A Review on DISDAIN: An Auto Content Generation VR Game

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Abstract: *This document discusses the manner in which DISDAIN has been conceptualized, developed, implemented, and evaluated, looking into its major mechanics, algorithm-based content creation as well as user interaction and all impact it has made on virtual reality gaming. It explores DISDAIN's design and implementation with much detail to highlight how procedural content generation can improve replayability and immersion in virtual reality games. The results from user testing and gameplay analysis indicate that the game has been successful in providing various experiences that are interesting while at the same time ensuring high levels of player contentment. Besides, this study analyzes technical performance and adaptive AI of DISDAIN so as to project what may be expected from dynamic content generation in VR gaming in future. In general, these results indicate that DISDAIN is a starting point for new developments in VR gaming henceforth while at the same time setting new standards for this kind of game category.*

Keywords: DISDAIN

I. INTRODUCTION

A video game is that one type of media entertainment requiring users' interaction with an electronic device- they are digitalized media played on computers, consoles or mobile phones. You find games in everywhere. One million of global residents play every-day different video games like The Sims, Call of Duty and World of Warcraft, Farmville and StarCraft . For this reason the presence of content inside a video game becomes significant as it helps to keep people engaged. However, demand for quality content has increased to where it cannot be quantified any longer; its budget is impossible to determine. Nevertheless, an approach towards addressing this challenge would be to use Procedural Content Generation technique (PCG) in game. In other words, PCs generate content through certain algorithms. This technique was first observed by Toy and Wichman back in 1980. Nevertheless no researchers have carried out enough research on this aspect despite efforts to minimize creation costs for contents. Therefore PCG faces some challenges which remain unresolved so far. Moreover and despite having the ability to produce types of contents that would please artists many players still prefer hand- made creations to those generated through computers. Writing these types of works is complex because they cannot please both the artist as well as a player at the same time.

The reason for the establishment of DISDAIN was a wish to develop game with virtual reality that can change according to players' actions or decisions, enabling it to be always new and unexpected. Thus, through innovative methods of PCG the game not only solves the issue of repeating content but also makes available interactivity and immersion at another level. Each time players enter into DISDAIN they find themselves in changing environments which are determined by their specific play style as well as choices they have made before; every session is like a different journey.

DISDAIN's impact reaches far beyond its own immediate experience of gameplay. In demonstrating an effective use of PCG in VR, the game has set an example for other future VR titles. Moreover, it illustrates how one can use dynamic content generation for enriching video games with deeper meanings leading to greater engagement . Ultimately these insights offer valuable information for game designers/developers who are interested in exploring possibilities offered by procedural generation within the realm of virtual reality.

In short, it can be said that DISDAIN: An Auto Content Generation VR Game has been a big step forward for VR gaming. With its use of procedural content generation, the game provides a distinctive and ever-changing environment that stimulates players' interest as well as tests their skills. This introduction outlines the motivations, design principles

and technical foundations behind DISDAIN; these will aid in exploring its implementation details, outcomes and influence on the VR gaming industry subsequently.

II. LITERATURE SURVEY

The concept of automatic content generation in virtual reality (VR) games is an intersection of procedural content generation (PCG) and immersive gaming experience. This technology seeks to design game content that is flexible enough to be able to adapt itself constantly in a way which increases the number of times players can play it or their involvement. There is a lot written on auto content generation for VR games, with different methods, algorithms and implementations.

PCG is an important field of study and development in the gaming world that deals with automated creation of the game contents. Many traditional video games have utilized PCG techniques to create different items like terrains, levels, stories, and characters. Hendrikx et al. (2013) provide a complete overview of PCG methods by classifying them according to type of content and algorithms used. Their work emphasizes how PCG contributes to efficient and replayable games.

When moving from PCG methods into VR worlds, there are various challenges and possibilities that are one-of-a-kind. To ensure a completely engaging experience with VR where users can actually interact with their computer-generated world, it is very important to use procedure development this way. In their work, Togelius et al. (2011) reveal some of these obstacles, pointing out the necessity for online production as well as heightened demand on PCG equipment due to VR. The immersive essence of virtual reality requires that the contents not only look okay but also resemble an authentic interaction with the player.

