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Evolution in Videogame Graphics: An Approach Between the Approach to Reality and the User's Perspective

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ABSTRACT

Technological progress in the video game industry has become increasingly visible at the time of consuming games, these tend to try to be more realistic either by the ambition of the developers or by request of the community of each video game; this approach to reality can be in various forms, the main one that we study in this work is in the graphic section, in-game mechanics, history and interaction with the game. Based on the existing intrigue of how video games today can be indistinguishable from life itself in their technical and graphical section, as well as being able to create emotional, immersive, and exciting stories; in this article, we analyze how these games can approach reality through everything they can offer us, analyzing the technologies that are currently used to make this possible and how we as users can perceive it as accurate. We use an analytical-descriptive methodology, using Scopus, IEEE, IGN, Google Scholar, and WoS databases. Thus, the purpose of this study is to review how video games increasingly come to resemble reality both in the technical/graphic section and in how users perceive that approach through the coherent narrative of the game. The results of this article show how the graphics engine has perfected the details such as particles, photo illumination, and environments; while artificial intelligence works with great support and improvement for greater power in the frames in addition to helping to refine the hyperrealism achieved by the graphics engine; for its part also the analysis of the behaviour of players when interacting with video games and that these transmit that immersive and authentic feeling at the time of consuming them. Concluding that the technologies of the games have had a significant advance in their graphical sections that now to see a scanned photo of nature is very complicated to differentiate it from an actual photo of some landscape.

Keywords: Graphical advance, Immersion, Approach to reality, Artificial intelligence, Graphics engines

INTRODUCTION

We are currently living a golden age in the subject of video games. We are reaching such graphic levels that it is challenging to tell briefly if we are seeing a video or a photorealistic simulation. If we get analytical, we are reaching the eternal dream of humanity to create worlds that, in certain aspects, are indistinguishable from ours. In a few decades, we have gone from seeing 8 pixels moving from one side to the other to seeing color, then perspective,

then 3D, then destruction in real-time, and now even hair or leaves with their physics (Reimer, 2005).

The interest in conducting this study is to present the technological advances for the development of video games; in addition to analyzing the aspects that influence the players' immersion, we do this using an analytical-descriptive methodology. The video game is considered a simulation tool, narrative, which dramatically influences behavior psychology, considering its ludic dimensions to tell the story through the game mechanics. The narrative goes according to the genre of the video game to generate a good atmosphere and progression in the story, being subject to the conditions and parameters imposed by the player deciding the course of the story (Carstensdottir et al., 2019) in its beginnings the narrative was irrelevant, with the time it was entered little by little from a brief story either with images giving a little more motivation to the player, until reaching the interaction with several characters solving the different enigmas, here greater importance is given to the story, and later with a more immersive character for the player making it more attractive to feel the intercommunication of the video game with audio-visual language as in the use of a first-person perspective camera making it more immersed in the story with new narrative techniques giving the viewer a better gaming experience.

Although no advances are without challenges, this process has led to today's advances. At this point, the graphics are so realistic that we begin to simulate reality, but how is this possible? The most significant breakthrough in our days we are seen with the graphics engine Unreal Engine 5, owned by Epic Games; this incorporates a new technology called Nanite, which is a real revolution of the technique, taking the rendering based on polygons to the next level, among other tools we see the DLSS and Ray Tracing, both properties of Nvidia, which through the use of artificial intelligence increase the performance in frames of the games creating new frames of the AI and increasing the tracing and refactoring of light in the environments of the games making them even more realistic to the eye of the users (Newell et al., 2021).

The truth is that graphics in video games have always been one of the main objectives of development. Unlike the gameplay mechanics, art direction, or the story of the video game, graphics is something you can excel with investment. Thanks to this technical development in the graphic section of the games, we have seen dizzying progress in the world of video games. This dynamic has made the graphic quality essential to sell a AAA video game, and in turn, this can look realistic (Ivanov et al., 2021).

