Pac-Man In OpenGL

CS324 - Coursework
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1 Features

In order for the solution to remain true to the original Pac-Man game [2] a lot of original features have been incorporated. These include: level resets, tunnel portals, a high score mechanic and multiple lives.

Furthering the point of remaining true to the original game, sprites have been used 2 to give the authentic feel. Each of the games many animations are simply executed by changing the sprite image over time, mirroring the way a flip-book would work.

Ghosts also have the original behaviour of Pac-Man implemented where each ghost has a unique personality [1]. This enables a more immersive and exciting feel to the game as the player must track multiple ghost movements of which none are the same. The ghosts are also "released" from the Ghost Pen at different times, akin to the original, which leads to the player having to think more about their actions the further through the level they progress. Finally, the ghosts also operate on a wave mechanic where they will switch between two modes: CHASE and SCATTER. When in scatter the ghosts will go to separate corners 1 and in chase they will switch to their individual AIs. This is so the player does not feel a constant level of stress when playing of all ghosts constantly behind Pac-Man.

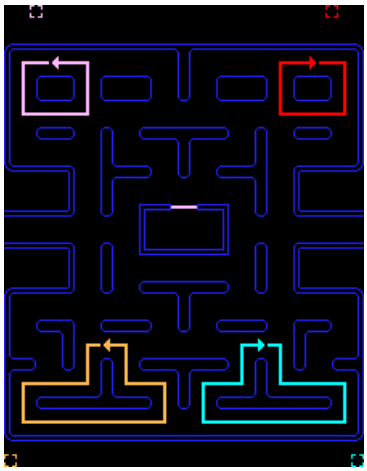

Figure 1: The ghosts respective scatter movements [1]

As with the original Pac-Man, bonus fruit also spawn in the level after Pac-Man has eaten first, 70 pills and then after he has eaten 170 pills. The fruit implemented are the cherry and strawberry which are worth 100 and 200 points respectively. Again, the original sprites were used for drawing them keeping everything authentic. The fruits only spawn in the lower portion of the maze and their spawn location is randomly selected. The application will randomly select a tile to spawn the fruit at and as long as it is an empty tile where a small pill once was, the fruit will be spawned, otherwise another tile will be chosen.

2 OpenGL Implementation

Rather than loading and binding textures throughout the course of the application it has been written such that in the *init* method all textures that will be used throughout the game will be loaded and bound. This translates to better performance in game, although does require more processing power initially.

As mentioned, the game uses sprites for drawing. However, when Pac-Man must interact with other entities, such as walls or ghosts, an extra feature must be used. All information on each entity's location is stored in a maze array. This will determine wall collision, pill eating or ghost collision. It is also from this array that all the map sprites are drawn; the array is iterated through and depending on the contents of each index, a different sprite is drawn.

Figure 2: The initial ready state of the game, displaying the sprites used

In order to keep track of time and movement within the game, *ticks* are used. There are multiple ticks for different purposes, however the overarching tick is *gameTick* which determines sprite animations, game events and game state changes. This tick incremented in the *idle* method to ensure smooth movement and interactions between all bodies.

A high score mechanic has been implemented which uses a *high_score.txt* file to store the highest score. This enables the score to be stored even after the game has been closed and be reloaded upon launch of the game. If, upon

launch, there is no such file then one is created and initialised with the value 0.

3 Setup Instructions

3.1 Compilation

In order to compile execute the solution some commands must be executed in the terminal.

First, to set up compilation on Linux use:

```
$ ln -fs Makefile.linux Makefile
```

The solution can then be made using:

```
$ make coursework -B
```

3.2 Execution

In order to execute the solution use:

```
$ ./coursework
```

Unless changes are being made to the code, compilation does not need to be run every time before execution.

4 How To Play

The aim of Pac-Man is to eat all the pills to advance to the next level, without being caught by the ghosts.

If Pac-Man eats a super pill the ghosts will turn frightened and Pac-Man will be able to eat them to gain bonus points. Otherwise, if Pac-Man encounters a ghost he will lose a life.

Pac-Man can also gain bonus points by eating the bonus fruit which appears randomly in the maze once a certain amount of pills have been eaten.

Movement:

- Arrow Keys - Left, Up, Right, Down

Game:

- P - Pause/ Unpause the game

- Q - Quit the game
- R - Only when "Game Over" is showing R will start a new game

References

[1] Chad Birch. Understanding pac-man ghost behavior. http://gameinternals.com/post/2072558330/understanding-pac-man-ghost-behavior. Accessed: 07-01-2017.

[2] Tegan Jones. The history of pac-man. http://www.todayifoundout.com/index.php/2013/08/the-history-of-pac-man/. Accessed: 02-01-2017.

Word Count Excluding References & Headers: 750