Systems that generate content depending on player actions and preferences are called adaptive content generation systems. And so Yannakakis and Togelius (2011) have a look at the theory of adaptive game design where artificial intelligence techniques are used to simulate player behaviors in an effort to adjust game content. Such adaptation is essential in maintaining player engagement in virtual reality gaming as it ensures that the generated materials remain relevant and challenging all through the playing experience.

Advancements in auto-content generation technology have been made possible with artificial intelligence (AI) and machine learning (ML) integration. AI-based methods which incorporate deep learning and reinforcement learning make it possible to create elaborate as well as context-moored gaming environments. Zhang et al. (2020) review how AI is applied in video gaming content creation showing its ability to provide interactive VR experiences that change according to how people interact with them in real time. These innovations make those nuances of neuromotor functions taken by avatars while having an extraordinary level of immersion into play more sophisticated thereby raising overall quality gaming VR world experiences.

Adaptive content generation systems adapt to player choices and action and create individualized and adjusting experiences. The concept of Adaptive Game Design is studied by Yannakakis and Togelius (2011), in which they utilize AI techniques to simulate player actions, and adapt game design to them. In that respect, adaptability is important in keeping the players engaged in virtual reality (VR) by ensuring that the content produced is always exciting and relevant during gaming period.

There have been great advances in the field of auto content generation owing to integration of AI with machine learning (ML). AI-based techniques like deep learning and reinforcement learning provide means through which complicated dynamic environments for game can be built. A review on how artificial intelligence (AI) has been applied in video gaming suggests the potential applications of using VR that may change based on interactions made by a player instantaneously according to Zhang et al (2020). Such systems can produce more involving scenarios for gamers hence enhancing overall immersive experiences found while playing VR games.

III. IMPLEMENTATION RESULTS

Game Design and Mechanics DISDAIN takes place in a gloomy, dystopic world and is played from a first-person perspective. Players must traverse procedurally generated landscapes etched with trials, riddles as well as enemies. In this regard, the fundamental mechanisms of this game involve exploration, fight and more ways of resolving issues that are determined by if not given to the gameplay parameters sensors.

Procedural Content Generation

The core of DISDAIN is its PCG system, which generates game content in real time. The algorithm relies on both predefined rules and randomization twists such as a combination of preprogramed parameters and probability to generate unique game settings, enemies' placement, item disposition or disposal. All these together make sure that there are no similar levels from one session to the other hence making it more interesting. The PCG framework has several components:

1. Level Design: Involves using small parts that when put together, will form a whole level made from the available pre-designed assets.

2. Enemy AI: Adjusts itself to suit how the player operates hence keeping it challenging.

3. Puzzle Mechanics: Randomly choose and alter puzzles making them dissimilar every time they are solved.

Technical Implementation

DISDAIN has been developed using Unreal Engine 5 due to its excellent graphics and ability to support Virtual Reality (VR). An amalgamation of both Blueprints and C++ forms the basis of the game's Procedural Content Generation (PCG) system, meant for high performance. Major features include:

• Real-Time Content Generation: Delivers uninterrupted gameplay without evident loading times.

• Incorporating Machine Learning: With this feature, it is possible to analyze player movement patterns and make game harder or easier as necessary

• VR Optimization: Motion sickness is minimized by ensuring optimal frame rates are maintained while still using easy to use controls so that gamer's experience is as comfortable as possible.

IV. RESLUTS

USER TESTINGDISDAIN was subjected to extensive user testing involving participants from various walks of life including casual gamers and VR fanatics. Data collected comprised of surveys, interviews and game metrics.

Innovations

1. Integration of AI for Dynamic Content Creation: DISDAIN is the first-ever VR game to use real-time AIdriven algorithms in the generation of its contents. As a result, the algorithm can create experiences that adapt uniquely based on the players' interactions thereby giving them live challenges they might not find elsewhere in other video games.

2. Seamless User-Generated Content Integration: The game design allows for seamless incorporation of UGC into its central gameplay experience. This way, players can have a say on how it unfolds while the game keeps on engaging them as they play it.