MATERIALS AND METHODS

METHODOLOGY / DEVELOPMENT PROPOSAL

This study is based on an analytical-descriptive literature review, applying a query to the primary databases (Scopus, WoS, IEEE, E3, IGN, STEAM, and Google Scholar) about the graphical section of video games and their approximation to reality to determine the changes and improvements in the

graphical section of video games and their relationship in resembling reality and immersion for the user, through the fulfillment of the following phases:

Phase 1
This article is a review of the graphic section of video games and their approximation to reality, it is of scientific-analytical analysis, which is determined using a review of conditions, changes, and improvements in the graphic section of video games with their relationship in resembling reality and immersion for the user.

Phase 2
A review is made about the most famous technologies of the moment, it is of scientific-analytical analysis, its operation is reviewed, to which it is oriented, and how it increases the performance and the graphic quality in the games.

Phase 3
A review is made about the psychology behind the narration in video games so that the user can consider the product he is consuming as accurate. It is of scientific analytical analysis, and it determines the visual aspects, the aspects of narration in the story of the game, and the interactive section in contrast with the visual and narration.

THEORETICAL FRAME OF REFERENCE

The video game is considered as a simulation tool, narrative, which greatly influences the psychology of behavior, considering its ludic dimensions to tell the story through the game mechanics. The narrative goes according to the genre of the video game to generate a good atmosphere, the course of the story, being subject to the conditions and parameters imposed by the player deciding the course of the story (Carstensdottir et al., 2019). In its beginnings it was small or invalid without telling a plot, with the passage of time it went into little by little from a brief story either with images giving a little more motivation to the player, until reaching the interaction with several characters solving the different riddles, here they are more dedicated to the narrative as in an adventure video game, and later with a more immersive character for the player making it more interesting to feel the intercommunication of the video game with audiovisual language as in first person making it more immersed in the story with new narrative techniques giving the viewer a better gaming experience.

TECHNOLOGIES MOST USED IN VIDEO GAMES FOR THE APPROXIMATION OF REALITY

Within the world of games, the first time a machine was taught to play against us was in 1950 when Alan Turing managed to get an algorithm to play chess more or less correctly; the first time he tried it, he had to print each move of the algorithm in a process that took 30 minutes per turn, all this effort resulted in a defeat for the machine in a total of 29 moves (Turing, 2012).

AIs have many uses, and within video games, they are essential since, without them, there would be nothing within video games, referring to enemies, challenges, interactive NPCs, or rivals (Skinner & Walmsley, 2019).

PRESENT AND FUTURE IN VIDEO GAMES

Modern video games can create scenarios indistinguishable from life itself, all this is accessible to anyone who has a PC capable of managing it. It is not necessary to use the most potent commercial graphics engine of the moment to achieve this since, with a lot of patience and community tools, many people have made it their hobby to make graphical improvements to existing games, the most famous case of this is GTAV which is an 8-year-old game that with MODS made by the community looks like a movie (McCauley, 2016).

Photorealism and scanning techniques are currently we have them quite fine-tuned for environments, landscapes, vegetation, etc. But what we still struggle with is ourselves. Today, we make realistic human faces, but we can still quickly notice something about them. We can be impressed if we are told that the landscape is not natural but a rendering, but that still does not happen with human characters because the graphic advance has run into a big problem: our evolution. Humans have the innate ability to recognize others of our species, so we have the innate ability to recognize others of our species.

So that is why when we see a simulation of our humanity that is not real, we tend to reject what we see.

Technology advances relatively fast, and artificial intelligence is something that surprises more and more to the point that today we have an "e-celebrity" as the profile of lilmiquela on Instagram or this person does not exist on Twitter, also the function of Deep Fakes that consists of emulating the appearance of other people, we have artificial intelligence as Dali or Stable Diffusion that can visually interpret the descriptions that are given in a text box (Rodrigo Martín et al., 2021).

Nowadays, AIs can create entirely new worlds in each game that is started, called procedural progress. They can create almost infinite worlds, as in the game No Man's Sky. In principle, they can automate creativity many newspaper articles and other media are written by an AI, as is the case of The Washington Post; there are also musical pieces created by these as the song "I am AI" by AIVA, that are indistinguishable from the human product (Mihailova, 2021).

The power of these new technologies opens possibilities that were unimaginable just a few years ago, both creatively and technically.

RESULTS AND DISCUCCION

Question 1. Do you consider that video game graphics have evolved over the years?

