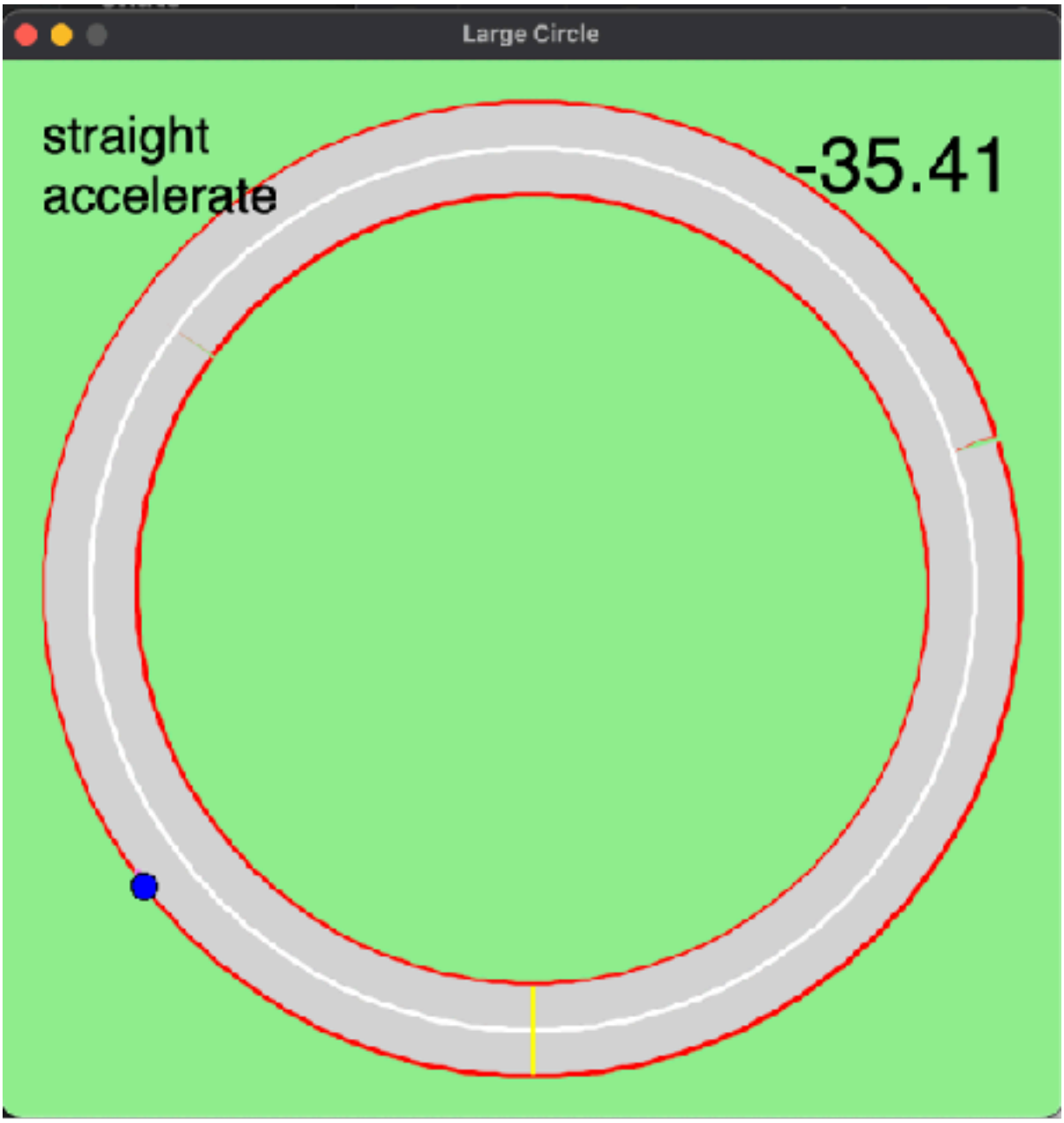
Race car project

In order to understand how the car works I have done a lot of testing to the agent, like what accelerate do to my agent, what is coast used for, when to turn left and when to turn right etc.

In the below iteration I was able to avoid the right side wall but it crashes the left side wall.



Below is the code after the car moves.