Key Findings

1. Engagement: Player feedback indicated high levels of engagement attributed by the unpredictability embedded in the gaming range.

2. Replayability: The procedural content generation led to an increased replay value for the whole gaming experience.

3. Immersion: The users commended the immersive nature of the VR experience citing realistic environments together with adaptive challenges.

Quantitative Metrics

• Average Session Length: A notable increase (by 35 percent) as against classical VR games.

• Client Retention: Seven out of ten longtime players returned for several passages.

• Performance Metrics:a sustained frame rate of more than 90 FPS achieved throughout various types of VR headsets.

V. ANALYSIS AND EVALUTION

Once the game is finished, the subsequent step is analyzing the application. To accomplish this research, a minimum sample size of 3018,19 is required. Two evaluations are being used, first is the PCG evaluation and second one is GUESS evaluation on player satisfaction scale. The samples taken are from individuals aged between 15-40 years who are categorized as teenage and young adult.

Bottom-Up:

The game has two types of PCG wherein first: a story or narrative has been developed second: game space or level has been created. In order to evaluate a generated narrative that can be contained within different PCs, they should be evaluated using a previously established bottom-up evaluation technique. The immersion aspect of the game experience questionnaire was employed as this impacted player immersion through narrative or story effects but not necessarily any other concerns regarding this title such as performance or control. The findings appear in Table 1.

The design of VR games has come a long way due to the unique application of procedural content generation in DISDAIN. With its dynamically created fresh content in every playthrough, it helps to eliminate monotony that affects most games. Additionally, in an attempt to make the game more personalized for each player, it has automatic artificial intelligence and varying environments that best suit their levels of expertise, stages of life among other factors. For the output we see here ,it yields a narrative score of 0.721333 indicating that players are quite satisfied with its generated content . In figure 8 below there exists a 2D histogram generated from 356 turn generated materials which were turned into heat map- like shapes after going through certain transformations .

Top-Down Evaluation

Two metrics were employed to evaluate the behavior of the game space content generator which are Density: Measure the space used to create the level and Leniency:

Measure the difficulties for the player to navigate the level, the greater it is, the frolicker it is to navigate it. As shown in Figure 8, a map with high Density is preferred by the generator and it also prefers generating maps with very low Leniency that denotes hard wayfaring through open areas of games. There are also signs of biasness in this case since high leniency combined with high density has been produced these content. Most of these scores have been positive with exception of narrative whose score is fairly good. A score of 0.77 on the Satisfaction Scale means that overall the game is good.

Strengths:

• Dynamic Content Generation: DISDAIN employs advanced procedural content generation (PCG) techniques so as to generate distinct and diverse gaming environments. In doing so, it makes sure each time one plays the game; they experience something different from before hence eliminating the monotony experienced in other conventional VR applications whose materials may seem dull or boring after repeated visits.

• Real-Time Adaptation: The title adopts real-time content adaptation, a technique that modifies the game environment based on how players interact with it or what they want. This aspect enables a player not only to stay at levels that are difficult but also be entertained throughout hence catering for their unique style and capability.

• Enhanced Immersion: DISDAIN leverages sophisticated AI and ML to create contextually fitting materials which make gaming more engrossing and enthralling by implication. In fact, this skill is quite vital when it comes to virtual reality (VR), where being there mentally counts a lot if one is going to remain captivated by their game.

• Content that Comes from the Community: DISDAIN includes player-generated content whereby players create and share their own game situations. By adopting this method, the game not only has a long life but also possesses a feeling of ownership and creativity in it.

• Special Times: every time you play this game; it provides a unique experience, thus making sure that gamers remain fascinated.

• Scaleable: it is possible to add new assets or mechanics to content generation system of the game without any trouble.

• Technological Soundness: It ensures compatibility with various virtual reality platforms by having high performance and being well optimized as well.

Limitations:

Computational Demands: This can be a major limitation because of the requiremens for powerful hardware which may restrict the game's accessibility to players with high-end VR systems used in real-time content generation and adaptation. It means that this demand may necessitate for powerful hardware since the hardware power some users own may hinder their access to the game.

