# Cartographies and Limits through the accumulation of Imaginaries

inteligencia artificial
humanidades digitales
fronteras
espacio relacional
producción artística
**artificial intelligence**
**digital humanities**
**borders**
**relational space**
**art production**

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La presencia de nuevas herramientas basadas en la Inteligencia Artificial (IA) en diferentes campos del conocimiento está suponiendo, más allá del avance tecnológico, un punto de disrupción conceptual que podemos abordar desde diversas perspectivas, especialmente en su vertiente ética y desde su capacidad transformadora de los procesos tradicionales de creación.

Este artículo pretende abrir una reflexión sobre el conocimiento implícito que existe en los patrones visuales generados por la IA, así como visibilizar desde la práctica artística nuevos escenarios de debate y posicionamientos alternativas que contribuyan a ampliar la lógica multimodal en el uso de la tecnología de la IA.

En particular, nos centraremos en cómo sintetizar visualmente nociones como frontera y/o umbral a través de la acumulación de imaginarios fotográficos extraídos de repositorios abiertos de imágenes, y observar el resultado procesado por la IA como respuesta a analizar en profundidad, no en su apariencia formal, sino en su significado, en su proceso de intersubjetivación, y en su posible interpretación humana.

En definitiva, acercarse a la semántica de la imagen para proyectar un espacio contemporáneo, real.

The presence of new tools based on Artificial Intelligence (AI) in different fields of knowledge is reaching, beyond technological progress, a point of conceptual disruption that we can approach from various perspectives, especially its ethical aspect and its ability to transform traditional processes of creation.

This article aims to open up a reflection on the implicit knowledge that exists in visual patterns generated by AI, and also to make visible from artistic practice new scenarios and alternative positions that contribute to expanding the multimodal logic in the use of AI technology.

In particular, we will focus on how to visually synthesise notions such as border and/or threshold through the accumulation of photographic imaginaries extracted from open image repositories, and observe the result processed by AI as a response to analyse deeply, not in its formal appearance, but in its meaning, process of inter-subjectivisation, and possible human interpretation.

In short, getting closer to the semantics of the image in order to project a contemporary, real space.
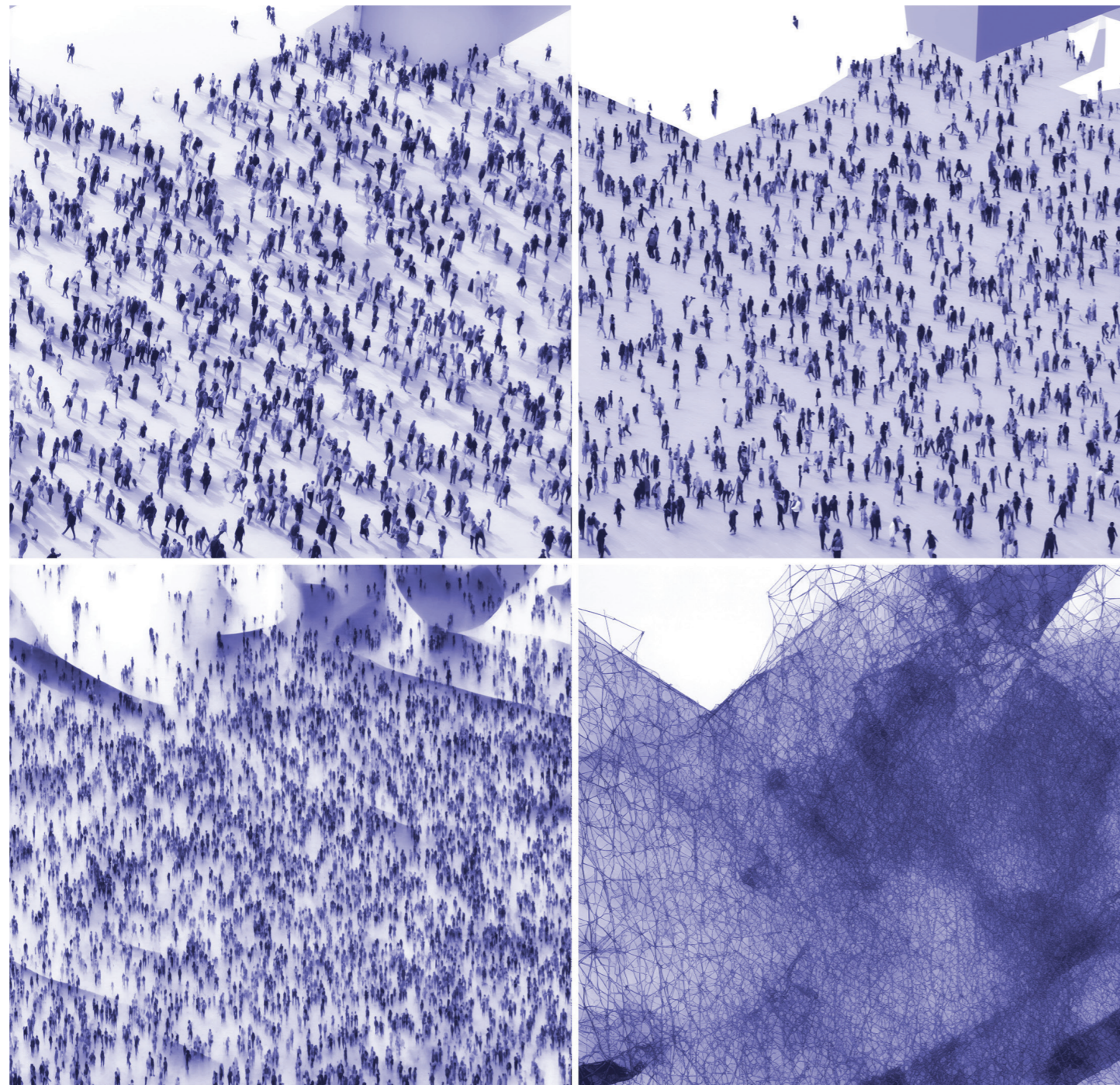
Fig.1 – Porosity and presence (graphic: Kenneth Russo & WAAI, 2022).