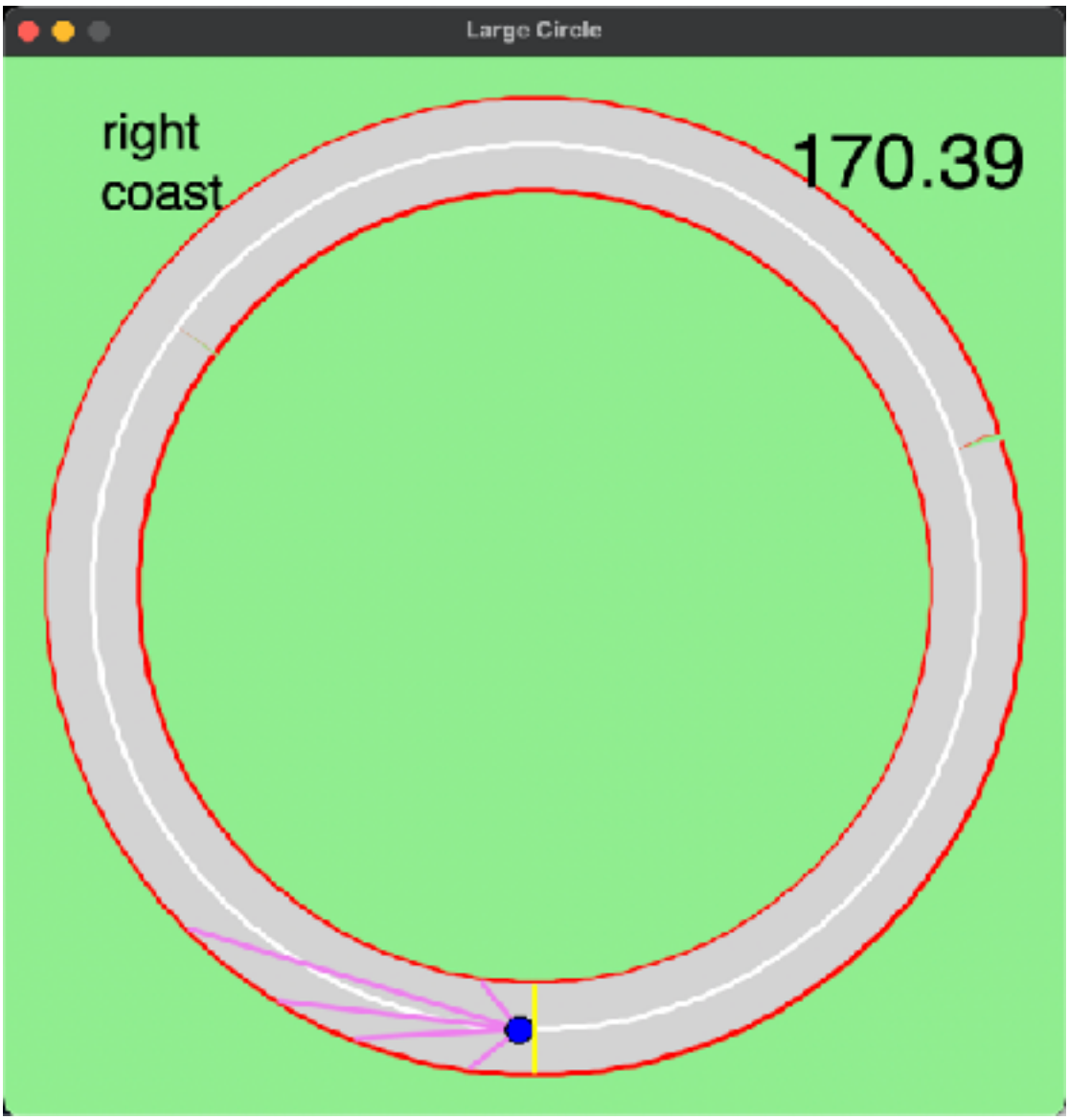
```
import random

class Agent:
    def chooseAction(self, obs, possibleActions):
        lidar = obs['lidar']
```