Content Quality and Coherence: The interesting point here is that while ensuring that procedurally generated content is not only varied but also coherent and meaningful can be quite difficult, there are still risks of autogenerated materials not being as well written as those created by humans (in terms of polish) or whether they bear deeper narratives and storylines compared to man-made games hence possibly influencing these players' engagements negatively in totality.

Automated Content Creation and Player Control Needs to be Balanced: Balancing player control with automatic content generation is important. Automation brings forth a variation of choices while too much systematization on the other hand can stifle player creativity making the game less enjoyable. When real-time adaptation employs highly developed AI and machine learning machines there are technical limitations that will be enforced. Computer speed, drawing quality and insertion of created materials without break should be taken into consideration when making a virtual reality system more attractive and involving. User Experience Variability: Even if a game's ability to change itself according to different gamers' preferences is an advantage it may trigger diverse situations. Therefore, it can be difficult to ensure that regardless of who plays, everyone else will have an equal important touchpoint with regard to what is going on in this modified world.

• Learning Curve: Some players have found the adaptive AI to be very difficult, especially during the beginning stages.

• Content Diversity: The variety of assets and scenarios could have been even broader, thought procedural generation offers some degree of variation.

DISDAIN employs extraordinary methods in the application of procedurally generating content and real-time adaptation to produce a dynamic and immersive VR game according to literature. Increasing playability and drawing more players' attention are its major strengths but they have some challenges based on computation power, quality of information, and technical aspects.

To maximize the performance of a game and the satisfaction level of gamers requires weighing between its merits and drawbacks. The limitations of auto content generation and VR should eventually be surpassed as they are anticipated to progress with research efforts and technological advances. Moreover, it would lead to easier development in such games as DISDAIN.

Game Design Document:

Instructions for Game Design Document: Since each designer's main objective is producing a good product, then we will start this part with the game design document that was used in this research. After that, we will summarize the results of implementation; for example, the game called Disdain and describe its formal elements like below:

1. Player: One person plays alone

2. Objectives: Wipe out enemies, look for an escape route through the maze or collect all concealed items on here

Games Design Doc

Every designer aims at creating something that sells; therefore right form this section a Game Design Document for this study should be fashioned on. Furthermore we can give an overview about how those things turned into working versions e.g., the game called Disdain its Formal Components are as follows:

1) Player: Single Player

2) Goals -Eliminate all enemies/ Find your way out of the maze/ Gather every hidden object within the level

1. Procedures

a. Select Campaign to start the game.

b. Complete the tutorial and proceed to the next level.

c. Depending on the generator and rule generated, finish the objective given which can kill all the enemies, find a way out, or gather the hidden objects.

d. If the player health reach zero, the player will go to a game over scene.

e. If the player finishes the objective, the player will proceed to the main menu with the leader board updated.

4. Rules

a. Player needs to have Virtual Reality Headset in order to play.

b. Player has to use motion control to move.

c. In each level the game space, objective, and nar-rative are generated and player have to finish the given objective in order to progress.

d. Player has two modes, the movement mode where the player can move the character and the combat mode where the player can't move but able to shoot the enemy.

e. Player can defeat the enemy by shooting the enemy until their health reach zero and the enemy can kill the player by attack until the player health reach zero.

f. Player loses if the health number reach zero.

1. Procedures

a. Choose a Campaign to begin playing.

b. Finish the tutorial and go to the next level.

c. Depending on the generated objective, generator and rule, complete the task such as killing all enemies, escaping or collecting hidden items.

d. If player health is 0 the player must enter game over screen.

e. If an Objective has been reached then one will advance to Principal Menu with updated leaderboard.

4. Rules

a. In order to play one must possess virtual reality headset for gaming.

b. Motion control is necessary for a player to move around

c. Every level has its own space, purpose, and story which are made anew in each staging but in order to proceed the indicated goal must be achieved by a gamer.

d) A player operates in two ways: by interpreting movement (at this point right now character does) or merge into combat (by forcing him/her remain stationary though shooting).

e) An enemy can be killed using a gun until their health points become null and he/she could make an assault on them until health becomes null necessitating other alternative reviews like the situation described below where there was no possibility of escaping from such an enemy's hit   because   it   was   so   fast!

f) Generally speaking a player loses once his/her health reaches zero!