Fig.2 – Citymap of borders 1 (graphic: Kenneth Russo & WAAI, 2022).

## INTRODUCTION

The development of Artificial Intelligence (AI) tools, associated with the implementation of algorithms in the treatment of massive data, allow us to extract and synthesise valuable information that can help us: in making specific decisions, in clinical diagnoses, in analysis of behaviours, in prediction of spaces, etc... Whether through symbolic learning or automatic learning (Ramesh, 2017), and beyond its relevant ethical role that it implies for us, AI can crystallise patterns and logic that history hid over time, or it can make visual

forms visible to us to interpret the world and its inherent thought. In this sense, the interest of this article, based on artistic production through AI, lies in the revelation of hidden data through the image.

It is not about a machine replacing the human ability to project, nor delegating social design to an algorithm. It is about understanding space through the representations that history has documented, it is about approaching universal patterns, represented complexities, patterns, represented complexities, and generating alternatives from

human coherence in a framework that brings us closer to the actor-network theory of Bruno Latour (2007).

The following research is based on different images generated through data seeds from a bank of thousands of images. None of the images exist, but at the same time it concentrates the logic of imaginaries where concepts such as:

- "Presence" (Fig.1).
- "Periphery" or "Place" that take a decisive role in the construction of the "Map" (Fig.2 and 4).
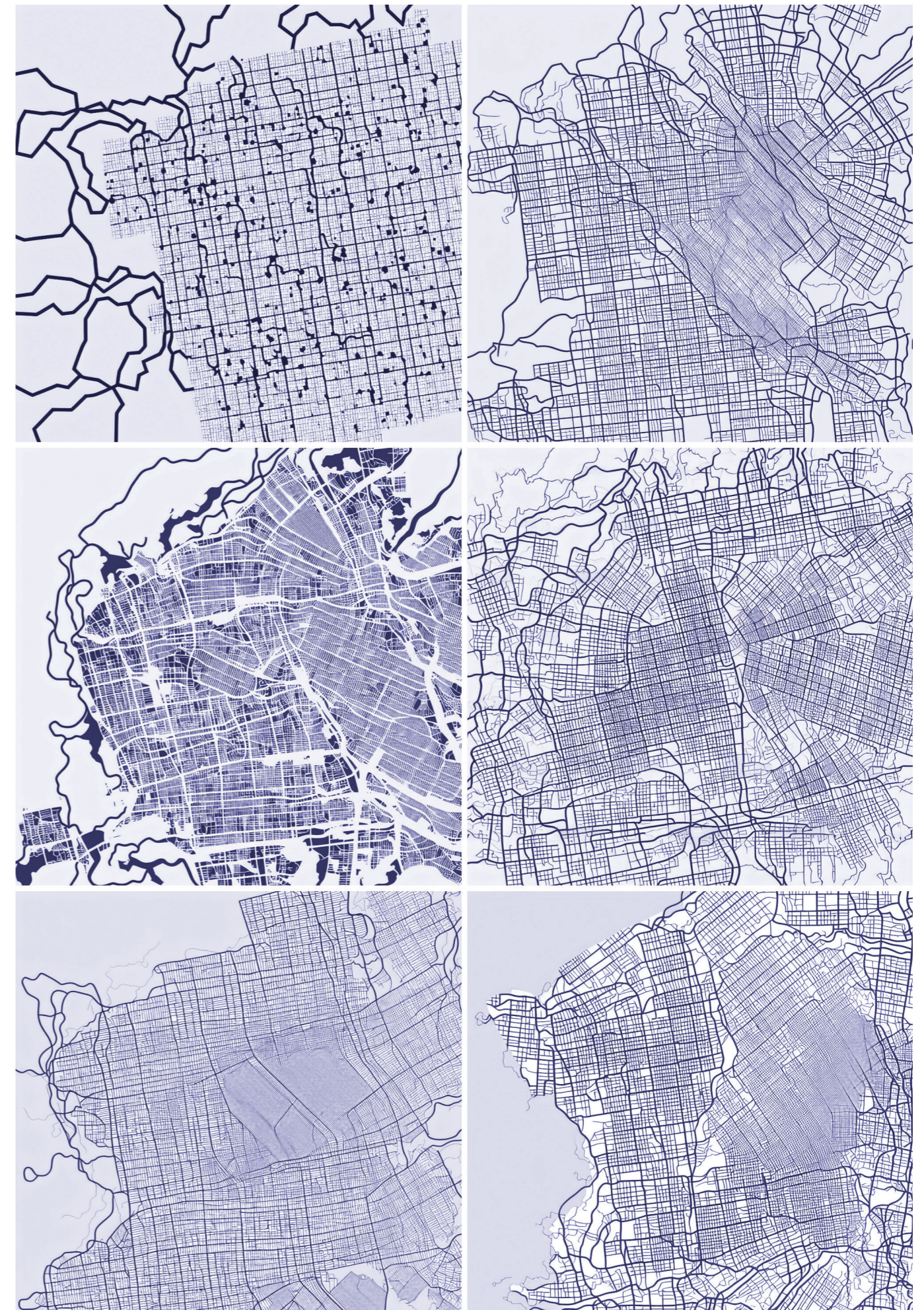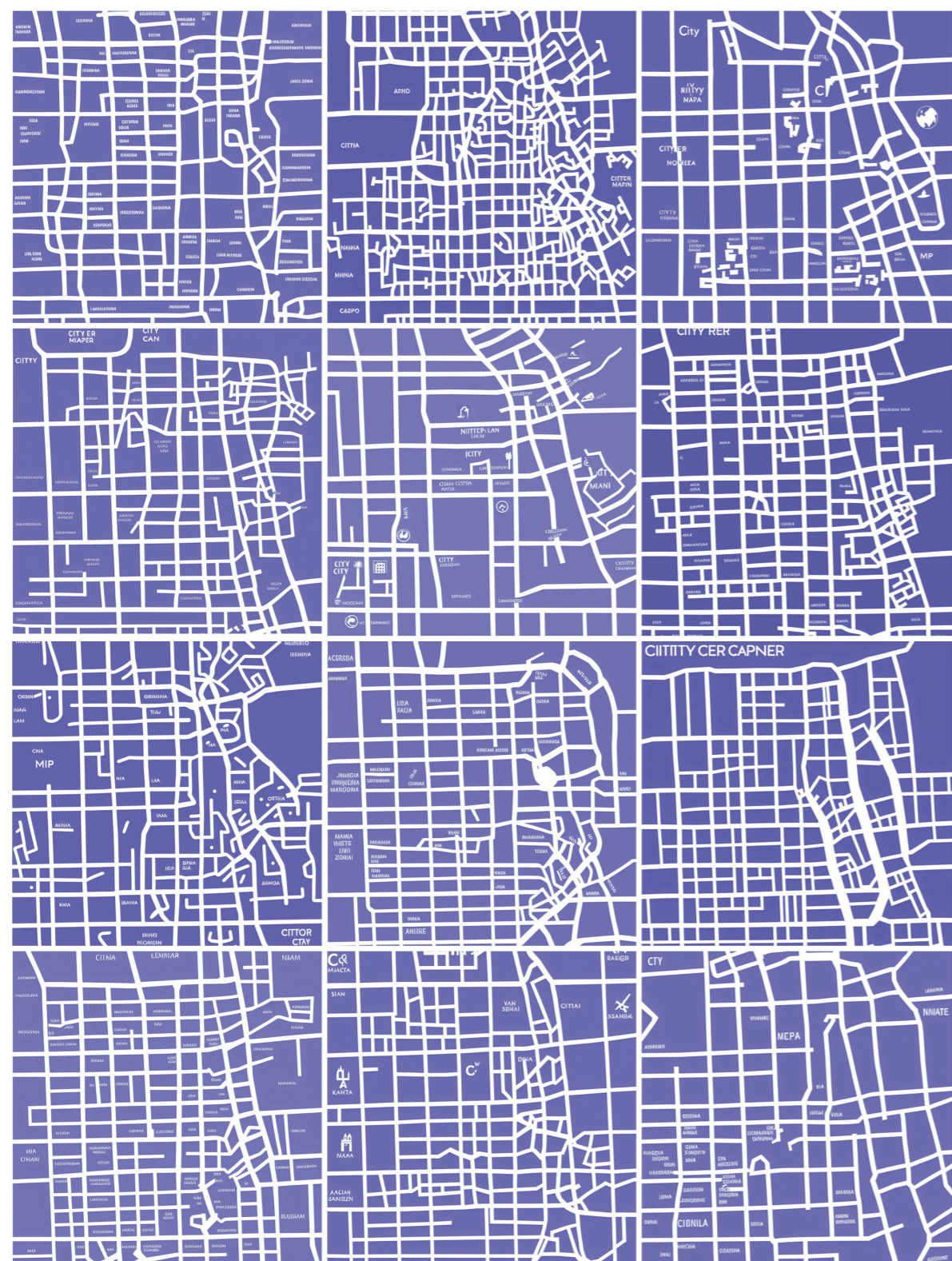
Fig.3 - Variations of limits in urban circuits (graphic: Kenneth Russo & WAAI, 2022).