Analysis. All the people who carried out the survey think that video game graphics have evolved significantly over the years due to their graphic advances, forms of creation such as textures, and more realistic details (see Fig. 1).

Table 1. Graphics over the years.

Indicators	Quantity	Percentage
Have worsened	0	0%
Significantly improved	80	100%
Have not changed much	**0**	0%

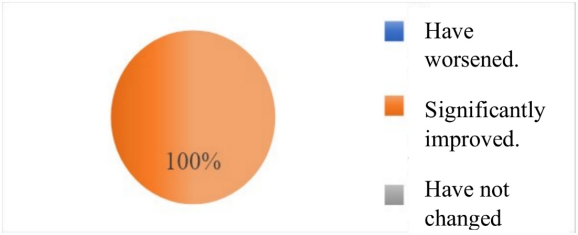

Figure 1: Graphs over the years.

Question 2. How close are current video games to reality?

Table 2. Approximation of video games to reality.

Indicators	Quantity	Percentage
Little	16	20%
Very Little	2	2%
A lot	62	78%
Total	80	100%

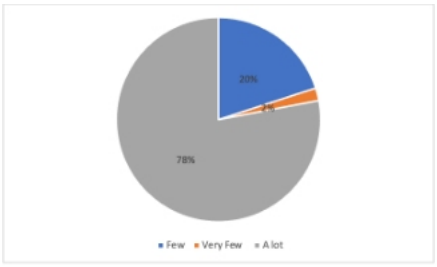

Figure 2: Approximation of video games to reality.

Analysis. All the people who carried out the survey think that video game graphics have evolved significantly over the years due to their graphic advances, forms of creation such as textures, and more realistic details (see Fig. 2).

Question 3. To what extent does the graphic quality influence the user experience?

Table 3. Graphical quality in the user experience.

Indicators	Quantity	Percentage
No influence	0	0%
Influences slightly	10	12%
Significantly influences	70	88%
Total	80	100%

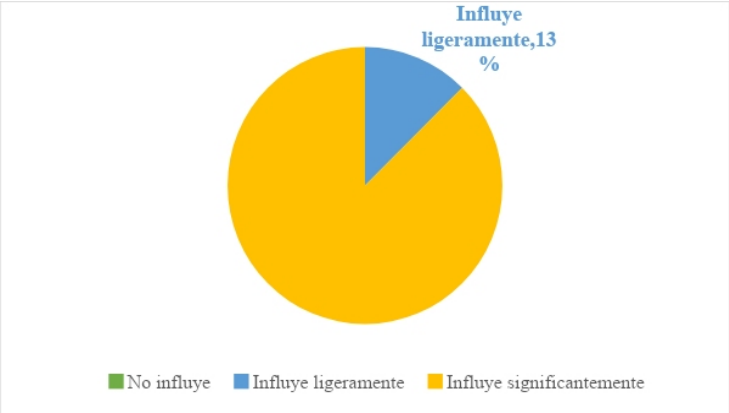

Figure 3: Graphic quality in the user experience.

Analysis. Of the total respondents, 88% of users state that graphic quality significantly influences the user experience. In comparison, 12% of these people consider that it only slightly influences the experience (see Fig. 3).

CONCLUSION

Technological advances show that video game development techniques have been perfected, either by having a powerful graphics engine that allows excellent management in the pixels of the games to improve the care in the details, use of artificial intelligence in the GPUs to improve the lighting in the environments allowing to have refractions, occlusions, reflections, shadows, and transparencies, and the ability to learn from the frames of the game to create entirely new ones to lighten the load on the computer when running the games to obtain a better frame rate.

The analysis of the three factors of immersion in games has denoted that these become important now in which the player must interact with the game, either for its mechanics or its story. Feeling that what we are doing in the game has some kind of repercussion and that it is developing coherently to the narrative or some historical fact if it is the case, helps the player feel part of the game and not an external agent.

In the surveys, the technological advance has been very well received by the users, making them feel a more incredible experience, being more realistic nowadays due to the industry's changes. In the interview, both experts agree that one of the leading tools in the market is Maya, for its way of modeling, considering the details, being fundamental to give it a more realistic look.

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