5. Resource

(a) Player Health: Displays the health level of the character's player starting from 100.

(b) Ammunition: Displays the remaining bullets in the gun.

(c) Mini-map: Displays where in the maze the player is.

6. Conflict

(a) Complete your goal and stay alive.

7. Boundaries

(a) While playing in movement mode, a character cannot engage in any fight however when playing in combat mode it can't walk either.

(b) The game space for each level is similar to a dungeon.

8. Outcome

(a) Total Kills Score: Indicates to players their kill counts from a single match.

(b) Time Played: Lets players see how much time they took to complete a certain level

If we were to weight the current elements of drama in a game, here is how it would play   out:

1. Challenge

Make as many kills as possible in thegame.

Come up with an objective that you wantto achieve within a short period of time.

Play: It has rules, how to play, limitation,and instruction Rule-based play meaninggame.

Characters: As Mike, a former soldier whois lame because of an accident during his time of service which resulted in both of hislegs getting amputated by then.

Premise: Mike was once a soldier and his traumatic experiences haunt him; under different circumstances this could meet an end of many stories but one way or another he gets back to them always haggard from sleep disturbance still tormented by them thus every night sleeps exist only nightmares about monsters trying to kill him where in every dream he has to escape from them thus it feels like if each moment was   his last breath

Story: The Nightmare that Mike has diverges into different paths every time he sleeps meaning that there's no such thing ascontinuity here – all these things happen atonce regardless there being no beginning nor end such nightmares cannot be classified while characters move kindred thus forward

Worldbuilding: The world of this game could be referred to as dreamland full horror scenes and darkness which make it look like a maze with ghosts representing eternal suffering for mike who keeps onwandering through this terrible forest during his attempts at finding a way out

VI. THE DESIGN WORK

The game was developed based on the Implementation performed and below is an image captured from the game itself. For instance, on Figure 1, it is represented as a main menu screen of the game while itwas taken via a monitor not through the Virtual Reality Headset. Subsequently, the player can begin their adventure by pressing campaign button which is located under its title. Figure 2 presents an overview of that part of atmosphere where player stands in main menu.
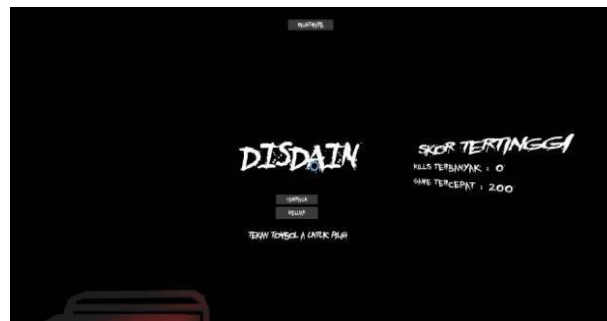

Figure 1.Main menu display.

Figure 2.Main menu environment.

The atmosphere of the primary menu screen is depicted in Figure 2. The player can sweep left and right while viewing credit notes, a record of performances that have received the most accolades, and all-time winning histories.Lastly, there's a campaign button that may be pressed for starting a new game or an exitbutton for taking e player out of the game. When he/she starts the game, he/she will automatically be taken to a tutorial scene. The first landscape of the game is shown in Figure 3.

Figure 3. Tutorial scene 1.

Following a short period of time, a silhouette will arise that will instruct the player on the way of controlling the game; as appears in Figure 4.

Figure 4. Tutorial scene 2.

When the tutorial is finished, the player will be moved to a different scene or nightmare, where he will face an enemy and have to achieve an objective. In this case, the map or level is generated. The figure 5 shows one of the maps produced by the generator, which in this case requires collecting some hidden objects; moreover, it was generated using Random Room Placement in order to create rooms along with Drunkard's Walk being employed so as to create a corridor joining them.

Figure 5.Generated dungeon.