- "Limit"(Fig.3).

- "Edge"(Fig.5).

As Deleuze and Guattari pointed out: "*The map does not reproduce an unconscious closed in on itself, it builds it*" (1997:28-29).

This cartography of the limits, which is not a simple representation of the territory, is installed in the meaning itself and in its metaphorical component that displays all those cognitive processes that underlie the map

(Balaid et al., 2013), in the relations of resistance (Foucalt,1979), or in an update of Debord's narrative structures where registered experience and catalogued/ processed information are now mixed (Russo, 2022).
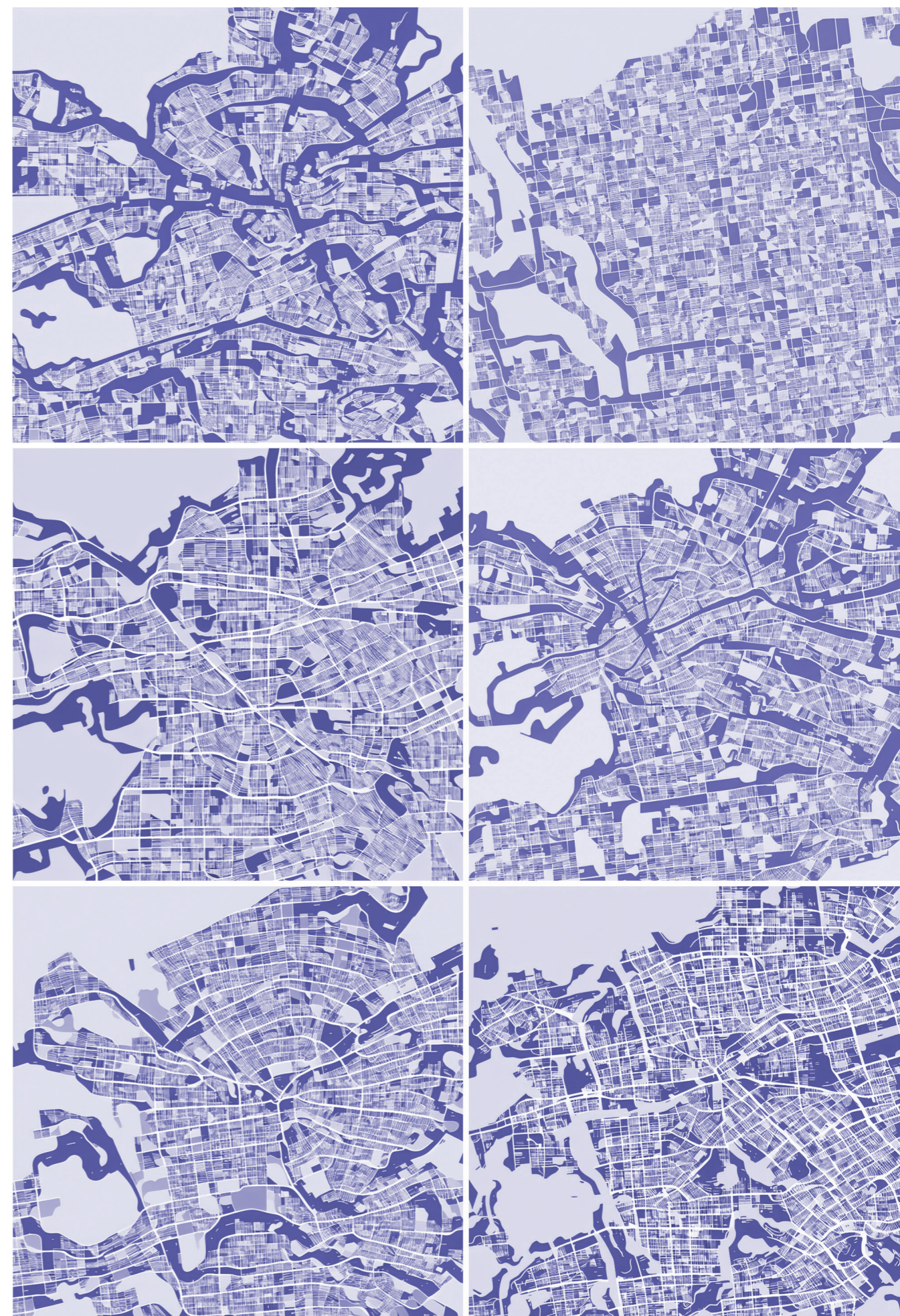