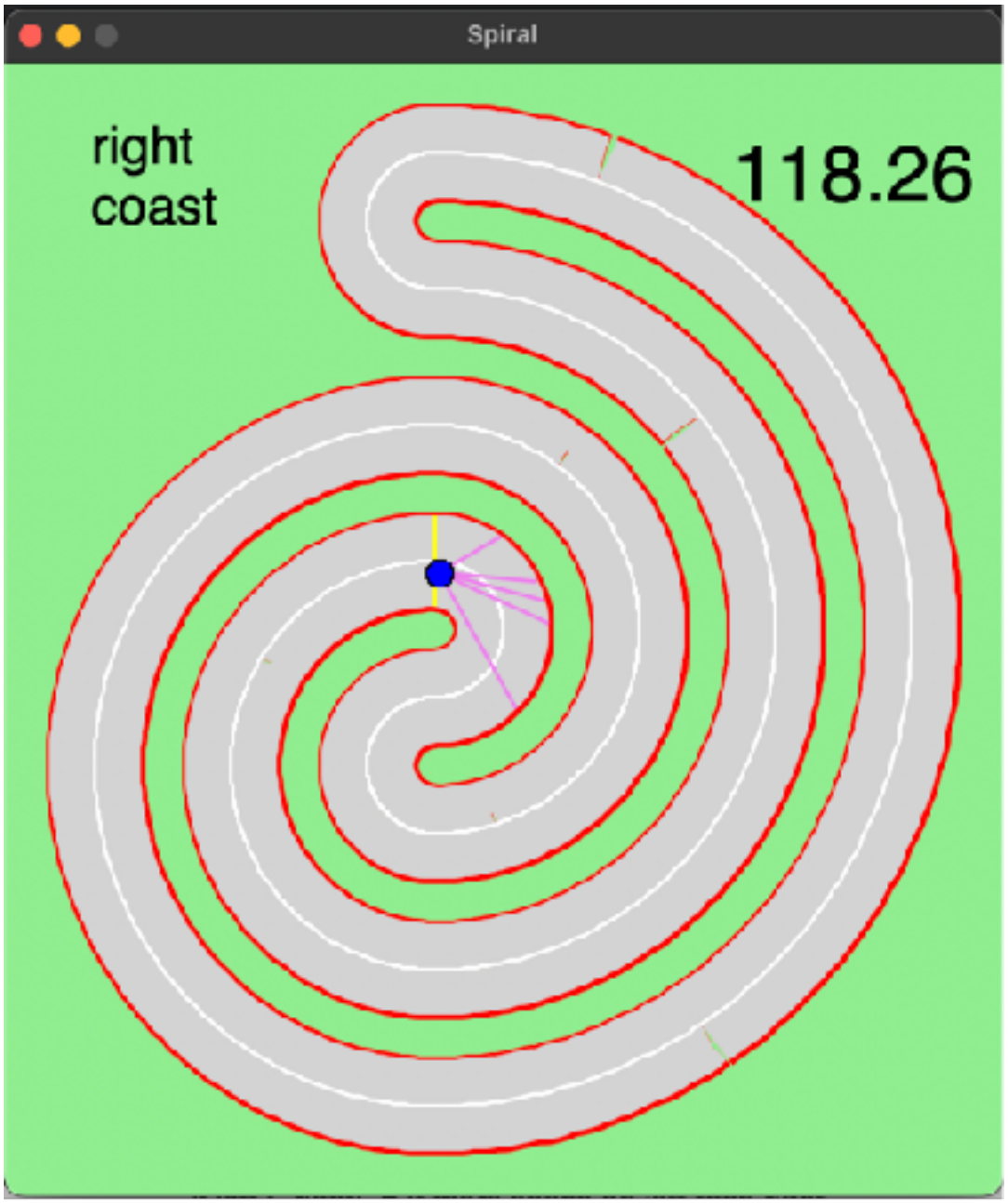
```
        velocity = obs['velocity']

        front = lidar[2]
        left = lidar[0]
        right = lidar[4]

        if front < 0.5:
            return ('straight', 'brake')
        elif left < 0.3:
            return ('right', 'accelerate')
        elif right < 0.3:
            return ('left', 'accelerate')
        else:
            return ('straight', ‘accelerate')
```

In this attempt, the agent exhibits a behavior where it moves to the opposite side of a wall if it is close to it. However, there is a problem when the agent begins accelerating. The velocity increases significantly, making it unable to turn right or left effectively. Initially, it avoids hitting the wall, but when it picks up the acceleration, it becomes out of control.

```
class Agent:
    def chooseAction(self, obs, possibleActions):
        lidar = obs['lidar']
        velocity = obs['velocity']

        left = lidar[0]
        front = lidar[2]
        right = lidar[4]
        fleft = lidar[1]
        fright = lidar[5]

        if front < 0.5:
            if velocity > 0.1:
                return ('straight', 'brake')
            else:
                return ('straight', 'coast')

        elif left < 0.3 and fleft < 0.3:
            return ('right', 'coast')

        elif right < 0.3 and fright < 0.3:
            return ('left', 'coast')
        else:
            return ('straight', ‘accelerate’)
```

Although there is minimal change in the output, it completes the track after a few iterations but fails to complete the remaining iterations.


Large Circle
right
coast
170.39



In this the agent was able to complete the first and second track with Average speed = 0.587 Maximum speed = 0.635.
But, while I am trying to run the same code for the remaining tracks it is crashing the wall.

```
import random

class Agent:
    def chooseAction(self, observations, possibleActions):
        lidar = observations['lidar']
        velocity = observations['velocity']
```

```
left, fleft, front, fright, right = lidar

if velocity < 0.15 and front > 1.0:
(Before change  if velocity < 0.6 and front > 1.0)
    if left > right:
        return ('left', 'accelerate')
    elif right > left :
        return ('right', 'accelerate')
    else:
        return ('straight', 'accelerate')
else:
    if left > right :
        return ('left', 'coast')
    elif right > left :
        return ('right', 'coast')
    else:
        return ('straight', ‘coast’)
```

In this code, instead of attempting to move away from obstacles, the agent will strive to remain in the middle of the track. However, due to the velocity and speed of the agent, it collides with the walls. To address this issue, I modify the velocity to 1.5, which reduces the agent’s speed but ensures that it completes all the tracks.

Challenges:

- During certain instances, when the agent initiates its movement from a position close to the wall, it experiences a lack of acceleration, rendering it incapable of executing left or right turns.
- Handling high velocities near a wall can be challenging, as the agent may collide with the wall.

Final output: