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Digital Technologies in Video Games

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Abstract

The world of video games is constantly growing and developing, and the digital technologies add new dimensions to it. The paper reviews recent data regarding the impact of digitalization on video games. Over the last few years, some major progress has been made in digital technologies, such as immersive media, machine learning or facial recognition. But how does the world of online gaming fit into the new era? Are digital technologies put to their best use within the gaming industry?

Keywords: video games, machine learning, artificial intelligence, virtual reality

Introduction

First online games are considered to date back before the creation of the Internet, as it was possible to play them on different types of computer networks. However, the gaming community tends to agree more with online gaming having its origins in the late 20th century, shortly after the Internet was created in 1983. Regardless of its true origin, online gaming has been known to have a spectacular development over the years, especially after the Internet.

Online video gaming has progressed together with computer development and technology enhancements. From pixelated images to high definition graphics, from slow machines to top speed servers, video games have proved they can keep up with the technological progress. And even help this progress, as gaming has always been a handy mean to test and correct some of the technical enhancements invented over the years.

Among the video games that were created around that timeframe and have developed together with the technological advancements, there are World of Warcraft (1993), Grand Theft Auto (1997) and StarCraft (1998). With such powerful role-models, game developers have had quite some sources of inspiration for the games that are now dominating the market, such as League of Legends (2009), Dota 2 (2013) and Fortnite (2017).

There is something else fascinating about the gaming community and that is, of course, competition. First video game competition was considered to have taken place in the early '70s, where winners were established based on the higher score. Around the '90s the concept of E-sports was better defined, and even before the year 2000, there were large E-sports tournaments taking place. Nowadays the concept has been taken to a higher level, with professional leagues separating themselves from the usual 'gaming as a hobby' acknowledgment.

This brings us to present time, the digitalization era. Over the last few years, some major progress has been made in digital technologies, such as immersive media, machine learning or facial recognition. But how does the world of online gaming fit into the new era? Are digital technologies put to their best use within the gaming industry? The gaming community says, 'Definitely yes!'

Immersive Media and the Gaming World

As games have continuously evolved over the years, so have their players. Nowadays, people playing video games have higher expectations from the final product than they did 10 years ago. Even 5 years ago. It is no longer satisfying enough to play the game from behind the screen – the gaming community cannot just watch anymore, it needs to join in the fantasy worlds they usually admire from their highly comfortable chairs.

Adapting the popular saying “Your wish is my command”, one could say that the gamers’ wish is the game development companies’ target. Therefore, if the gaming community wants to go from observing to participating, the development companies need to step up their game. Luckily, we are living in the digital era, and there are many digital technologies that come handy to needy companies.

For fulfilling the above – of the many wishes This sounds unclear to me– for gamers, technology gives us the Immersive Media. Under the term of “Immersive Media” fall many means of representing a fictional world in a way as close to reality as possible. Applying this fiction-to-reality experience within the video games, the best technologies to do the job are augmented reality (AR) and virtual reality (VR). We should either capital or small letters but it should be used the same everywhere.

The augmented reality is basically a technology that adds digital elements to the real, surrounding world. This is mostly done by using a mobile phone camera – consequently, leading us to the mobile games breach. The best example from the last years of a game using by-the-book AR is Pokémon GO, where players would wander around cities and parks looking to catch fictional characters on their smartphones.

AR is definitely an interesting technology, but when it comes to video games, VR is the juicy stuff. While AR alters the reality only on the device used by the player, VR completely locks out the real world and transposes the player into the fictional world. Hence, during playtime, the player’s real-world is replaced by the fictional one. Yes – this is the gamers’ wish.

Virtual reality on the gaming market has had a very successful growth up until now, and it is forecasted to continue like this. According to current game market trends, the growth will be

sustained by developing more affordable VR hardware equipment, by constantly innovating the current technologies and last but not least, by the cost reduction of the VR games.

Merging virtual reality with the games that they love and know from childhood will, for sure, give gamers the experience that they are looking for. By wearing a pair of glasses, the players are transposed to the fictional world, with 360 degrees graphics and content that will make them feel they are actually in the game. In addition to this, there is also the next level of interaction, where the player does not control a character anymore – they become the character in the game.

The experience sounds amazing and most of the dedicated gamers cannot wait to try VR games. But then the bigger question comes – what type of games do we get to play with VR? As expected, the leading type of game on the market also got the lead with VR – shooter games. First-person shooters set the perfect parameters for an authentic VR experience. The player gets to be the protagonist of the game, surrounded by visual and audio effects like gunshots and explosions. Right behind shooters, there are the racing games, which are expected to have an interesting development – given that gamers are promised palpable surroundings in the near future.

In the popular type of games category, there was always a special place for adventure games. The storyline is far more interesting using 3D graphics to the detail and the experience – a lot more interactive. Honorable mentions for virtual reality using are horror games, gambling, and casinos, but also city-building games. And even though the latter had a slower start with the VR technology, with better and better hardware equipment, city-building games started taking their place around 2018.

All in all, the future of VR gaming is promising. Hardware companies are doing their best to produce more comfortable equipment, as well as to reduce the time between the setup and the actual experience. Alongside with this, gaming companies are said to rise to the standards and develop games more suited for the VR environment.

ML and AI – Are We Playing Alone?

Next thrilling digital technologies with great applicability in the video games community are, and there is no surprise here, Machine Learning (ML) and Artificial Intelligence (AI). Although it may seem that these technologies are very similar, there is a fine line between AI and ML.

Artificial intelligence has its definition embedded within its name – it is a non-natural, human-created way of thinking. AI is not a system itself, it is implemented within a system. It leads to decision making and intelligence. Increasing the chances of success is AI's main goal, rather than accuracy.

