**Evaluation Overview**

After the completion of my technical solution and the testing, the evaluation gives me the opportunity to reflect on my project and assess how well my objectives were achieved. Additionally, I aim to gain some user feedback on the project and obtain some insight into what they think went well, and what could be improved in the project. Afterwards, I will conclude with my final thoughts about the project.

**Objectives**

* Create a Maze Solver Game that uses a Maze Generation Algorithm and uses an Algorithm to set that maze of a certain difficulty.
  + The maze generation will be able to generate completely random mazes which ensures that user will not experience the same maze twice.

This objective was achieved first using a recursive backtrack as a maze generation algorithm and a depth first search for the maze difficulty. I believe this section of my game is the best as the maze generation algorithm works very well creating entirely unique mazes every time. Additionally, with the addition of the depth first search, this makes this game mode more finished as the user is now presented with levels of difficulty, making a more challenging and entertaining game.

* Create a Mechanism that allows the user to manually solve a Maze.
  + Will include a timer to increase the competitive factor of the game.

This mechanism was created well, although it could’ve been made better. Currently, if the user presses one of the directional keys on the keyboard, the player’s icon moves by 1 space in that direction (given that there is no wall there). This could’ve been made so that the player can hold this down, as occasionally, the player can quickly traverse a straight path in the maze if one is generated. Overall, this objective was achieved well, although minor improvements could’ve more successfully achieved this objective, the game works perfectly without it.

* Create a Maze Creation Game that allows the user to create their own maze with their own settings, starting point and end point.
  + An alternative mode can keep the user playing the game, avoiding repetition by replaying the same game over and over.

The Maze Creation game-mode was more of an experimental mode as this allows the user to create their own mazes and let the computer solve it or let another player solve it. Aiming to introduce a creative aspect of the game, this game-mode achieved this as players could work at creating their mazes for a long duration of time. However, the user could find themselves solving mazes again, therefore I believe that the repetition aspect was not fully resolved in this game-mode. In conclusion, I believe this was the weakest part of my game, however, the mode achieved exactly what it was supposed to and therefore I think this objective was achieved sufficiently.

* Create a Shortest Path Algorithm that solves the maze created by the user.
  + Increases the competitive factor as the user will aim to create a maze that is difficult for the shortest path algorithm.

This was the hardest part of the project as it encapsulated mathematical concepts and merging them with the game logic to create a shortest path algorithm that considered heuristics to find the shortest path. The A\* was the chosen algorithm that I would use; this was very difficult to create, however, with comprehensive research of the algorithm and the different variations, I was able to create a good algorithm that solves the shortest path. Additionally, a depth first search was made that solves the maze the computer creates and shows the maximum number of nodes that need to be explored before the player reaches the end goal. This was very effective in creating the difficulty verification and always ensured that the maze was difficult. Overall, this objective was fully achieved and made the game feel more complete, even as a non-functional requirement.

* Create an enjoyable, competitive game that keeps users playing and competing.

I feel as if the game I have created is enjoyable and competitive, however, I will need to conduct further research with some potential users to assess whether they had found this game enjoyable, competitive and engaging.

**End-User Feedback**

To obtain some End-User Feedback, I conducted in-person real time interviews with players whilst they played the game and found some interesting feedback about the game, both positive and negative responses.

The age demographic for the selected group is between 17-24, and the same individuals that completed the user’s Google Form in the Analysis Documentation, had a playthrough of the game and talked to me about how they found the game. It is essential for me to interview the same people as this means that they get a wide perspective of the game and how the game was developed across the documentation.

Question 1: Your initial thoughts on the User Interface (UI) Design and layout?

Most answered this question with a basic UI was used with a basic colour scheme. However, the basic UI meant the layout was very simple and therefore easy to navigate which is important for the quality of life of the user (quality of life refers to the unnecessary features of the game and the overall feel of the game for the user; quality of life improvement would essentially mean it becomes easier for the user to navigate the game). Although the UI was basic, most players liked it as it was a nice dynamic from an easy menu screen to a difficult game.

Question 2: Do you think the competitive element of the game is sufficient?

