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REINTERPRETING ARTISTS' SELF-PORTRAITS THROUGH AI DERIVATIVE CREATIONS

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ABSTRACT: Over recent years, the use of artificial intelligence (AI) in the field of Art History has garnered growing interest. Many academic publications on this relatively recent topic explore the role of AI in the analysis of huge datasets and digitised art collections, according to specific research or curatorial questions, while others address AI as a theme or a tool for contemporary artistic practices. This paper presents an alternative approach, considering generative AI as part of an interpretative methodology based on derivative images created with text prompts that specifically request a reinterpretation of a particular artwork, without adding any stylistic or contextual modifiers. Focusing on the iconic Self-Portrait (in a red coat) by the Portuguese painter Aurélia de Souza, the aim of this study is to discuss how images produced with different text-to-image AI generators may not only illustrate some of the features highlighted in Art History studies, but also foster new questions and readings of the same artwork.

1. INTRODUCTION

Reinterpretation has always been a key topic in Art History, not only for scholars and curators but also for the artists themselves. In view of their biographical relevance and subjectivity, artists' self-portraits tend to be especially fertile in terms of curatorial and creative readings. Explored in numerous exhibitions and publications, the interest in self-portraits has expanded greatly with the increasing digitisation and online circulation of art museum collections and, more recently, with the development of artificial intelligence (AI).

Over the past three decades, an exponential growth has been seen in the number and diversity of scientific publications addressing the intersection between Art History and digital technology. In line with Lev Manovich's "Database as a Symbolic Form" (1998) [1], many authors have studied the ways in which art databases and digital tools have paved the way for new methodologies in Art History and museum studies. As insightfully noted by Johanna Drucker in her vision of Digital Art History as a possible autonomous discipline, the paradigm shift does not reside solely in the use of new digital tools but, above all, in the new approaches and ways of thinking that have emerged with digital processes [2]. This is also evident with the increasingly frequent incorporation of machine learning (ML) processes in Art History, for instance, to identify and sort artworks according to specific criteria or to conduct innovative comparative analyses. In fact, ML models can "reveal connections and links between artworks that might otherwise not have been fully legible, or only incompletely accessible" [3]. As Drimmer and Nygren observe:

"There is, however, an important distinction between recent (and anticipated) applications of

AI and earlier instantiations of Art History's adoption of computation. Whereas earlier work largely used digital tools for the purposes of information management or to ask questions adjacent to the works of art (in other words, in generating and analysing what could be considered a work's context), we are seeing the first efforts at aiming AI at the work itself, that is, the use of computer vision as an analytical lens placed on the object" [4].

At the same time, advances in AI-based systems for image production also pose new challenges to art historians, curators and artists. In the last two years several AI text-to-image generators - such as Midjourney, Stable Diffusion, Runway, DALL-E and Microsoft Bing Image Creator - have emerged and rapidly become extremely popular. Besides opening a new and exciting chapter in the History of Digital Art, AI image generators are having a wider impact on contemporary culture at large, also fuelling the debates on authenticity, copyright and the ethical use of technology. According to Juan Martín Prada, these ML models mark "the beginning of a new phase of visual culture in which a large part of the images produced will have their origin, to a greater or lesser extent, in these types of AI-based generative systems or, at least, will have been edited using some of these new technologies" [5].

Against this background, the methods and criteria adopted for the study of artists' self-portraits are being critically reviewed. Today, art historians and curators benefit from an unprecedented opportunity to easily access online art collections and databases, where they can find other works that, for different reasons, can be compared to a specific case-study. Such comparisons typically include works by the same artist or by other authors, who lived in the same period or had similar interests and artistic practices. Additionally, a comparative analysis can consider existing reinterpretations of a painting by artists from different generations. In fact, through appropriation, re-contextualisation and recreation processes, derivative artworks offer new perspectives on the original, building alternative narratives upon the initial creation [6]. Today, with AI image generation tools, the range of comparative hypotheses can be further extended through the creation of speculative images that could somehow exist, but do not, in online art archives [7].

Focusing on a specific case study – Aurélia de Souza's *Self-Portrait* (c. 1900), also known as *Self-Portrait in a Red Coat* – this paper examines how, in parallel with derivative works created by contemporary artists, images produced with generative AI tools can also shed light on less evident or less studied aspects of this masterpiece of Portuguese modern art. Drawing on both a literature review and a set of experiments performed in 2023, using three AI image generators – Aitubo, Microsoft Bing Image Creator and DALL·E 2 – this paper contrasts the descriptions found in fundamental bibliography on Aurélia de Souza's painting with the images generated by AI as a response to text prompts specifically designed for this study.

2. AURELIA DE SOUZA'S ICONIC SELF-PORTRAIT

Figure 1: *Aurélia de Souza, Self-Portrait, c. 1900. Oil on canvas, 45 cm x 36 cm. Museu Nacional de Soares dos Reis, Porto [8]*

Born in Valparaíso, Chile, Aurélia de Souza (1866-1922) was one of the few women to be recognised as one of Portugal's great painters of the second half of the nineteenth century [9]. In 1869, when her family returned to Portugal, they settled in Quinta da China, a farm on the banks of the river Douro, which would become the setting and studio for many of her paintings and photographs [10]. At the age of 16, she took up drawing and painting classes with António

da Costa Lima, a former disciple of Roquemont, and painted her first self-portrait in 1889 [11]. She later studied at the Porto Academy of Fine Arts and at the Julien Academy, in Paris, an independent art school where she attended courses by J. P. Laurens and B. Constant. Aurélia de Souza's artistic training was also marked by her trips and visits to museums during this period, not only in France, but also in Belgium, Germany, Italy and Spain. This was also when (c. 1900), she painted her famous *Self-Portrait* (in a red coat), which is unanimously considered a masterpiece of Portuguese art from the turn of the century.

This painting, which belongs to the collection of the Soares dos Reis National Museum, in Porto, was listed as a National Treasure in 2006. Over the last two decades, Aurélia de Souza has garnered critical acclaim and this particular work has been a prominent feature in various exhibitions and publications. Studied by Portuguese art historians from different generations, such as José-Augusto França, Raquel Henriques da Silva, Maria João Lello Ortigão de Oliveira, Adelaide Duarte and Filipa Lowndes Vicente, among others, the year 2000 marked a turning-point in the internationalisation of this self-portrait with its appearance in the exhibition *1900: Art at the Crossroads*, co-produced by the Royal Academy of Arts, in London, and the Solomon R. Guggenheim Museum, in New York. More recently, exhibitions such as *On Portraiture from Life* (2018), *All I want – Portuguese Women Artists from 1900 to 2020* (2021) and *Life and Secret. Aurélia de Souza 1866-1922* (2022) have re-centred this painting under the general framework of Portuguese contemporary art and within the scope of Aurélia de Souza's unique career.

The literature around her *Self-Portrait* (in a red coat) highlights the frontality and psychological intensity of the representation [12], which denotes a new interest for introspection and "self-awareness that emerged in the first decades of the twentieth century" [13]. Some authors further elaborate on the psychological dimension of the painting, referring to the tension between presence and absence [14] or between a restrained femininity and a masculine austerity [15]. Regarding the physical features of the sitter, some descriptions mention the severe head with reddish hair [16], the light blue eyes and the enigmatic gaze, while others refer to the pale tone of Aurélia's skin against the dark background and the explosive energy of her red coat [17]. José-Augusto França pays particular attention to the symmetrical composition, defined "by the high neckline of a blue blouse with yellow braids, with an amber pin [...], vertically along the parting of the hairstyle, the nose [and] the middle of the closed mouth" [18]. This symmetry is only interrupted by the concealed button fastening of the red coat. Filipa Lowndes Vincente and other authors also explain the affinity of this representation with photographic images used by the artist as a preparatory process for some of her paintings [19], namely portraits.

In parallel with academic and curatorial studies, Aurélia de Souza's *Self-Portrait* has also been the object of research and creative reinterpretation by contemporary artists, such as Albuquerque Mendes, Noé Sendas and Susana Mendes Silva. Such projects provide alternative insights into this iconic painting, as they recontextualise some of the aspects already studied by art historians and, at the same time, raise new questions by exploring different media (e.g. photography, performance) and establishing connections with other topics, works and authors.

Considering that "a derivative work is one which is not only based on a previous work, but which also contains sufficient new, creative content to entitle it to its own copyright" [20], this paper subscribes to the idea that derivative experiments can provide fresh perspectives on the original. However, the notion of derivative art has become a topical issue with the recent developments of AI image generators. In her book *Computational Formalism: Art History and Machine Learning*, Amanda Wasielewski describes AI-generated portraits as metarepresentations, explaining that:

"An AI-generated portrait can also be considered a type of composite image in that it draws its form from a multitude of images to create a new, single image that shares characteristics with these multiple sources. […] Whereas GAN is a far more complex process than simple photographic compositing, the algorithm cannot create anything truly new that is not related to the input that it is given. So, although the algorithm does create a completely new (and often unexpected) image, this image is always related in some way to the contents of the database" [21]

Hence, and since AI generated images are intrinsically derivative and composite, this paper seeks to investigate the potential contribution of such images to a broader study of Aurélia de Souza's *Self-Portrait*. Do they illustrate the main features highlighted by art historians and curators? Do they suggest any links with other works by the painter? Do they unveil any relevant particularities of her creative process?

