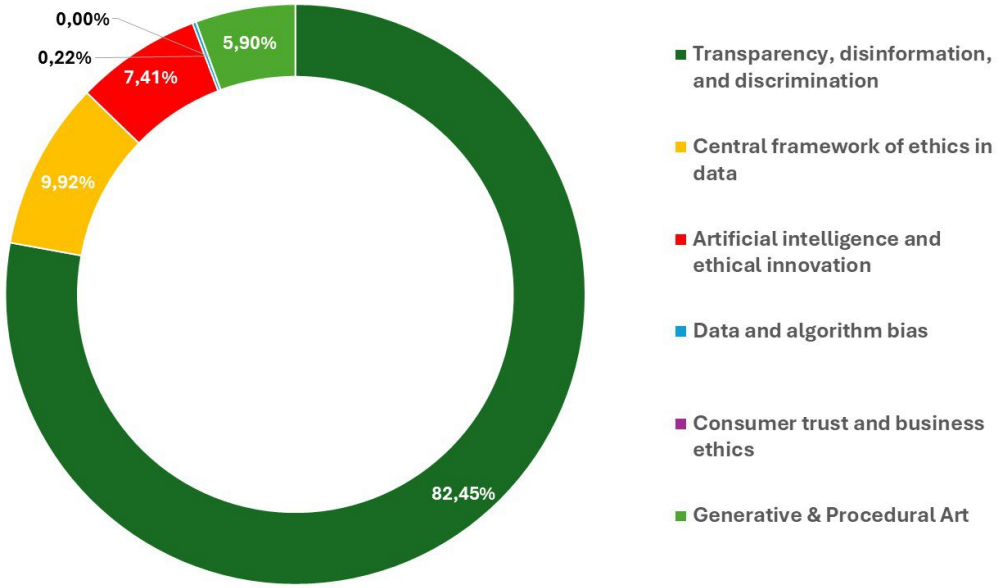
Figure 7. Analysis of sentiment in messages about ethics



Source(s): Own design, 2025

Regarding the segmentation of the messages into the five identified clusters (Transparency, disinformation, and discrimination; Central framework of ethics in data; Artificial intelligence and ethical innovation; Data and algorithm bias; Consumer trust and business ethics), 82.45% of the messages are about themes associated with "Transparency, disinformation, and discrimination", as visualized in Figure 6.

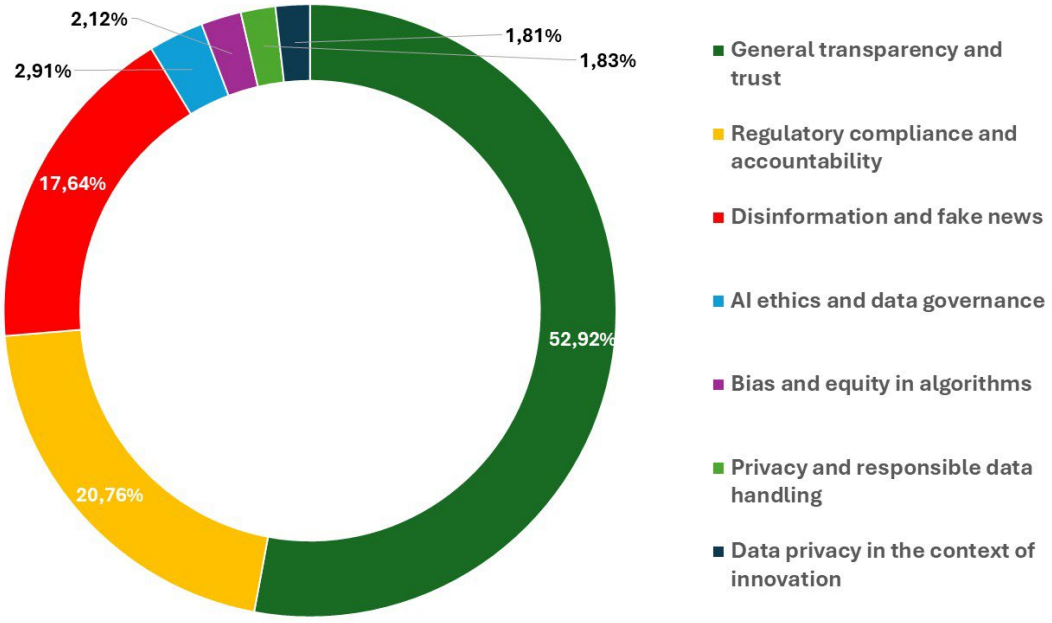
Figure 8. Analysis of Ethics Message Clusters



Source(s): Own design, 2025

Finally, analyzing the main conversation topics in messages about ethics associated with Data art, users are more concerned with key issues such as transparency, regulatory compliance, or disinformation—although the latter, which might seem highly relevant, ranks third in user interest (17.64%). These figures can be seen in Figure 9.

Figure 9. Analysis of the main themes of messages on ethics



Source(s): Own design, 2025

The most common theme in the messages is the fundamental need for transparency in data and AI (30%), followed at a great distance by issues related to the balance between privacy and innovation (16.4%) and governance frameworks for ethical AI (15.5%).