The response for this question were mixed as lots of players felt that they had enough challenging aspects with the difficultly of the maze and the added time pressure meant they made lots of mistakes and errors forcing them to restart that game. On the contrary, some felt that it needed to be harder, and this could’ve been made by the introduction of a leaderboard. This would’ve been made possible by the option of a login system and storing time for mazes under that login. This would’ve meant the introduction of a database system and more complex means of transferring data.

Question 3: Did you find the game repetitive?

Responses were mostly the same; they did not think the game was repetitive. Some people felt that the game was sometimes repetitive, but the different modes and settings in the game kept the users engaged and continuing to play. Eventually, like all games, the users found it repetitive ultimately but were surprised that they were engaged in the game for so long. On another hand, the people who found it repetitive thought that it lacked another competitive edge, like another player as it was inconvenient replaying the same mode again to see whether their peers could beat their time.

Question 4: Did adding the timer make the game better/more competitive?

In a pre-testing phase, I wanted to assess how much of an impact the timer made, so I had played several games without the timer and quickly found the impact of the timer. When the player is playing with the timer, the player is pressured to think quickly to solve the maze. All the interviewee’s responded positively and loved the addition of the timer to make the game better and more competitive.

Question 5: How well does the game use problem solving skills?

Lots of responses said that the game uses lots of problem-solving skills, however, some suggestions included an even harder option for both game modes could further increase this skill in the game.

Question 6: What areas of the game did you like?

The most common response was the maze solving game mode: hard difficulty. This seemed to be really challenging for most of the players and proved to therefore be the most entertaining aspect of the game. Additionally, others also enjoyed the maze creation as it allowed them to create their own mazes and explore a creative aspect of the game. Fortunately, all the players enjoyed the game, encapsulating all their requirements and satisfactions.

Question 7: Any suggestions for any improvements?

A couple of people had suggested a leader-board system would be a good addition to the game. A user is presented with a login system which will update a database containing information about the difficulty of the maze, their name, and their time taken to solve the game. This would be an interesting addition to the game, however, due to the scale of the project and the complexity of the introduction of a database, this was not included. Additionally, other responses including better deploy options, this could be in the form of an executable file to run the game, rather than in the Thonny development environment that the game currently runs in.

In conclusion, the interviews were very informative and allowed me to understand the success of my project. The questions chosen tested the users against the objectives and requirements I had set. Considering the End-User feedback and responses, I would say these objectives and requirements have been satisfied and achieved.

**Self-Reflection**

In my personal reflection of the game, I want to discuss areas that I had done well/successfully and areas of the project I could improve in, in order to get a wider perspective of my project’s success and failures.

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| *What Went Well* | *Areas of Improvement* |
| The Objectives were achieved well. All the identified problems were addressed, and the end-users found that this was resolved too. Therefore, I can confidently say all objectives were achieved. | The Analysis documentation could’ve contained a better modelling section, with more focus being on the user interface which I believe is the weakest point in the project, so a better initial modelling could have made this better. |
| The Requirements identified using the end-user feedback gave a good indication for me as to what the project should contain. These were all completed successfully (see Testing Documentation). | The User interface overall in the project could have been done better and more engaging, more research into this would’ve helped me form a stronger human computer connection. |
| My research in the design for the algorithms I believe fully scoped the project’s main algorithms in lots of depth and helped me really understand the implementation of the underlying data structures. | Lots of the code in the technical solution could’ve been modelled better in the design, however, this isn’t too much of an issue/improvement as the code was completed fine without this. |
| The technical solution was completed cleanly, I made sure to add comments throughout to ensure that I knew what that section of code meant, included changes I had made, errors and fixes. | The technical solution took too long to create, a Gantt Chart should’ve been used to ensure that I was on a schedule instead and not spending too much time on the little details. On another hand, the technical solution was luckily completed in just enough time, but if this is to be completed again, an organised time structure needs to implement. |
| The Testing Documentation effectively showed my iterative testing and the testing of my requirements with the assistance of a video. | - |

**Evaluation and Project Conclusion**

In conclusion, the project was conducted well, I was satisfied with the outcome after achieving all the objectives and requirements. After the google forms and the in-person interviews with the potential end-users, I can conclude that the game meets the user’s requirements and addresses the problems identified in the analysis and therefore is successful in completing the project aims and targets of making a competitive maze game.