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“PAC-MAN GAME”

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Certificate

This is to certify that the project titled "**PAC-MAN Game**" is a record of the bona fide work done by **Rhythm Robin** (Reg No: 219310035) and **Sai Yashwant Reddy Panthy** (Reg No : 219310192) submitted for the partial fulfilment of the requirements for the completion of the Experiential Learning (DA1001) course in the Department of Computer Science and Engineering of Manipal University Jaipur, during the academic session Oct 2021-Feb 2022.

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ABSTRACT

Research indicates that commercial exergames do not support acquisition of user Fundamental Movement Skills (FMS) owing to both technical and theoretical limitations. That is, affordable 3D sensors (e.g. Kinect®) demonstrate poor accuracy detection enabling users to 'cheat' motor skill outputs during gameplay and, lack fundamental design principles crucial to improve motor skill outcomes over time. Accordingly, this study outlines a principled framework to support design and deployment of video games with a primary 'play' purpose of motor skill acquisition. A systematic review of effective real-life interventions for motor skill acquisition was undertaken. Twenty-two studies met criteria for inclusion and were then analysed for underpinning 'principled' ingredients. Findings were discussed alongside fundamental game design principles, framed by The Theory of Constraints, The Exertion Framework and gaming schema from gaming literature. This led to development of a generalised framework entitled 'PaCMAN' (Principles and Conditions for Motor Acquisition). PaCMAN is intended to support effective design of video games for motor skill acquisition and, guide non-gaming experts (teachers, clinicians, researchers) tasked with a 'human-in-the-loop' deployment process deemed necessary to negotiate currently existing limitations of affordable 3D sensors.

INTRODUCTION

Computer games, that square measure sometimes related to kids and pleasure, square measure varied and attracted persons of all ages yet as those of varied backgrounds. Nowadays, the needs of pc games aren't just for diverting, however additionally for learning. Pac-Man may be a labyrinth action game developed by Namco and introduced in arcades in 1980. To stop the harm of arcade machines, the initial Japanese title of Puck Man was altered to Pac-Man for worldwide releases. Midway produced the sport in North America as a part of a contract with Namco America. During this paper we are going to describe implementation of one of the types of the Pacman game. The use of this kind of computer games has considerably determined the issues of creation of games at school level . Truth be told, this new age is those understudies UN organization square measure raised inside the computerized world and square measure local speakers of the advanced language of PCs, computer games and accordingly the web. They pay a significant amount of your time getting a charge out of computer games, have the capacities to move and issue tackle among it and that they square measure at home with an undeniable degree of inspiration and commitment. Several of those kids at school these days square measure in danger of failure. This can be because students of this generation getting bore, laid low so for refreshing this type of game necessary. As well as they have bunch of inspiration to address it. Therefore, victimization of this type of PC games at school will help students for getting positive attitude as well as gaining concentration. Indeed, this game the vastly widespread game from its 1st unleashes through these days and it's created his own separate exitance in game history, and is among the famous game that are present. In addition, the bulk of game generations are square measure connected to the current game. The paper consists of different sections. The first section is the introduction to the pacman game and the related work done by the developers in the gaming industry. Next section is the methodology and algorithm of proposed game explained with the diagram and use of automata. and finally, the results and discussions on the running game with scope and limitations of the project.

The idea of designing Pac-Man came to me while I was reading an article about Pac-Man on GitHub. The article was about the design and AI lessons within the classic Namco game Pac-Man. I was really amazed at the complexity in the design and AI of a game that seems so simple while playing at the time. So I then decided to create a series of experiments(coding) that illustrate the use of Design Patterns to implement some of the complex design issues in the game Pac-Man.

The first article in the "Pac-Man Patterns" series will focus on the different behaviour each of the four ghosts has during the different modes of the game. We will also look at how the Strategy Pattern can help with the design of the different movement behaviours.

Pac-Man is an arcade game that was first released in 1980. The player navigates Pac-Man through a maze and has to collect all the dots (Pac-Dots) in order to complete the stage. Pac-Man is being chased by four ghosts in the game whose main objective is to kill him.

The four ghosts, Blinky, Pinky, Inky and Clyde, each has different behaviour depending on the mode of the ghosts. The ghosts change the mode during gameplay from scattering to the corners of the maze, to chasing Pac-Man and also to being frightened when Pac-Man picks up a Power-Pellet.

