Immersive Techniques and Artificial Intelligence in Contemporary Audiovisual Creation

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Abstract
Artificial Intelligence dazzles with its promise and revolutionizes all cultural creation, especially that most closely related to audiovisual, but also with many of the practices in the hybrid space between immersion and hybrid artistic projects. Its presence has disrupted the limits of what is possible in the immersion of the spectator, leading to a rapid advance in the field and the proliferation of projects in this line. Next, a tour is made throughout the current audiovisual creative panorama to analyze the current implication and impact of artificial intelligence in immersive techniques, as well as addressing ethical questions and reflections that arise as a result of its application, around authorship, the transformation of collaboration in creation.

Keywords: artificial intelligence; audiovisual creation; immersion; artistic techniques; aesthetics.

1. Context of current audiovisual creation in immersion

Generative art and audiovisual production, dependent on an interface that manages algorithms, constitutes the new reality of audiovisual productions (Manovich, 2013).

In its latest incarnation, Artificial Intelligence (AI) shines with its promise as the ultimate development in the increasing software-based nature of cinema and audiovisual creation although it has already been supporting the production of films and content behind the scenes for some time. Its camouflage in the form of visual effects is classic in the industry, especially since the advent of shape tracking, recognition and motion capture techniques, animation, color grading, and digital painting.

Despite its wide spectrum, it is perhaps in the field of immersive projects where its effect has been least characterized and visible. There are many reasons for this. A quick tour of this artistic and audiovisual area reveals the technological dependence that has conditioned its

historical development. Production companies such as Digital Domain, founded by James Cameron for his film projects, or devices such as Metastage as a specific set—composed of multiple cameras, screens, and capture accessories—declare that these narratives were only available to a select few. Basically, only the large traditional entertainment conglomerates have maintained the investment capacity to cope with such technological adaptation for sustained production similar to that of traditional films and projects.

This technical issue remains in both display and reception: although the illusion of spectacularization through a sense of three-dimensionality has been around for some time, it has evolved with the variation in format—from the traditional or standard 1.33/1.37:1 screen to 1.66:1 (VistaVision) and 2.77:1 (Cinerama) to curved screens—sound—in its commitment to increasing tracks and surround sound—and seating types. Later, IMAX technology took a leap forward with its application to conventional theatres, offering a wider screen and higher resolution. With 4DX technology, the seats started to move, giving the sensation of movement, and the theatre allowed viewers to smell and hear the narrative actions as if they were part of them. These examples lead to a genealogy that ranges from the illusions of perspective, stereoscopy, the 18th-century Panorama, the Cinéorama, simulation booths, the Sensorama, binaural audio, and video games to the limited success of experiments with immersive cinema, virtual reality cinema, and 360º cinema. Its artistic modality includes all audiovisual applications in the creation of immersive experiences, which produce a specific effect on the viewer and can be exploited for artistic purposes (Marí-Altozano and Sedeño-Valdellós, 2024).

2. Artificial intelligence and inmersion: general issues

Artificial Intelligence is rapidly making its way not only into the field of contemporary art, but also into many other disciplines such as medicine, programming, and audiovisual production. Its ability to facilitate, streamline, and solve problems that previously posed great difficulty or required extreme investment in resources is one of the most important reasons for its expansion: refining processes for immersion and the viewer's sense of reality within it (Marí-Altozano and Sedeño-Valdellos, 2024).

The application of AI techniques to immersive projects covers a wide range of cases in entertainment, education and training, tourism, marketing, among others. Virtual tours, simulations of places, destinations, and experiences, improved learning through virtual campuses and gamification experiences; the development of engaging campaigns, the creation of applications that enable interactions similar to those in real environment and much more; bringing up future lines of research in AI applied to immersive technology. AI technologies have been used to create content for augmented reality and extended reality, with the automation of map readings or gaze estimation (Anantrasirichai et al., 2016). Data collection techniques can be applied to measure the physiological effects of immersion through conflicting sensory

interactions (Ng et al., 2020), simulate real workspaces (Laver et al., 2017), or recognise its effects in surgery or physical therapy (Keswani et al., 2020). Extensive work is also being done on how artificial intelligence techniques create experiences that connect fictional virtual space and the real world in sports and training (Kumar, 2022).