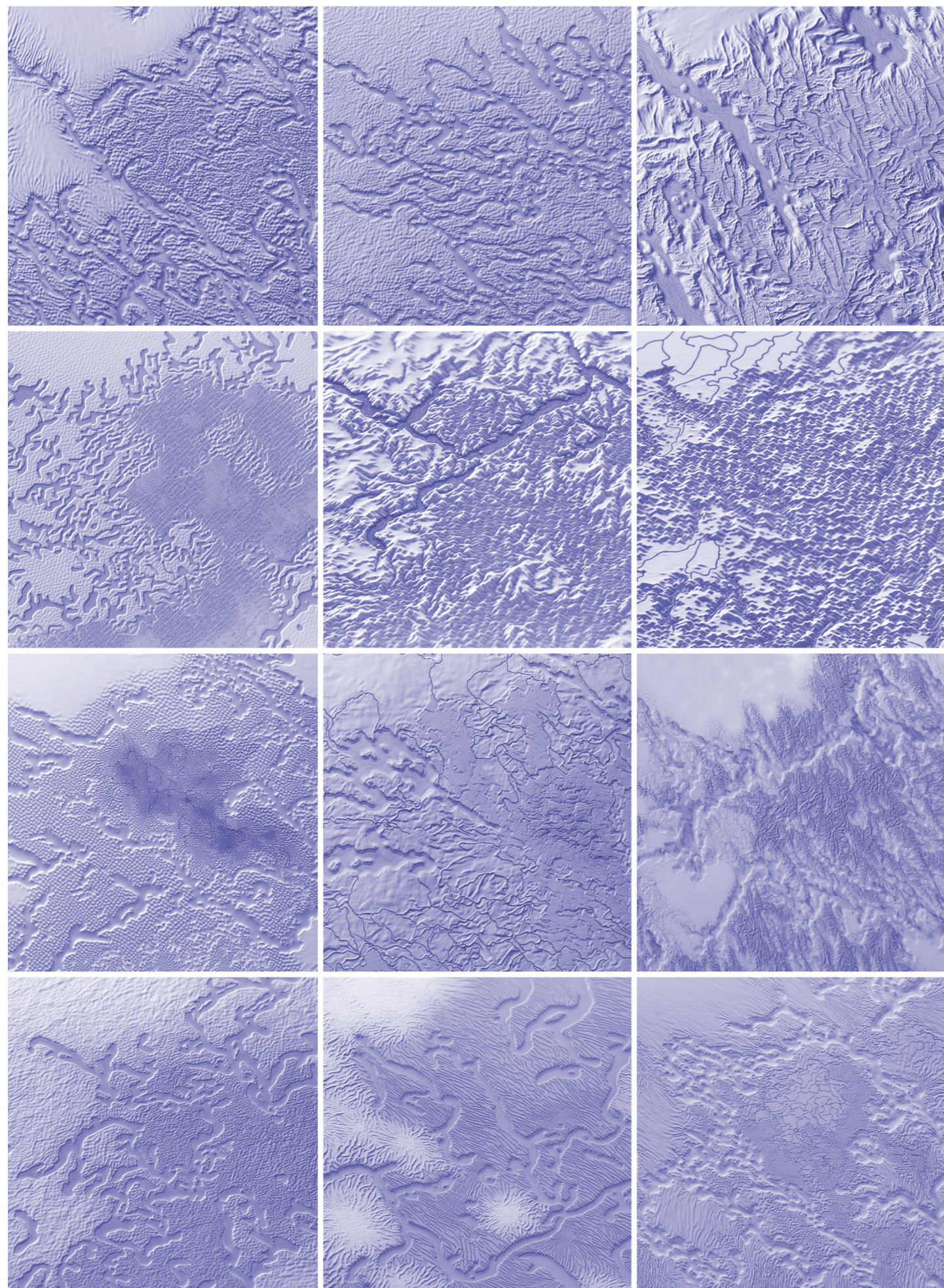Fig.4 – Citymap of borders 2 (graphic: Kenneth Russo & WAAI, 2022).

Fig.5 - Geological border in non-geopolitical zones. Edgeview (graphic: KennethRusso & WAAI, 2022).