LITERATURE VIEW

The aim of the literature review should be to develop the hypotheses. What is done in the first section is to describe Pac-Man in the language of game theory, but nothing seems to follow from this. There are no hypotheses about optimal strategies or other game theoretic ideas to be tested empirically.

Pacman game is a kind of computer game is a game medianya.Game RPG genre. According to Iwatani who created this game was only beginning to attract the interest of women. The name itself was named Pac Man nails nail Pakkuman which describes (the sound of) the mouth movement when widely opened and then closed in a row as well as the basic concept of eating. Making this game is an evolutionary step at the time because the study of an enemy element that has the ability to Artificial intelligent (AI). Pac Man is the original form of the four enemy ghosts each of them has different goals to beat the player. The first ghost who plays as a striker will be looking for the shortest path approaching the player, forcing the player to avoid it. The second ghost tasked to intercept the path of the road dodge nearest player. The third ghost is also in charge of the intercept in the middle of the maze and try to prevent players using the tunnel in his side. Meanwhile the fourth ghost just around without direction around the end of the game, preventing the player wins. In making this game Iwatani helped by his friends on 9 February 1980 pacman game launched in Japan and got a good reception. Feeling got a good reception from the fans that one of his friends decided to bring the game Pacman to the United States by Bally division Midway and was named Pac Man. Not less than 5 months this game has been ranked top in the game that is often played by young children in the United States. The game is very simple pacman game from its display or play the game in terms of graphics.

We will use this game to test the gamer if they can concentrate, think faster or make decisions in a short time and the right. The gamers had high concentrations of power and be able to make a quick decision making that enable them to accomplish several tasks.

Researchers have stated the effectiveness of different games and their advantages in various fields. creating this type of game supports a student academically and helps to increase concentration and learning ability. These types of games that are present nowadays such as Tetris. Its priority is taught using this method. In the game like Tetris, it consists of different figures made of different blocks known as tetramines. The main challenge is to control the sideways motion of the blocks while they are falling down and not making gaps between the blocks. The ultimate aim is to fill the maximum number of blocks at the bottom of the interface. This type of game of Tetris was created using different mapping techniques that are present today.

Crossword types of games are developed using OOP and different gui frameworks. Crossword is a form of word puzzle which is present in the form of a quadrilateral shape. The main challenge of this game is to create a word with the help of clues that are given in the game.

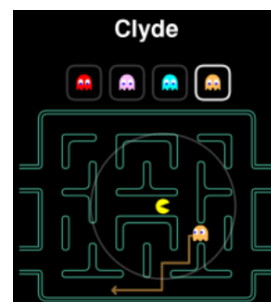
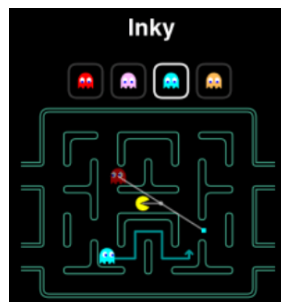
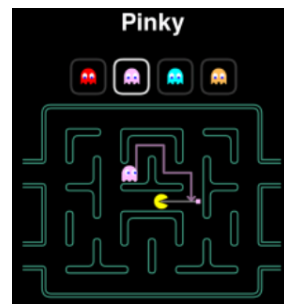
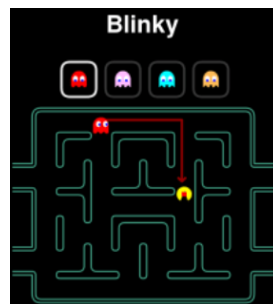
The second section is incomplete, but addresses the issue of serious games and asks whether Pac-Man can be seen as a serious game. The most important point in this section is probably the issue of flow, as this is a psychological issue that does not fit naturally into the analysis of Pac-Man from a game theoretic point of view. In the third section, there are some vague ideas about other ways of thinking about TQM as a game. This might be a good idea as there are EFQM assessments of both the quality department that could be defined as a game. The internal conflicts within the quality department might also be described as a game.

