A Pygame-based Pacman Game

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1 Introduction

This report outlines the development of a Pacman game using the pygame library. The main objective of this project was to create a game, balance the levels, and gain experience from the first major project using OOP.

2 Methods/procedures/algorithms

The biggest challenge was the algorithm for controlling the main character. I used a few that I invented myself, but in the process of researching, it turned out that I utilized existing algorithms that I was not aware of, such as a grid-based collision detection system that was implemented to create the main character's movements.

2.1 Pacman movement

The problem was that the character had dimensions of 32 by 32 pixels, which corresponded to the size of the aisle through which he could move, which made it impossible to control the character freely, because you needed to get into the gap perfectly. This was possible only for 5 milliseconds, which is quite difficult for a person to get into this time period. To enable Pacman's movement, invisible squares were created around the character of the same size. The player's desired direction was tracked, and collision detection was performed between the squares and the walls. This ensured that Pacman could only move in areas without collisions.

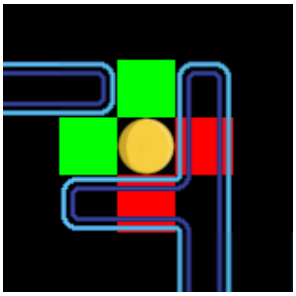

Figure 1: Grid-based collision detection system

2.2 Ghost movement

For the ghosts, their movement was determined by comparing their position with the contents of the CSV file, allowing them to identify available pathways. The algorithm analyzes the file and controls which values surround the ghost position. If this value is '-1', it means that the entity can safely pass through this place. This project does not implement the original algorithm from the original game. All character movements are based on randomness. The ghost moves in such a way that after it has changed the chunk (32 by 32 pixels), the file with the walls is analyzed and all possible options for walking are recorded. After that, the possibility of going backwards is rejected and a random direction is chosen using the random library.

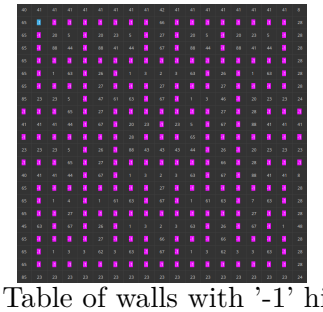

Figure 2: Table of walls with '-1' highlighted

2.3 Fireballs

The implementation of fireballs at the last level is very similar to the ghost algorithm. The player's position is taken, this position is found in a csv file, and a 4 by 4 area around the player is taken, where the algorithm finds all the values of '-1', that is, potentially all the places where the player can be. After that, a random free position is selected using the random library. This is repeated every 0.5 seconds.

3 Conclusion

The implemented approach successfully solved the problems that arose during the development of the game. The overall gameplay was smooth and en-

Figure 3: Fireballs

joyable. The project was built using the pygame library, which proved to be effective in providing an immersive gaming experience. The success of the project emphasizes the potential for further improvements and extensions, such as the inclusion of additional game features and improvement of ghost behavior algorithms, and so on.

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