In the field of immersive audiovisual production, its potential to build interactive human-AI environments gives it, from the user's perspective, an importance (matters) to its *raison d'être*, a significance to technology that transcends the control of its dataset. This importance or matters is essential for Wagstaff (2012), as it is what prevents the use of technology from becoming a mere artifice and gives it a real reason to exist and be in that product.

According to Manovich (2018), AI is relevant to four fundamental objectives in this field: content selection, content search, assistance in creation, and complete autonomy in creation (generative AI). The implication of the latter two in the creative phenomenon causes a seismic shift in the way we understand the authorship and artistic creativity. AI assistants are seen as a support for creation, a tool that assists creators in developing their work and production, becoming an “AI collaborator” (Knotts and Collins, 2020). And if it is understood that an assistant in creation is an essential part of the creative act, it should be elevated to ‘co-creator’ (Edmonds, 2018), which would bring into question its influence on the creative process, its *poiesis*, which in this case is based on its dataset, influencing its *aesthesis* eventually. This integration of AI into creative practices unifies, in a sense, the efforts of the artist and technology, resulting in a collaborative product that reformulates the concept of authorship toward a posthumanist perspective (Xu et al., 2024).

Collaborative AI maintains, to a certain extent, the hierarchy and primary authorship of the human creator, or at least equates it. However, generative AI (with complete autonomy for creation) introduces a much deeper reflection on whether what generative AI does is actually a ‘creative’ activity (Miller, 2020). This reflection has been the subject of analysis and study for decades. Projects such as Harold Cohen's AARON robot, designed to paint in the author's style, raised post-humanist questions and issues in art that are still relevant today. Along these lines, Galanter proposes the existence of alternative models of authorship in the context of ‘complexism’, a theory of generative art based on scientific complexity (West and Burbano, 2020, p. 4).

Along with questioning authorship and traditional models of intellectual property, generative AI also brings potentially malicious uses such as its use as a weapon against the artist to be a tool for plagiarism or the creation of works falsely attributable to authors, using an artist's style to conceive a product that can be stylistically associated with their works. The rise of fake news and the harmful use of AI has led to the emergence of studies in the field of art in this regard. These conclude that humans alone are not capable of correctly discerning between fake and real works of art by various painters, while deep learning models can discriminate

efficiently 89% of the time (Park et al., 2023, p. 5188). In fact, this reality has led to paintings winning art competitions when they were made entirely by AI, as happened in the "digitally manipulated art" section of the Colorado State Fair Fine Arts Competition (Kuta, 2022). However, it seems that people can develop acceptable criteria for discrimination when they are assisted or recommended by AI, through which they obtain additional information to be able to adequately assess visual content (Park et al. 2023, p. 5188). This opens a door to defeat and combat the malicious use of generative AI and prevent episodes of plagiarism and illicit profit-making activities by using other AI models that can provide tools to deal with such actions.

3. AI possibilities for immersive audiovisual creation (techniques)

AI has revolutionised the field of programming and building immersive experiences. Video game engines such as Unity and Unreal Engine, widely used in the field of VR world building, are joined by a series of AIs that improve technical procedures in programming and designing virtual worlds. One of the most widely used and readily available types of generative AI is the one designed to generate 3D models. The web market offers a long list of AIs for creating structures, avatars, or objects to design a virtual universe, such as Meshy AI, Promethean AI, Polycam, or Gaia in Unity, this one also capable of generating entire terrains. As with creating 3D models, AI can be used to detect objects and their characteristics in mixed reality projects. The AODNET AI, developed on the ResNet50 programme, allows elements of the environment to be recognised in real time for processing in VR digital art projects (Wu, 2022).

Traparic et al. (2023) propose an immersive visualisation system using ICE technology that improves the experience by automating the expansion of the sides of game elements, virtual worlds, and so on, supported by artificial intelligence technology, which enables the filling in of planes and later fragments of the entire space through outpainting or generative filling.

In addition to assisting in the generation of the visual environment, AI can generate resources for the design of personalised experiences for the user by controlling the NPC (non-playable character) avatars which the viewer will interact with. The Theatre of Tomorrow platform, dedicated to the creation of immersive experiences, works along these lines. Its programming of non-playable characters is based on connecting the avatar to ChatGPT via an API (Wu, 2023). Consequently, the dialogue is automatically generated from essential information previously given about their role and questions asked by the audience.

Beyond the design of virtual worlds, AI is also a potential tool for generating immersive video art without the need to create new metaverses. Programs such as RICOH360 Tours and Toolify AI allow users to generate 360-degree videos and images from pre-existing images. The Painting project by REM Experience works in a similar way, using AI to simulate a 3D environment built on paintings by artists such as Van Gogh and Grant Wood, building new imagined worlds according to how these artists conceived them in their paintings (Agrup Lab,

2013). These types of visual art projects often use intelligence that generates content from a type of generative network called GAN (Generative Adversarial Networks). Their implementation and use are becoming so established in the art market that the term “GAN Art” has been coined, considering this practice as a whole new style of visual art. A well-known example of text-to-image generation software is DALL-E 3. Developed by OpenAI, the third version of the system offers a significant increase in realism and consistency in response to user prompts. DALL·E 3 is developed natively in ChatGPT and is characterised by greater integration with the dialogue generation engine (Flathers, et al., 2024).

Alongside the visual field of video art, the audio component has been exploring new horizons and possibilities of AI to improve and strengthen its immersive capacity through spatial audio. The MIMOSA project is working along these lines, using machine learning models to obtain a high-quality, flexible spatialised auditory experience (Ning et al., 2024). In Europe, the SONICOM project led by Lorenzo Picinali has been focusing its studies over the last decade on the simulation of sound spaces and the physical characteristics of sound and its relationship with the environment, using its own AI-based HRTF modelling to create new spatialised audio engines such as 3D Tune-In Toolkit and the Binaural Rendering Toolbox (BRT) (Picinali et al., 2022).

These spatial audio systems are widely used in several immersive projects. Sound space simulation is an essential tool for improving the 360º sensation of the visual component through the sense of hearing. This is how the Lucid Loop experience developed by the iSpace studio works, using AI to modify the viewer's point of view by simulating a dream. Spatial audio is integrated as another element of the audiovisual creation presented through Oculus Quest headsets, with a simulated sound space thanks to the device's own HRTF model (Kitson et al., 2022). Applications designed with AI are also emerging for the creation of immersive multimedia experiences in which spatial audio is established and consolidated, such as the Deep Authoring application. It uses a deep neural network to automate complex processes such as detecting a person's position or recognising facial movements in 3D. This application allows 360º videos to be constructed from 2D images and 3D models, extending these into a spherical domain to construct the viewer's immersive perspective (Takacs and Vincze, 2021).

In addition to the immersive sensation, AI can help to construct sound content that emerges spatially, conceiving a human-AI interaction that ‘draws on the acoustic phenomenon as material for spatial sound’ (Einbond et al., 2022, pp. 3–4). Aaron Einbond proposes this way of using AI in sound in his works Prestidigitation and Cosmologies, designed for spherical speakers and a room with 32 speakers.

With regard to the generation of musical content itself, there has been a significant proliferation of generative networks available to users that allow them to create whole new songs and themes from a series of essential instructions. Intelligences such as suno.ai, moises.ai and

MusicStar.ai provide consumers with a complete tool for designing their own music by simply specifying elements such as the lyrics, style and even the voice of the singer they want to use, which raises a number of ethical and moral considerations regarding intellectual property and the rights of performers and composers that need to be addressed.Haga clic o pulse aquí para escribir texto.