METHODOLOGY

Explaining the rules of Pac-Man in the context of TQM seems like a good idea. There is also much written about action research and discourse analysis, but I am not certain whether this is all that helpful for the paper. I believe the best way for this paper is to present the model in the methodology chapter and present the simulation results in the results chapter. Performing a simulation means we are trying to predict something. It is not clear from the introduction and literature review that this paper is concerned with predictions made from the Pac-Man model, but it might be a good idea to rewrite the paper along such lines.

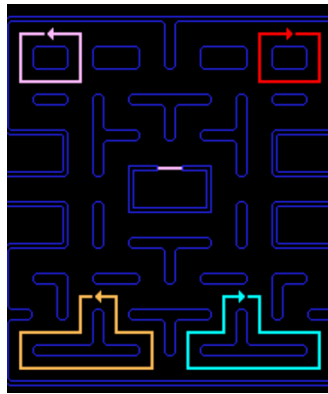
Chase

In “Chase” mode, the ghosts are trying to find and capture Pac-Man. Each of the four ghosts has a unique behaviour while chasing Pac-Man. Blinky the red ghost is very aggressive in its approach while chasing Pac-Man and will follow Pac-Man once located. Pinky the pink ghost will attempt to ambush Pac-Man by trying to get in front of him and cut him off. Inky the cyan ghost will patrol an area and is not very predictable in this mode. Clyde the orange ghost is moving in a random fashion and seems to stay out of the way of Pac-Man.



Scatter

In “Scatter” mode, the ghosts will stop chasing Pac-Man and each will move into its respective corners for a few seconds. Blinky the red ghost moves towards the top right corner, while Pink the pink ghost moves towards the top left corner. Inky the cyan ghost moves towards the bottom left corner and Clyde the orange ghost moves towards the bottom left corner. This mode lasts only for a few seconds and then changes back to the “Chase” mode.



Frightened

The “Frightened” mode occurs when Pac-Man eats an energizer within the maze. There are four energizers located in the maze and all four ghosts change mode. The ghosts turn dark blue and wander around in the maze being vulnerable. They will flash moments before they return to either the Scatter or Chase mode. So, to sum up the movement requirements of the ghosts, the following table illustrates the types of movement and also how the individual ghosts behave during those types of movement.

Ghost Name Chase Scatter Frightened Blinky (Red) Aggressive Top Right Corner Wandering Pinky (Pink) Ambush Top Left Corner Wandering Inky (Cyan) Patrol Bottom Right Corner Wandering Clyde (Orange) Random Bottom Left Corner Wandering

To implement the different ghost behaviours, the instances of the Ghost class will use the behaviour represented by an interface (ChaseBehaviour, ScatterBehaviour & FrightenedBehaviour) to ensure that the different implementations of each behaviour is not implemented within the Ghost class.

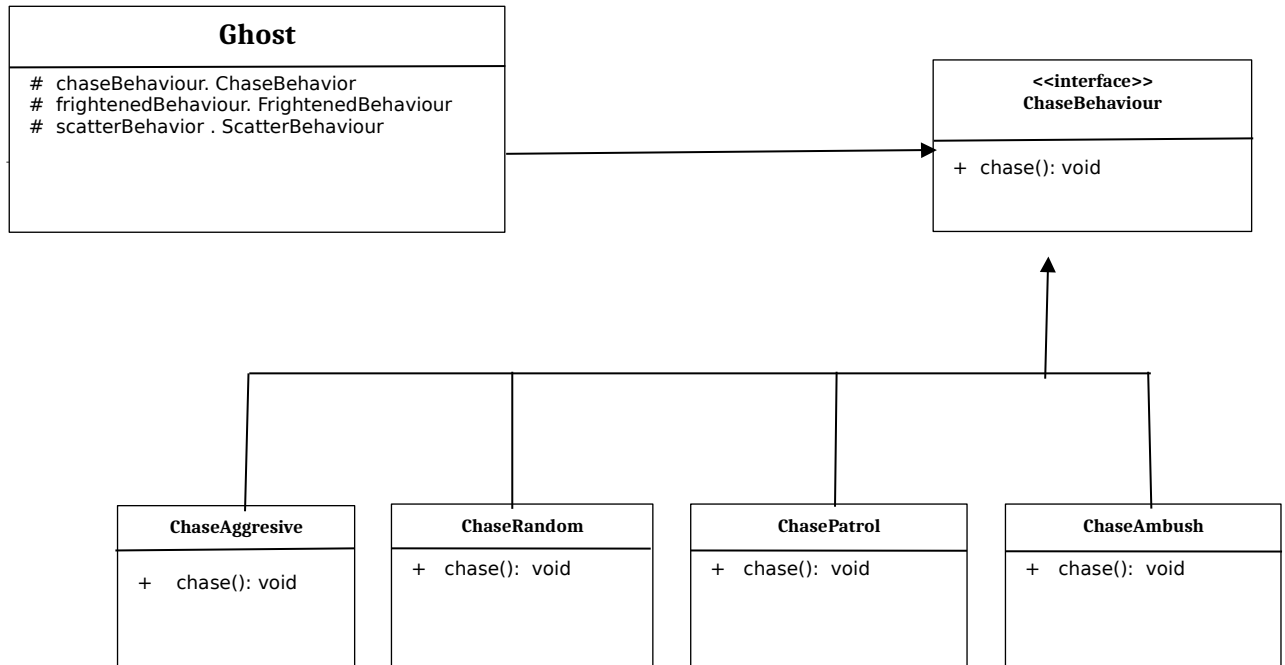
According to the Strategy Pattern, the behaviour that varies is placed into a separate class to allow you to make changes to those behaviours without affecting the parts that stays the same. Furthermore, the pattern aligns to the design principle to “Program to an Interface, and not to an Implementation” so that the three modes of a ghost can be defined as interfaces, and the different implementations of the modes of movement can be implemented in separate classes.