3. REINTERPRETING AURÉLIA DE SOUZA'S SELF-PORTRAIT THROUGH AI GENERATED IMAGES

In order to respond to these questions, several experiments were conducted between July and November 2023 using three different AI image generators: Aitubo, Microsoft Bing Image Creator and DALL·E 2. The use of these three tools sought to compare images with different content and expression, despite being generated from the same text prompts. As observed by Jonas Oppenlaender, "today, beautiful and intriguing digital images and artworks can be synthesized from textual inputs ("prompts") with deep generative models" [22], which have been trained with massive datasets including millions of images available on the web.

Online guides and manuals for AI art generators usually emphasise the importance of prompt design, explaining that, in order to attain the best results, the text prompts should give simple, clear and detailed instructions [23]. In spite of their limited length, when using these AI tools for an artistic work, an effective "prompt should include specific descriptions, shapes, colours, textures, patterns and artistic styles. This allows the neural networks used by the generator to create the best possible visuals." [24]

Nonetheless, as the purpose of this study is not to develop a creative process based on Aurélia de Souza's painting, but rather to formulate a new hypothesis of interpretation, the prompts were limited to the essential idea of generating interesting derivatives. In order to minimise the author's interference in the production of such images, the prompts focused on the objective of creating a new visual interpretation of the original painting using generative AI, without any creative or visual inputs. Following this criterion, no photographs were uploaded to serve as a basis for the production of the AI images and no reference to artistic languages, techniques, background colours or visual effects was directly provided. The process began with very short prompts to which further details about the original painting were gradually added, such as the date or the reference to the red coat, which were introduced in some experiments as a modifier of the main prompt (see Table 1). It is important to note that the same prompts were repeated in all three AI image generators.

The following pictures correspond to the author's curatorial selection from a total of 82 images especially created for this paper. With Bing Image Creator the more generic prompts – i.e. "A new version of the self-portrait of the Portuguese painter Aurelia de Souza" and "A contemporary image inspired by the self-portrait of the Portuguese painter Aurélia de Souza" – produced a significant number of interesting results (see Table 1). The relevance of these images lies both in the consistent, yet sometimes subtle, similarities with the original and in the clues they may provide about the painter's creative process.

Figure 2: *Image generated by Bing Image Creator for the prompt "A contemporary image inspired by the self-portrait of the Portuguese painter Aurélia de Souza". Helena Barranha, 01.08.2023.*

This can be observed, for example, in Figure 2, which appears to be very similar to a scan of a vintage portrait photograph, taken in a studio, in the early twentieth century. The red, although present, is attenuated by the pattern of the blouse fabric and by the sepia tone that dominates the entire composition, also changing the colour of the sitter's eyes. Marked by the frontality and symmetry that characterise

Aurélia de Souza's self-portrait, this image allows the observer to deduce that there is a connection between the artist's work and photographic techniques. Indeed, and as explained by several art historians, the painter used photography as a means to investigate self-representation and arrive at the final painting [25].

Figure 3: *Image generated by Bing Image Creator for the prompt "A contemporary image inspired by the self-portrait of the Portuguese painter Aurélia de Souza". Helena Barranha, 01.08.2023.*

In the bibliography on Aurélia de Souza, the use of photography as part of the creative process is also associated with another famous self-portrait in which the painter represents herself as Saint Antony (c. 1902). A second image created with the same AI tool and the same prompt (Fig. 3) reveals intriguing resemblances with that painting, highlighting the triangular shape of the face and the slender figure of the painter. While this picture illustrates the Symbolist ideal of androgyny [26], other AI images (Figs. 4 and 5) evoke the painter's interest in transvestite representations, namely as in the aforementioned *Self-Portrait* as Saint Antony [27]. Although both images were created with the same prompt – "A new version of the self-portrait of the Portuguese painter Aurelia de Souza" – their expression is considerably different, revealing how DALL·E tends to generate less conventional images. It is also interesting to note that, even though the prompt did not include any reference to colours, in both cases the presence of red flowers creates a vibrant contrast with the rest of the composition.

Figure 4: *Image generated by Bing Image Creator for the prompt "A new version of the self-portrait of the Portuguese painter Aurelia de Souza". Helena Barranha, 02.11.2023.*

Figure 5: *Image generated by DALL·E 2 for the prompt "A new version of the self-portrait of the Portuguese painter Aurelia de Souza". Helena Barranha, 21.10.2023.*

Another series of experiments with more detailed prompts, including the date of the original painting and the reference to the red coat, led to equally diverse results. Such additional inputs, especially the red coat, ensured a closer similarity to the original painting (Figs. 6 and 7). Nevertheless, some of the results were quite surprising and, once again, DALL·E produced the most intriguing images.