Machine learning is actually a type of learning which benefits from AI's help and it is aiming to improve accuracy rather than success. It is the type of machine that learns on its own without needing to be previously programmed. ML takes a model data set and learns from it. This technology involves developing its own algorithms and self-teach. In the end, it leads to knowledge and it allows the system to improve and learn from experience. So it may seem that AI and ML are very similar, but their applicability within the video games world has some significant differences.

In video games, the best use for AI is to generate intelligent and more responsive behaviors of the non-player characters (commonly known as the NPCs). Behind this, there is a thorough implementation of different types of decision trees, used to guide the NPCs' steps during the game. This is what makes video games interesting and fascinating for players – that even though they may choose single-player games, they have the feeling that they are not playing alone.

Artificial intelligence has other uses within video games besides the above. Interactive stories and even fresh content can be generated with the help of AI, such as surrounding music and weather conditions. Another important example of AI usage is data mining regarding users' behavior. This data allows game development companies to figure out better ways to monetize the products, based on gamers' wishes and behaviors.

Most exciting happening in the gaming community that involved artificial intelligence is when Google's AI system called AlphaGo won a tournament against a human player. The AI won 4 out of 5 games of the abstract strategy game "Go" against the 18-time world champion at "Go".

When it comes to machine learning, we have some slightly more interesting facts related to the video gaming world. This technology is not actually used in the game itself, as in its development phase. There are many ways in which ML is being implemented in video games. For instance, there is the concept of reinforcement learning, meaning that the system is told what is right and wrong rather than what to do next. Adding punishments and rewards related to these facts, eventually, the system will recognize what it has to do in order to get more rewards than punishments. Therefore, this leads to infinite possibilities of scenarios the machine can generate while the gameplay evolves.

One of the machine learning's best advantages is that it aims to dynamically respond to the gamer's actions and queries – and real-time! This means that the limitations of fictional worlds caused by planned programming will slowly disappear. To sustain this, a freshly developed game called “No Man's Sky” is now on the market, where the player discovers an infinite number of scenarios while exploring the game.

A much-unexpected approach for ML usage within video games is for beautifying them. Developers are working on rendering and enhancing images dynamically using machine learning. Usually, in video games, the big picture is the one that seems more detailed and clearer, but as the characters are approaching different elements, their details get lost or pixelated. Using machine learning to enhance image graphics is supposed to render close details as expected.

Big challenges are up for game development with machine learning in the future. First and most important is the lack of data to learn from. As the technology is still considered in its incipient phase, there will be years before machines will have strong data sets to learn from further. Once this is achieved, more enjoyable content and more unique gameplays should be available for passionate gamers.

Facial and Voice Recognition – The avatar is me!

Facial recognition uses technology to recognize a human's face. The system analyzes a picture of a human face, uses biometrics to map it (based on factors as the distance between the eyes) and then cross-references it with a database that contains multiple images in order to check the identity.

With gaming, facial recognition plays well with 3D scanning to allow players to create virtual avatars to their resemblance and likeliness. Even better is that special effects can be applied to the self-image translated into the game, so personal avatars look funny and cartoonish.

Going further than physical appearance, facial recognition is set to analyze the emotions that people have. What can this do for the gaming industry? Systems can analyze the emotions one player has at a certain stage or level of the game and choose the best following gameplay according to the emotion. Meaning that the gaming experience can become much more customizable than it currently is. Following this, game developers are set to remove the conventional joysticks or any other hardware equipment and replace them with face and hands gestures.

Are there any disadvantages to facial recognition in video games? Definitely. And as usual, safety comes first. Unfortunately, hacking facial recognition systems are often hidden and untraceable. Players could have their facial data stored, even without giving permission. Following this “mysterious” path, they would not even know who has direct access to their facial signature. In addition to this, facial recognition systems have a long way to go until they are considered stable and accurate. Lacking perfect accuracy, players may be mistaken with one another by the system – and we all know what precious treasures each and every gamer account holds.

Alongside the above, there is still room for developing multiple advantages for facial recognition usage. For instance, this technology helps gaming companies monitor their players. Although video games’ target audience is usually around teenagers to mid-age people, younger children have started to develop an interest for the gaming community as well. Of course, with age comes limitations. As an example, children in China are limited at one hour of gameplay based on facial recognition, in order to better prevent future game addiction or medical conditions such as Myopia or near-sightedness.

Voice recognition is a technology at least as interesting as facial recognition. It may be more familiar used with the newly developed virtual assistants, as Alexa (for Amazon), Cortana (for Microsoft) and Siri (for Apple). The system analyzes the voice of a person, aiming to interpret phrases and words.

Unluckily yet, the gaming community has not had a better taste of this new type of technology. When it comes to video games, voice recognition is barely a concept. Gaming companies that go about the idea of integrating this technology aim to provide a more immersive and personal experience for the players. Another advantage would be that beginners could skip the part where they need to learn all the controls of the game and jump right in the gameplay.

Although game development companies have a long way to go before achieving the first fulfilling results with voice recognition, we can say that the future looks promising for the collaboration between these two.

Conclusions

The gaming community is a fascinating world as it is, and it has been like this since the beginnings. Adding digital technologies to video games will only increase the level of fascination players have for this world because they will have the opportunity to be a part of it more than ever before.

Virtual reality and augmented reality will allow players to become the game protagonists and to replace their realities with the one in the game. Artificial intelligence and machine learning will surround them with virtual character friends and new challenges, as non-player characters will gain more personality and advanced decision making. Facial and voice recognition will draw the highest level of integration with the game, making it a more immersive experience than ever.

Put together, all these digital technologies form a mighty alliance that is set to not only improve but upgrade the gaming world that we know to a whole different universe.

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