## GET CLOSER TO AI

The economy, society, the environment and governance are key factors, which in their balanced combination, would have to draw us a conceptual framework in which to address our possible futures and our relationship with AI. Beyond a technological vision in which efficiency in work flows and data processing systems improve economic development, AI is a tool subject to human approaches.

In other words, the focus of interest in which to apply AI technology is decisive, in the same way that the choice of relevant data to be processed is decisive. This obviousness is frequently diluted in an ocean of approaches based on hyper-specialised models, which respond with general logic about aspects of productivity and connotations of the economic framework, to the detriment of the humanistic component.

The global demographic increase and its concentration in urban areas brings us closer to the use of AI as a tool to plan sustainable cities, or to achieve a certain degree of autonomy in the flows of a city, advancing towards the notion of a Smart City. In its holistic vision of how to deal with this reality, different contributions from authors (Richelle Winkler et al.2015,Yigitcanlar et al. 2015) already point out that: "*As a matter of fact, sustainability represents a nested hierarchy consisting of environment, society and economy as living environment, which enables human society to build an economic system that is not a threat to the environment*".

As a disruptive technology, we can see AI as an opportunity to optimise existing resources in its multiple applications, be it in: home automation, robotics applied to social services, management of autonomous public transport and flow monitoring, diagnosis of climate change, control of animal health and crop status, 4.0 industry, etc. But the question that accompanies us in this reality is to know how we intertwine human control and its decisions in front of a machine and its algorithms, and how it makes real decisions, in hybrid thinking, which can profoundly affect our future.

Our direct participation in these network spaces that shape us is one of the gaps that is opening up unevenly, between individuals and societies, and which, according to Adam Greenfield (2018), forces us to understand how these radical technologies work and to reconsider our relationship with these objects and services that colonise our daily lives: smartphones, block-chain, augmented-reality interfaces andvirtual assistants to 3D printing, autonomous delivery drones and self-driving cars.

## WHAT INGREDIENTS DO WE FEED THE AI WITH, AND HOW DO WE COOK THEM?

Research into problem solving, planning, language processing or interaction between individuals, using a machine that emulates and automates these cognitive processes originated after the end of World War II. At the present time, massive data is interconnected through the network, a fact that allows for improving the prediction of patterns through algorithms that determine precise instructions based on predictability of behaviours. Although it is a complex issue to label AI according to whether it is based on capabilities or functionality, we must highlight the notion of machine learning (ML), which more than a type of Artificial Intelligence in itself, consists of the way in which AI learns.

If ML exists, then learning is carried out by the system itself autonomously without human intervention. We can talk about a specific AI: a system dedicated to executing actions to solve a specific problem, but that does not know anything beyond that specific problem, and which, in short, are systems that focus on a single task and are far from behaving like humans.

In contrast, ML refers to a general AI, our interest, where through algorithms, it gives computers the ability to identify patterns in massive data and make predictions. Specifically, ML is the technique in which an algorithm is trained to generate an output of information, without the need for explicit programming, and that, saving the distances, allows the machine to acquire a reasoning capacity and data interrelation similar to what humans can do. However, it should be noted that any decision delegated to machine learning algorithms has to be deeply evaluated to understand how the AI has reached the result.

This idea, in AI known as explainability, is the one that inevitably accompanies the generation of data capable of transforming our reality. As Jocelyn Maclure (2021) points out: "*weighing the benefits and the risks must be done on a case-by-case basis, but it is hard to find cases where explainability can be given up when the rights, opportunities and wellbeing of citizens are at play*".

For this last process, the availability of large-scale and well-annotated data sets is essential to adopt deep learning models, since Big Data requires prior human analysis and classification to outline a base model on which to develop training. In other words, it is not about projecting models based solely on quantification and statistics, but to obtain a robust model we need it to be complemented with multimodal analyses, own abstract concepts such as affectivity or subjective evaluations that add value to the cognitive process model.

In this sense, we find revealing and academically documented works such as Graph Neural Networks for Knowledge Enhanced Visual Representation of Paintings (Efthymiou et al., 2021), an example of multimodal architecture that integrates Graph Neural Networks (GNNs) and Convolutional Neural Networks (CNNs), to weave a framework of meanings between visual and semantic artistic

representations, and that allows us to show the significant advantages of multitasking learning.

This proposal means that the transversal integration of human knowledge, that captures and encodes valuable relational dependencies between artists and works of art, can surpass the performance of traditional methods that are based solely on the analysis of visual content.

As a summary, given that the artificial processes of visual analysis are complex and are the subject of visual analysis are complex and are the subject of in-depth study, we are referring to the relationships that can be generated between the labels that categorize fine arts in combination with semantic relationships such as attributes extracted from social networks, attribution/authentication structures to artists or contextual data of styles.