Figure 6: *Image generated by DALL·E 2 for the prompt "A recreation of the self-portrait of the Portuguese painter Aurélia de Souza, dating back to 1900, also known as self-portrait in a red coat". Helena Barranha, 21.10.2023.*

Figure 7: *Image generated by Bing Image Creator for the prompt "A re-creation of the iconic self-portrait in a red coat of the Portuguese painter Aurélia de Souza (1900), with the same eyes as the original". Helena Barranha, 08.08.2023*

A variation of the same prompt, with a reference to Aurélia de Souza's eyes, also led to curious results (Fig. 7). Although many of the descriptions found in Art History literature underline the rigid symmetry of the Self-Portrait, on closer examination a slight difference between the painter's blue eyes may be noted. Interestingly, this is one of the facial features to emerge in different images generated with AI that may encourage the observer to explore the painter's work, in order to understand why. In fact, in other self-portraits, particularly the one in a blue blouse (n.d) [28], Aurélia de Souza highlights the asymmetry of her eyes.

With Aitubo the results obtained for the various prompts were more repetitive and, in most cases, less relevant than with the previous two AI image generators. In fact, the pictures created with Aitubo attest the visual specificity of this tool and its effectiveness for creating Pixar-styled images [29] that seem to belong to an animated film. A good example of these animation aesthetics is the image generated using only the link to the Wikipedia article on Aurélia de Souza as a prompt (Fig. 8).

Figure 8: *Image generated by Aitubo using only the link to the Wikipedia article on the painter as a prompt:https://pt.wikipedia.org/wiki/Aur%C3%A9lia_de_Sousa. Helena Barranha, 31.07.2023.*

4. CONCLUSION

As shown in the previous section, although the prompts used in the three AI image generators were exactly the same, the results were surprisingly diverse, thus proving that even when these tools are based on the same technology, as is the case of Microsoft Bing Image Creator and DALL·E 2, the visual output can be considerably different. The following table synthesises a qualitative assessment of the results obtained with the different prompts and AI image generators. This evaluation was made by the author based on curatorial criteria, such as the possibility of establishing a consistent relationship between the derivative image and the original or the existence of features that allow or invite the observer to discover relevant aspects of Aurélia de Souza's creative process.

Prompts	AI Image Generator		
	Aitubo	Bing Image Creator	DALL·E 2
A new version of the self-portrait of the Portuguese painter Aurelia de Souza	***	****	*****
A contemporary image inspired by the self-portrait of the Portuguese painter Aurélia de Souza	**	*****	**
A derivative artwork based on the self-portrait of the Portuguese painter Aurélia de Souza c. 1900	***	****	***
A recreation of the self-portrait of the Portuguese painter Aurelia de Souza c. 1900	***	****	***
A recreation of the self-portrait of the Portuguese painter Aurélia de Souza, dating back to 1900, also known as self-portrait in a red coat	***	****	*****
A recreation of the iconic self-portrait in a red coat of the Portuguese painter Aurélia de Souza (1900), with the same eyes as the original	**	****	****
Link to the Wikipedia article on the painter: https://pt.wikipedia.org/wiki/Aur%C3%A9lia_de_Sousa	*****	*	*

Table 1: *Relevance of the images obtained for each prompt, from ***** (highly relevant) to * (irrelevant). Curatorial assessment made by the author according to the objectives of this study, 2023.*

The research conducted for this paper aimed to investigate the ways in which images created with AI can expand perspectives on an artwork. Considering that "how computers 'see' images is fundamentally different from how humans process image data" [30] and that these derivative images are created through algorithmic associations between the original and other sources, it may be concluded that these images can effectively indicate new ways of looking at a given painting. Unfortunately, the current lack of transparency in generative AI does not enable an identification of the sources selected and processed among the millions of digital items used to train the machine learning model. Thus, it is impossible to decipher why certain images reproduce visual and cultural stereotypes while others are less conventional.

The study of an artist's self-portrait through the production and analysis of AI generated images is still a largely unexplored subject which, as argued throughout this paper, proves to be interesting when observing it from a different angle or finding other layers of meaning. From a curatorial point of view, this methodology of derivative comparison opens alternative possibilities for interpretation, study and associative display. Moreover, from an educational perspective, AI generated images can provide an effective means of engaging students in the study of a particular artwork by fostering autonomous discovery, as well as the development of detailed observation and visual comparison skills. In fact, the automated creation of digital images derived from an artist's self-portrait can actively motivate the interest of students in different levels of education in Art History, inviting them to identify the uniqueness of a certain artist, as well as to understand the specific features of an artwork and its underlying creative process.

Finally, and more importantly, this methodology can contribute to the current debates around the role of AI in shaping contemporary visual culture by addressing the increasing ambiguity between digitised originals and born-digital derivative works and also issues of authenticity, copyright and the politics of image appropriation and reuse. In doing so, this approach can fuel critical and creative thinking, thus contributing to promote visual and digital literacy.

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