The Ghost class has a ChaseBehaviour, ScatterBehaviour and a FrightenedBehaviour. The HAS-A relationship refers to the composition of the classes. Now it is possible to compose the Ghost class to in such a way that each of the different types of ghosts can be composed of different implementations for each of the 3 modes of movement.

The chase behaviour of the ghosts varies, and the implementation of each of the parts are removed into a separate class. Hence, the algorithm to chase aggressively, ambush, patrol and random is placed in separate classes. An interface (ChaseBehaviour) is created to allow for the composition between the Ghost class and the different implementations of the Chase behaviour.

The following diagram illustrates the composition and implementation of the Ghost class and the different implementations of the ChaseBehaviour:

Class Chase



Ghost

The Ghost class contains the different behaviour that the different ghosts have in the Pac-Man game. There are three distinct modes a ghost can be in: chase, scatter and frightened.

ChaseBehaviour

The ChaseBehaviour interface is used to define different ghostly behaviours during the chase mode of the Pac-Man game. In chase mode, the ghosts will have different behaviours associated with their personalities.

ChaseAggressive

The ChaseAggressive class contains the behaviour of a ghost in the Pac-Man game. In chase mode, the ghost chases aggressively and will usually take the shortest route to you, and tends to follow.

ChaseAmbush

The ChaseAmbush class contains the behaviour of a ghost in the Pac-Man game. In chase mode, the ghost will attempt to ambush Pac-Man. The ghost tends to take a more wounding way towards Pac-Man with deadly effect.