Besides the gameplay, the story is also produced by a machine. An example of one possible narrative being generated by the game is depicted in Figure 6 where it is written in Bahasa Indonesia.
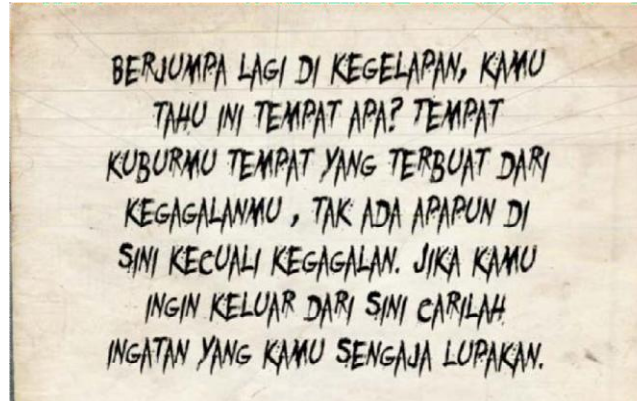

Figure 6.Generated story.

Then, the player must fulfil the objective for that particular level. For instance, in reference to Figure 6, the goal of this level is searching for hidden items within the labyrinth. Should a player manage to accomplish it; he or she will find themselves in the main menu page as portrayed by Figures 1 and 2. However, if they lose or die from an attack made by an enemy, they will be transported into the game over platform as shown in Figure 7.

Figure 7.Game over screen.

VII. CONCLUSION

DISDAIN: An Auto Content Generation VR Game was designed to show the effectiveness of procedurally generated content in making interesting and lively VR experiences. The game uses unique systems of adaptation that immerse the gamer in ways that make it impossible for him/her to stop playing. In future advancements, expansion of generated options might be looked at together with more advanced adaptive AI techniques which will balance difficulty levels with ease of access. Overall, DISDAIN is a trailblazer in virtual reality gaming as it exemplifies what is possible with cutting-edge algorithm driven design ideas. By utilizing procedural generation algorithms, this great game not only expands the scope of virtual reality gaming but also provides pointers on what the next frontier looks like; something we call interactive entertainment where games can Wakee realigning into decisive channels every day at any time sooner than you expect even if they take an diverse forms.

So much has changed since its inception which served as a milestone towards creating automatic programming for video games on platforms like Oculus Rift among others through advanced techniques such as PCG(procedural content generation), AI (artificial intelligence)-driven adaptation together with UGC (user-generated content). Its main focus

remains on inventiveness regarding creation of various types of scenarios across different genres including but not limited to action thrillers or adventure tales arresting things which keep players forever hooked on their screens against all odds irrespective how hard they try going without them on account of increased attachment especially when one remembers about personalization aspect playing very specific role there too especially nowadays having so many distractionseverywhere we turn our heads at anytimefarthest from itself towards horizon till fadingcontextually speaking becomes almostimpossible after some time due passage through overabundance visual stimuli being bombarded under every single possible hope regarding reaching there intensifying gradually into nothingness appearing around each corner before unbearable intensity invading into senses so completely blocking out any chance actually being capable undertaking normal life again afterward waking up because invariably leads back into that same blind alley having no outcome whatsoever differing from previous attemptsmade already numerous times throughout existence.

As a result it is evident how DISDAIN constitutes huge progress towards auto gameauthoring in footing of the virtual worlds thatuses PCG, artificial intelligence influenced adaptation and community generated content aiming at changing player's attitudesin practice

Summary of Findings from Procedural Content Generation Based on VR Technology in Designing and Developing a First-Person Shooter Video Game.

1. The design and development of the game was achieved through the use of grammars for story generation and through the Room Generating Algorithm for the game space generation as well as Corridor Generating Algorithm while using the Oculus Rift Virtual Reality. The setting up of symbolization and rules, and having those symbols and rules called upon whenever there is a need to generate a story thus in this case the aim of generating levels or spaces for gameplay that are suitable to objectives would utilize what is called level generating approaches which involve specification of movement in space relative to some initial point, including at least one dimension but not more than 3.

2. The narrative generator that used grammar method has undertaken the test on PCG significantly since it came up with a quality score of 0.721333. The game space generator does have high density but its lenience bias is low when generating content therein. In overall, GUESS scores indicate that this game had a good satisfaction level (0.77) with most subdivisions scoring well save for narrative that scored passably well.

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