The objective of this essay does not fall on the description of specialised progress, but on the multimodal approach that underlies the notion of AI. In other words, taking the field of Digital Humanities as a reference, we see how tools based on the use of CNN allow us to explore digitised art collections in relation to singular works, and consequently: extract, detect, identify, contextualise, classify contents and styles... In order to show interdisciplinary methodological extensions where digitised information and humanistic perspective come together.

This means that the machine can return an "aesthetic prediction" or even an "aesthetic creation" (Elgammal, 2019) from network training.

Another topic to study would be the specific analysis of the operation of the different generative platforms trained on huge data sets, among which *Stable Diffusion* (the basis of the artistic production presented) and *DALL-E* stand out. As Somepalli et al. point out: "*Because these datasets are too large for careful human curation, the origins and*

*intellectual property rights of the data sources are largely unknown. This fact, combined with the ability of large models to memorize their training data, raises questions about the originality of diffusion outputs. There is a risk that diffusion models might, without notice, reproduce data from the training set directly, or present a collage of multiple training images*" (2022: 2).

Opening the debate on whether AI systems could become autonomous artists, as if they were autonomous critical creation machines, leads us to deduce that the machine is still far from having a self-awareness of the perception of time and/or its emotional capacity to interpret the data (Hertzmann, 2020).

Despite these sensitivity limitations, which represent a challenge for the future, AI can be a great ally to expand the possibilities of artistic production. As Mazzone and Elgammal already pointed out: "*For human artists who are interested in the possibilities (and limitations) of AI in creativity and the arts, using AI as a creative partner is already happening now and will happen in the future. In a partnership, both halves bring skill sets to the process of creation*" (2019).

Therefore, again the AI in this perspective acquires more prominence as a tool driven by humans, in a hybridisation whose result is superior to the autonomy of the parts.

At this point we cannot continue without mentioning the rigorous study *Understanding and Creating Art with AI: Review and Outlook* (2022), by Eva Cetinic and James She, where we are presented with an exhaustive journey on the intersection between AI and art, from which we point out the following:

"*Most of the current AI Art works can be understood as results of sampling the latent space. Perhaps the most novel aspect of AI Art is this possibility to venture into that abstract multi-dimensional space of encoded image representations. From the artist's perspective, the latent space is neither a space of reality nor imagination, but*

*a realm of endless suggestions that emerge from the multi-dimensional interplay of the known and unknown. How one orchestrates the design of this space and what one finds in it, eventually becomes the major task and distinctive signature of the artist. In this context, it is important to understand the role of the human in this collaborative process with the machine.*" (2022: 9).

## QUESTIONS

The most relevant of the images presented in this essay, which become research results in a visual format, are not simply aesthetic values associated with a style. Each image has been generated following a CNN process, emulating AI Art generation procedures, and starting from strategic prompts ("presence", "border", "limit"...) that search for connections between databases of thousands of images catalogued in open repositories.

Therefore, the tangible return of the image itself is the result of synthesising thousands of catalogued representations that balance on an idea transferred over a period of time.

We are talking about an AI process applied in a speculative way on the representation of the territory and/or the city, and that apparently is not related to the efficiency data logic with which the Smart City is fed.

In other words, the advances in AI oriented towards the contemporary production of space are developed in a frenetic collection of data, quantifications and statistics, whether from mobility sensors, energy consumption indicators, intensity of transactions in social networks, flows of economic activities... However, how do we link the historical context in these processes? Can we add human values in AI processes? After citing experiences in which the discipline of Art History and the discipline of Computer Science seem to have found a meeting point, can we apply this communion of values in an interdisciplinary field?

## CONCLUSION

In a hybrid scenario where different humanistic positions come together and Deep Learning is developed based on computational methods, we are also capable of imagining a machine capable of interpreting metaphor, representation, or even contextual influences. The generated images that are shown have their origin in a database conditioned by values such as: the reputation and experience of the institution that provides the database; the quality of the images, including resolution, lighting and reproduction quality; the rigour of the classification and description of the images; the presence of metadata and other relevant information; and the availability of documentation and technical support.

These technical items reinforce the idea that AI image generation algorithms have to be created by multidisciplinary teams that work together to design, train and validate the models. AI can be used to collect and analyse data, identify patterns and trends, and generate graphs and visualizations to illustrate the results. However, decision-making regarding the interpretation of the data must be carried out by human researchers and from collaborative work.

The result we see is the reflection of a historical consciousness processed by a trained algorithm, and in reality it is about how we represent the border-limit through a documented collective imagination, a bird's-eye view that also warns us that everything that is not we see. It does not warn of accumulated errors, of the importance of the explicability concept in AI, and above all of the need to interpret speculative maps with human intelligence (HI). As a synthesis, it is necessary to highlight different ethical premises that we cannot ignore in any use of AI, since its power to transform our real environment is expanding. So, beyond speculative exercises and visual experimentation, we must always bear in mind the need to: collect and analyse data responsibly

to avoid bias in the information used to train AI models, evaluate the impact of algorithms for AI in different population groups to detect possible discrimination, verify that the algorithms work correctly and are not biased, that users and developers understand how decisions are made in AI systems, have a diverse development team that includes different perspectives and experiences, and implement policies and regulations that promote equity and fairness in the development and use of AI.

