INFO1113 Assignment2

Report

Class Hierarchy

There are two abstract classes, eleven normal classes and two enumerations in the codebase. One of the abstract class, **MovableObject,** is designed to be the super class of all movable objects in the game. This includes Waka and ghosts. The reason for this is that they share many same attributes and logic. For example, they both have horizontal and vertical coordinates, they are both movable (this means they both have their current moving directions and next possible moving directions) and cannot go through walls (this means they share the same logic of collision with walls). It is designed as abstract class because it includes anything that is movable and this makes it too abstract to create an instance.

The other abstract class, **Ghost**, is inherited from MovableObject. The reason to have this abstract class instead of directly having four normal classes for four types of ghosts is that these ghosts have similar logic for movement – they will all move to the direction that has the shortest distance to their target locations. The only difference among them is the target locations.

The four classes, **Ambusher, Chaser, Ignorant** and **Whim**, are inherited from Ghost. They use the same logic defined in Ghost but have different target locations.

The other class, **Waka**, is inherited from MovableObject. This class manages the information of Waka.

Fruit is the other superclass. It manages the information of fruits, including its horizontal and vertical coordinates, sprite and if it has been eaten. It has a subclass **SuperFruit** which is designed to carry the information of super fruits. The reason for this is that normal fruits and super fruits share many
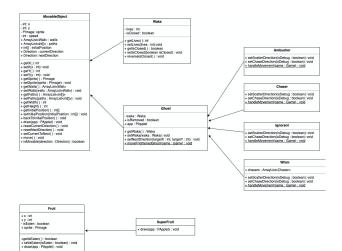
same attributes – they both have locations and they both can be eaten by Waka.

Functionality of other classes

Game is the main class of the app. It manages the overall game flow including the movement of

Waka, the movement of ghosts, the collision between Waka and ghosts, eating fruits of Waka,

switching modes, timing the game and winning or losing of the game. It invokes other methods in

other classes and handles the interactions between them.

Direction and **Mode** are two enumerations. The four instances in Direction – UP, DOWN, LEFT,

RIGHT are the four directions that Waka and ghosts can move. Mode has three instances –

SCATTER, CHASE, FRIGHTENED. They are the three modes of the game.

Appendix

MovableObject

```
- int: x
- int: y
- PImage: sprite
- int : speed
+ ArrayList<Wall> : walls
+ ArrayList<int[]> : paths
+ int[] : initialPosition
+ Direction : currentDirection
+ Direction: nextDirection
```
```
+ getX() : int
+ setX() : int): void
+ getY() : int
+ setY() : int) : void
+ getSprite() : PImage
+ setSprite(sprite : PImage) : void
+ getWalls() : ArrayList<Wall>
+ setWalls(walls : ArrayList<Wall>) : void
+ getPaths() : ArrayList<int[]>
+ setPaths(paths : ArrayList<int[]>) : void
+ getWidth() : int
+ getHeight() : int
+ getInitialPosition() : int[]
+ setInitialPosition(initialPosition : int[]) : void
+ backToInitialPosition() : void
+ draw(app : PApplet) : void
+ resetCurrentDirection() : void
+ resetNextDirection() : void
+ setCurrentToNext() : void
+ move() : void
+ isMovable(direction : Direction) : boolean
```

Waka

```
- lives : int
- isClosed : boolean
```
```
+ getLives() : int
+ setLives(lives : int):void
+ getIsClosed() : boolean
+ setIsClosed(boolean isClosed) : void
+ reverseIsClosed() : void
```

Ghost

```
- waka : Waka
+ isRemoved : boolean
+ app : PApplet
```
```
+ getWaka() : Waka
+ setWaka(waka : Waka): void
+ setNextDirection(targetX : int, targetY : int) : void
+ moveFrightenedGhost(game : Game) : void
```

Ambusher

```
+ setScatterDirection(isDebug : boolean): void
+ setChaseDirection(isDebug : boolean): void
+ handleMovement(game : Game) : void
```

Chaser

```
+ setScatterDirection(isDebug : boolean): void
+ setChaseDirection(isDebug : boolean): void
+ handleMovement(game : Game) : void
```

Ignorant

```
+ setScatterDirection(isDebug : boolean): void
+ setChaseDirection(isDebug : boolean): void
+ handleMovement(game : Game) : void
```

Whim

```
+ chasers : ArrayList<Chaser>
```
```
+ setScatterDirection(isDebug : boolean): void
+ setChaseDirection(isDebug : boolean): void
+ handleMovement(game : Game) : void
```

Fruit

```
+ x : int
+ y : int
- isEaten : boolean
+ sprite : PImage
```
```
+getIsEaten() : boolean
+ setIsEaten(isEaten : boolean) : void
+ draw(app : PApplet) : void
```

SuperFruit

```
+ draw(app : PApplet) : void
```

Wall

```
- x : int
- y : int
- sprite : PImage
+ isEmpty : boolean
```
```
+ getX() : int
+ getY() : int
+ getWidth() : int
+ getHeight() : int
+ draw(PApplet app) : void
```

Map

```
+ mapFileName : String
+ game : Game
```
```
+ readJsonFile(filename : String) : void
+ readMapFile() : void
```

Game

```
+ app : App

+ waka : Waka
+ wakaLives : int

+ map : Map

+ ghosts : ArrayList<Ghost>
+ ambushers : ArrayList<Ambusher>
+ chasers : ArrayList<Chaser>
+ ignorants : ArrayList<Ignorant>
+ whims : ArrayList<Whim>

+ fruits : ArrayList<Fruit>
+ walls : ArrayList<Wall>
+ paths : ArrayList<int[]>

+ mode : Mode
+ lastMode : Mode

+ isDebug : boolean

- frameCounter : int
- modeCoutner : int
- modeTimeCounter : int
- gameOverTime : int

- isWon : boolean
- isLost : boolean
+ modeLength : ArrayList<Integer>
+ frightenedLength : int
- frightenedStartTime : int

- timeElapsed : int
```
```
+ getIsWon() : boolean
+ getIsLost() : boolean
+ setIsWon(isWon : boolean) : void
+ setIsLost(isLost : boolean) : void
+ setFrightenedStartTime(time : int) : void
+ setTimeElapsed(timeElapsed : int) : void
+ getModeCounter() : int
+ setModeCounter(modeCounter : int) : void
+ getModeTimeCounter() : int
+ setModeTimeCounter(modeTimeCounter : int) : void
+ setFrameCounter(frameCounter : int) : void
+ setGameOverTime(time : int) : void

+ manageGameFlow() : void

+ drawWalls() : void
+ drawFruits() : void
+ drawWaka() : void
+ drawWakaLives() : void
+ drawGhosts() : void

+ eatFruit() : void

+ moveWaka() : void
+ moveGhost() : void

+ manageModes() : void
+ isFrightenedEnd() : boolean
+ handleGameEnd() : void

+ collide() : void
+ checkCollision() : void

+ isCollectAllFruits() : boolean

+ displayWinScreen() : void
+ displayLoseScreen() : void
+ restartGame() : void
```

App

```
+ WIDTH : int
+ HEIGHT : int
+ time : int
- game : Game
```
```
+ setup() : void
+settings() : void
+ draw() : void
+ keyPressed() : void
```

**<<enumeration>>
Direction**

```
UP
DOWN
LEFT
RIGHT
```
```
+ getIndex() : int

+ convertIndexToDirection(index : int) : Direction
```

**<<enumeration>>
Mode**

```
SCATTER

CHASE

FRIGHTENED
```