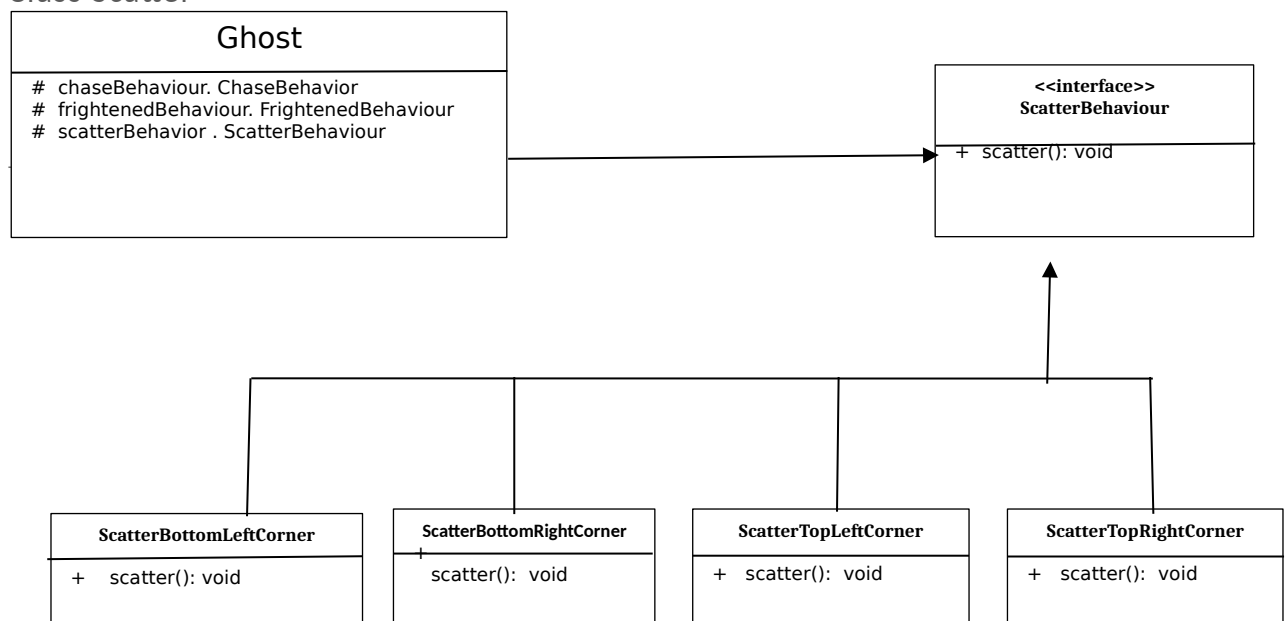
ChaseRandom

The ChaseRandom class contains the behaviour of a ghost in the Pac-Man game. In chase mode, the ghost will move in a random manner around the board and is not much of a threat.

The scatter behaviour of the ghosts varies, and the implementation of each of the parts are removed into a separate class. Hence, the algorithm to scatter to the top-left, top-right, bottom-left and bottom right corners is placed in separate classes. An interface (ScatterBehaviour) is created to allow for the composition between the Ghost class and the different implementations of the Scatter behaviour.

The following diagram illustrates the composition and implementation of the Ghost class and the different implementations of the ScatterBehaviour:

Class Scatter



Ghost

The Ghost class contains the different behaviour that the different ghosts have in the Pac-Man game. There are three distinct modes a ghost can be in: chase, scatter and frightened.

ScatterBehaviour

The ScatterBehaviour interface is used to define different ghostly behaviours during the scatter mode of the Pac-Man game. In scatter mode, the ghosts give up the chase and head for their respective home corners.

ScatterTopLeftCorner

The ScatterTopLeftCorner class contains the behaviour of a ghost in the Pac-Man game. In scatter mode, the ghost will give up the chase and head for the top left corner of the board using its regular path-finding methods.

ScatterTopRightCorner

The ScatterTopRightCorner class contains the behaviour of a ghost in the Pac-Man game. In scatter mode, the ghost will give up the chase and head for the top right corner of the board using its regular path-finding methods.

ScatterBottomLeftCorner

The ScatterBottomLeftCorner class contains the behaviour of a ghost in the Pac-Man game. In scatter mode, the ghost will give up the chase and head for the bottom left corner of the board using its regular path-finding methods.