Going deeper into liminal spaces or borders from an image generated from experience and knowledge transformed into data is one of the challenges that we must address collectively: with AI technology and human involvement in all its branches of knowledge This is precisely the core idea that shapes that configures the set of visual information exposed, which could be seen as the laboratory to trigger a critical stance on social and ethical design (Manzini, 2015), or as plastic and static evidence of a complex game of relationships which will require a human interpretation. A map built from the accumulation and abundance of data. A map-image where to interpret the place from the polyhedral sum of superimposed and saturated visions. A way to semantically expand the AI models from the image and its substratum of meanings to "inhabit the world within the existing reality" (Bourriaud, 2006).

## BIBLIOGRAPHY

BALAID, Ali Saleh. ZIBARZANI, Masoumeh. ROZAN, Mohd Zaidi Abd. A Comprehensive Review of Knowledge Mapping Techniques. In: Journal of Information Systems Research and Innovation, 2013, vol. 3, pp.71-76.

BOURRIAUD, Nicolas. Estetica relacional. Adriana Hidalgo, Buenos Aires, 2006

CETINIC, Eva. SHE, James. Understanding and Creating Art with AI: Review and Outlook. ACM Trans. Multimedia Comput. Commun. Appl. 18, 2, Article 66 (May 2022), 22 pages. https: //doi.org/10.1145/3475799

DEBORD, Guy. Teoría de la deriva, Internationale Situationniste (1958-1969).

DELEUZE, Gilles. GUATTARI, Felix. Rizoma. Introducción [Rhizome.Introduction (1976)].

Valencia: Pre-Textos, 1997.

EFTHYMIOU, Athanasios. RUDINAC Stevan. KACKOVIC, Monika. WORRING Marcel. WIJNBERG, Nachoem. Graph Neural Networks for Knowledge Enhanced Visual Representation of Paintings. In Proceedings of the 29th ACM International Conference on Multimedia (MM '21), October 20–24, 2021, Virtual Event, China. ACM, New York, NY, USA, 10 pages.

ELGAMMAL, Ahmed. AI Is Blurring the Definition of Artist. American Scientist, vol. 107, no. 1, 2019, pp.18–21, https://doi.org/10.1511/2019.107.1.18.

FOUCAULT, Michel. Microfísica del poder. Madrid: Ediciones La Piqueta, 1979.

GREENFIELD, Adam. Radical Technologies: The Design of Everyday Life; Verso Books: London, UK, 2018.

HERTZMANN, Aaron. Computers do not make art, people do. Communications of the ACM 63, no. 5, 2020, 45–48.

LATOUR, Bruno. Nunca fuimos modernos. Ensayo de antropología simétrica. Buenos Aires: Siglo XXI Editores, 2007.

MACLURE, Jocelyn. AI, explainability and public reason: the argument from the limitations of the human mind. Minds and Machines 31.3 (2021): 421-438.

MANZINI, Ezio. Cuando todos diseñan. Una introducción al diseño para la innovación social. Madrid: Experimenta Editorial, 2015.

MAZZONE, Marian, and Ahmed ELGAMMAL. Art, creativity, and the potential of artificial intelligence. Arts. Vol. 8. No. 1. MDPI, 2019.

RAMESH, Raj. What is Artificial Intelligence? In 5 minutes. 2017. [Archivo de video]. https://www.youtube.com/

RUSSO, Kenneth. WAAI Reviews. 2022. http://www.kennethrusso.net/p/164/en/WAAI-Reviews (accessed 17 November 2022).

SOMEPALLI, Gowthami. SINGLA, Vasu. GOLDBLUM, Micah. GEIPING, Jonas. GOLDSTEIN, Tom. Diffusion Art or Digital Forgery? Investigating Data Replication in Diffusion Models. arXiv:2212.03860v3 [cs. LG] 12 Dec 2022. https://doi.org/10.48550/arXiv.2212.03860

WINKLER, Richelle. DELLER, Steven. MARCOUILLER, Dave. Recreational Housing and Community Development: A Triple Bottom Line Approach, Growth and Change, Wiley Blackwell, vol. 46(3), 2015, pages 481-500, September.

YIGITCANLAR, Tan. MD, Kamruzzaman. Planning, Development and Management of Sustainable Cities: A Commentary from the Guest Editors Sustainability 7, no. 11, 2015: 14677-14688. https://doi.org/10.3390/su71114677