6. Discussion with the authors

The analysis of the public conversation on X confirms that data art has consolidated as a legitimate, albeit controversial, form of data-based communication, in line with what is proposed by Roberts (2025) and Lan et al. (2025), who emphasize its hybrid character between information, aesthetics, and narrative. The results show that the majority perception of users is situated in positive or neutral registers, which reinforces the idea that data art is valued as an effective tool for translating complexity and generating engagement, especially when supported by artificial intelligence technologies.

However, this positive valuation coexists with a growing critical sensitivity toward the ethical risks associated with its use. As Baynes (2023) warns, aesthetics can function as a mechanism for uncritical legitimization of the message, especially when visual impact is prioritized over methodological transparency. The peaks of conversation identified around political disinformation and visual manipulation reinforce this tension, showing that users not only consume data art as a cultural product but also evaluate it from a logic of social responsibility.

From the perspective of framing (Entman, 1993), the results confirm that data art on X operates as a highly condensed visual micro frame, capable of activating dominant interpretations in extremely brief exposure times. The predominance of frames linked to AI art and data storytelling suggests that the audience associates these practices with innovation, creativity, and accessibility, although, simultaneously, a critical counter frame emerges centred on ethics, data governance, and the need for regulation, as proposed by Qiu and Hu (2025).

Likewise, the centrality of the transparency frame in ethical messages coincides with the approaches of Ramesh et al. (2025) and Raheb et al. (2023), who highlight that public trust in data-based communication depends primarily on the clarity with which sources, transformation processes, and limitations of the data used are explicitly stated. In this sense, the study shows that public discussion is not oriented solely toward questioning the aesthetics of data art, but toward demanding an ethics of representation commensurate with its growing social influence.

In summary, the findings dialogue with recent literature by demonstrating that data art cannot be analysed exclusively from an artistic or technical perspective, but as a complex communicative phenomenon, traversed by symbolic disputes over truth, authority, and legitimacy in the data era.

7. Conclusions

The analysis of the public conversation on X allows us to assert that data art has consolidated as a relevant discursive object within the ecosystem of data-based digital communication. Based on a broad and longitudinal corpus, this study has successfully met the proposed objectives, providing empirical evidence on how users interpret, value, and problematize this hybrid practice between data, aesthetics, and visual narrative.

Regarding the first objective, aimed at identifying and categorizing the predominant discursive frames, the results show a hegemony of frames linked to the use of data art as creative expression mediated by artificial intelligence and as a tool for storytelling and accessible visualization for non-expert audiences. These frames present data art as an innovative, pedagogical, and culturally valuable resource. However, alongside these dominant frames, a critical frame emerges that questions its informational legitimacy, especially when aesthetics prevails over clarity, evidencing that data art functions as a space of symbolic dispute over the truth and authority of data.

With respect to the second objective, focused on the analysis of overall sentiment and its temporal evolution, the findings indicate that the conversation about data art is predominantly characterized by positive and neutral sentiments, with a marginal presence of openly negative discourses. This trend remains relatively stable throughout the analysed period, although it intensifies at specific moments associated with debates on artificial intelligence, sustainability, or disinformation. The stability of neutral sentiment suggests that, for a significant portion of users, data art is perceived as a normalized phenomenon within digital communicative flow, rather than as an exceptional or inherently problematic practice.

As for the third objective, oriented toward identifying the predominant themes and their level of impact, the results show that conversations with the greatest reach and visibility are concentrated around artistic creation with AI, data visualization for dissemination purposes, and the use of data art in cultural and promotional contexts. These themes are not only the most frequent but also those that generate the greatest impact in terms of views, interactions, and dissemination, which reinforces the idea that aesthetic appeal and technological innovation act as catalysts for engagement on X.

Finally, regarding to the fourth objective, the data reveal a high level of user sensitivity toward the ethical aspects linked to data art. The ethical conversation is articulated primarily around the need for transparency, the prevention of disinformation, algorithmic bias, and data governance. Although these discussions are less numerous than those centred on artistic creation, their relative impact is significant and reveals a growing concern for the social and political implications of using aesthetically persuasive visualizations. This finding confirms that users not only consume data art as a visual product but also evaluate it from a logic of responsibility and trust.

Overall, the conclusions allow us to assert that data art is perceived simultaneously as a communicative opportunity and as a potential risk, depending on the frames from which it is interpreted. This ambivalence reinforces the need to advance toward a specific ethics of data art that integrates aesthetic, informational, and ethical criteria, especially in high-visibility contexts such as social networks. The study thus contributes to understanding the role of data art as an indicator of social trust in contemporary data-based communication.

Finally, the study provides relevant empirical evidence for the field of visual communication and digital culture, by showing how audiences not only consume data art but actively participate in its ethical evaluation. As a future line of research, comparative studies between platforms are proposed, as well as the incorporation of qualitative visual analyses of the most influential data art pieces, in order to better understand how specific aesthetic decisions condition data interpretation.

8. Acknowledgments

This work has been developed within the framework of a line of research focused on visual communication, digital culture, and data ethics. The authors thank the institutional support of OBS Business School and EAE Madrid, as well as the contributions of the academic and professional community that, through public debate on social networks, actively contributes to critical reflection on the responsible use of data art.

Likewise, gratitude is extended to the previous work of data researchers and artists whose studies have served as theoretical and methodological foundation for this research, as well as to the anonymous

reviewers of the journal, whose observations have contributed to improving the clarity and rigor of the manuscript.

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