4. The current state of AI-assisted immersive contemporary creation

The growth of VR is leading to an evolution in human-AI interaction, with the metaverse serving as the environment and place of interactive connection. Thus, museography has evolved towards the design of VR and AR environments where the way of approaching the work of art changes radically thanks to the use of AI, creating an ecosystem of mixed and virtual realities within museography (Martí Testón, 2018). These new museographic environments have seen the emergence of contemporary creations in which AI constructs and enables immersive interactivity with the viewer. The “neuro-mirror” by the Ultravioletto studio in Italy uses the person's own reflection in the mirror to modify its structure, colour and texture based on aspects such as emotional status (Fan and Wen, 2019). Nick Verstand also explores the use of machine learning in artistic creation with the work Anima. It consists in a luminescent sphere that reacts based on the emotions detected in the viewer, changing its light, movement and texture (Fan and Wen, 2019, p. 141). On the other hand, this new museographic trend has encouraged the proliferation of platforms and projects in which museums are made accessible to viewers remotely thanks to HMD (Head-Mounted Display) devices, also known as VR glasses. Finn Sinclair's VR Museum of Fine Art simulator offers a museum in the form of a metaverse where you can enjoy different artworks with complete autonomy of exploration for free, allowing you to read texts about the works, just like in a real museum. The Meta company also offers, for a fee, an exhibition hall focused mainly on viewing paintings from different periods with the VR Museum: Art Through Time application for Meta Quest devices. All these developments in VR environments dedicated to art and visual art exhibitions are emerging thanks to the advances that virtual reality has experienced in the field of video games, where these devices have found strong potential for exploitation. In this field, AI is used for various functions and roles such as assisting the player in games such as Final Fantasy XIII-2, improving the player's conditions in FPS (First-Person Shooter) video games, controlling NPCs based on pre-established behaviours in VR games such as Half-Life Alyx or Alien: Rogue Incursion, or generating content in real time, such as the instant creation of enemies or NPCs according to the player's progress (Safadi & Ernst, 2015).

In interactive theatre shows and VR theatre, machine learning is being widely used to generate speech, turning characters into living beings that can be modified according to what they are asked, using AI as a means of dialogue between user and creation through language:

‘The emergence of ChatGDP (Gross Domestic Product) as a creative collaborator within the domain of theatre opens an intriguing chapter in the evolution of both technology and artistic expression’ (Ren, 2024). This reality has already been illustrated on the Theatre of Tomorrow platform with the use of ChatGPT connected to NPC avatars to create dialogues. It can also be seen in Liina Keevallic's play It's Time to Fight Reality Once More, in which she trains an AI on A.I. Chekhov's plays to create a play with robots trained to respond based on Chekhov's text (Barale, 2024). These theatrical VR performances use video game development platforms such as Unity or Unreal Engine, along with techniques and resources where AI is helping programmers and developers design metaverses with high visual and interactive quality. VR productions such as Tempest by the Tender Claws company evidence the refinement and immersive capacity that new techniques for creating VR environments can achieve. In this production, the viewer travels through a virtual world guided by an avatar controlled by an actor (Rodríguez, 2021). Another large-scale show in which immersion reaches high levels of refinement in terms of audience involvement is Blanca Li's virtual dance stage production Le bal de Paris. Thanks to the use of VR headsets and next-generation human pose detection suits, the audience becomes a native avatar of a whole new metaverse where they are invited to dance alongside the rest of the audience to the rhythm and style of the choreography and scenarios presented throughout the journey in the virtual world (Li, 2020).

5. Findings

Immersive techniques and Artificial Intelligence are pushing the boundaries of what is possible in contemporary audiovisual creation. These technologies are not only changing the way media is produced, consumed, and distributed, but also opening new avenues for artistic expression, storytelling, and audience interaction.

Artificial Intelligence has burst onto the scene of immersive audiovisual production, making it easier and more accessible to create virtual environments and metaverses thanks to programmes such as Promethean, ChatGPT and Toolify. This has led to the proliferation of immersive audiovisual products that use AI, with different levels of relevance and impact on the content. These contents offer consumers a wide range of complete virtual environments to facilitate full immersion in new metaverses in applications such as The VR Museum of Fine Art or in video games such as Half-Life Alyx.

However, they also bring with them ethical and social issues that creators and the public must take into consideration when exploring their potential. Topics such as the principle of authorship and intellectual property, as well as harmful phenomena such as plagiarism, require careful examination in order to address future problems that may arise from the evolution of AI. Both positive and malicious use are already established realities in society, so the public needs tools to protect themselves from content produced through the misuse of AI.

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