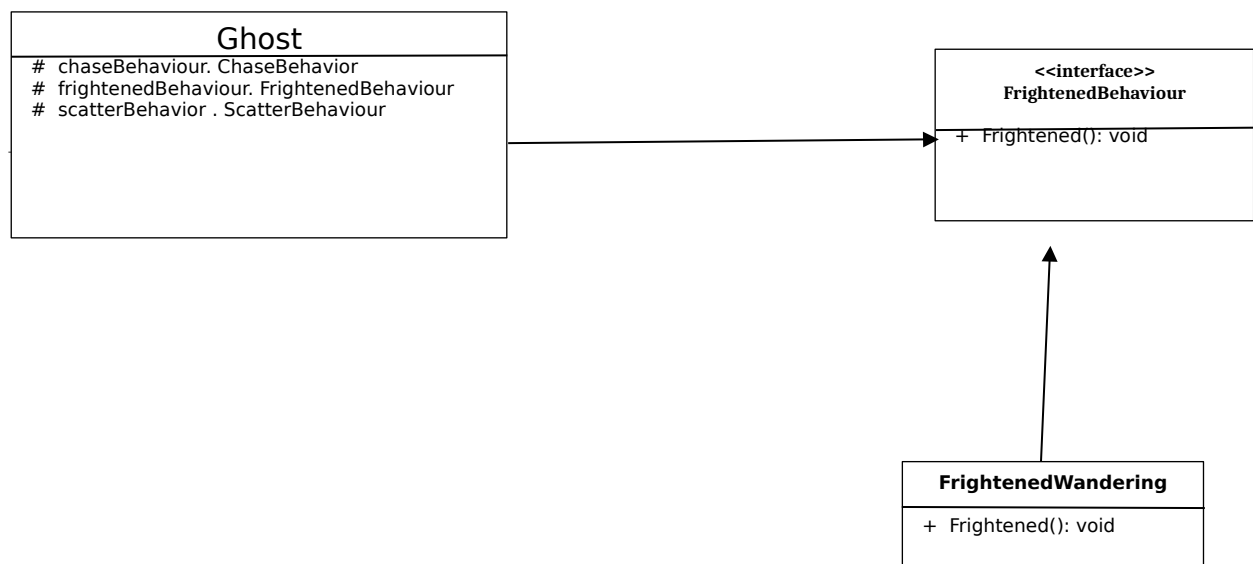
ScatterBottomRightCorner

The ScatterBottomRightCorner class contains the behaviour of a ghost in the Pac-Man game. In scatter mode, the ghost will give up the chase and head for the bottom right corner of the board using its regular path-finding methods.

The frightened behaviour of the ghosts may does not vary, however the implementation of is still removed into a separate class. Hence, the algorithm to wander around is placed in separate class. An interface (FrightenedBehaviour) is created to allow for the composition between the Ghost class and the implementation of the Wandering behaviour.

The following diagram illustrates the composition and implementation of the Ghost class and the different implementations of the FrightenedBehaviour:

Class Frightened



Ghost

The Ghost class contains the different behaviour that the different ghosts have in the Pac-Man game. There are three distinct modes a ghost can be in: chase, scatter and frightened.

FrightenedBehaviour

The FrightenedBehaviour interface is used to define different ghostly behaviours during the frightened mode of the Pac-Man game. In frightened mode, the ghosts will all turn dark blue.

FrightenedWandering

The FrightenedWandering class contains the behaviour of a ghost in the Pac-Man game. In frightened mode, the ghosts will all turn dark blue and aimlessly wander around in the maze for a few seconds.

The Strategy Pattern assists with the design of the different behaviours of the ghosts in Pac-Man. Applying the Strategy Pattern to the ghost movement design, the solution become reusable, extensible, maintainable and allows for change without major impact to the rest of the code.

RESULTS AND DISCUSSIONS

This is the main screen of the game play and the output of the computer program as well. The Pacman who is the main character of the game is denoted by the letter P. The Ghosts who chase the pac man are denoted by letter G. When the game starts the ghosts start moving and pacman also moves based on the arrow keys pressed by the player. Pac man eats the dots in the map and the game finishes once it eats all the dots present in the map.

LIMITATIONS

- 1) The Pac man Game is not multiplayer as well as it is not portable due to it being played on a large machine. If played on an arcade machine we cannot save its progress. The game can be unreliable sometimes and can crash if the system doesn't work properly.
- 2) Another limitation is that the game can be addictive and engaging. This will have an adverse effect on a student playing this game.

CONCLUSION

Pushdown automata has been planned to style the Pacman game by understanding a finite-state machine with a stack to store the inputs specified the system will recognise it. It's provided that there's consistency between the inputs and therefore the expected outputs. We believe that the project was completed with success. This game elaborates a straightforward type of the game. This game helps to enhance the concentration power and process ability of the code.

Game can be described as the very big thing. The game has any levels and is able to make his children always to play creatively and do not abusing the game. The children who play pacman game can improve their concentration and have a strategy in solving the problem.

At the end, we have gained a tendency to observe that there are many benefits of such types of games. This type of pc games will help to improve students' concentration as well as build learning about additional gratification.

FUTURE SCOPE

The existing system is a simple programme developed in C++ language. In future the addition of a good GUI can be done with addition of sound effects, color effects to it. The challenges in the game can be increased and can be made more interesting using AI based bots. For a game there is always a scope for improvement and bug fixes.

REFERENCES

- 1) [GitHub](#)
- 2) [GitLab.com](#) · [GitLab](#)

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