Planning for drunks

Software description

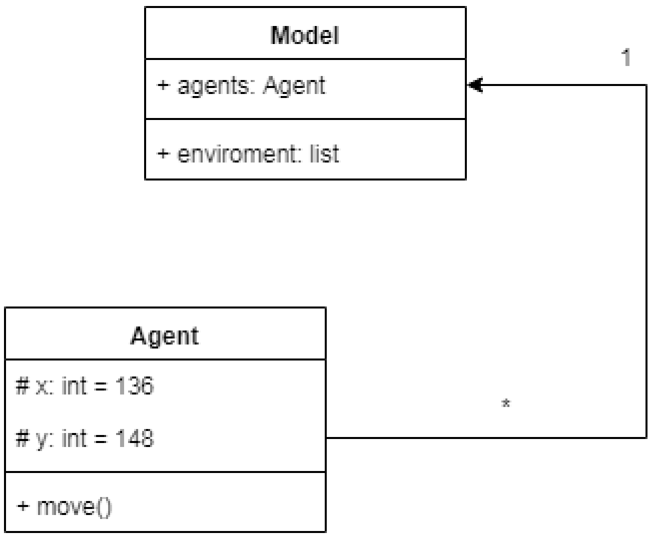
Imagine you are in control of town planning, and your town is full of drunks. You need to build a model that shows where drunks walk when they're trying to get home.

> Build a program to do the following...

1. Pull in the data file and finds out the pub point and the home points.
2. Draws the pub and homes on the screen.
3. Models the drunks leaving their pub and reaching their homes, and stores how many drunks pass through each point on the map.
4. Draws the density of drunks passing through each point on a map.
5. Saves the density map to a file as text.

Software developing process

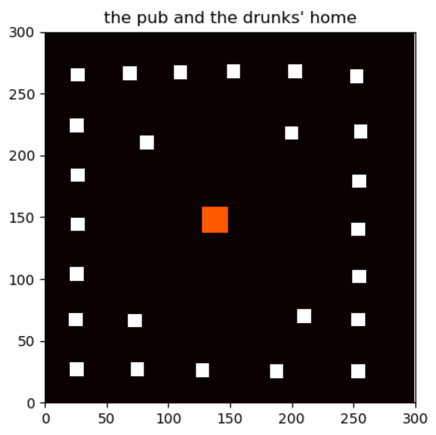
UML diagram



modeling idea

1. start point

By drawing the images of pub and drunks' home, we assume that all drunks start from the same point to find their own home, and the choice of this point has little effect for the model, so we choose the middle position of the pub area



2. move drunks

move the drunk randomly left/right/up/down in a loop that picks randomly the way it will go like this code

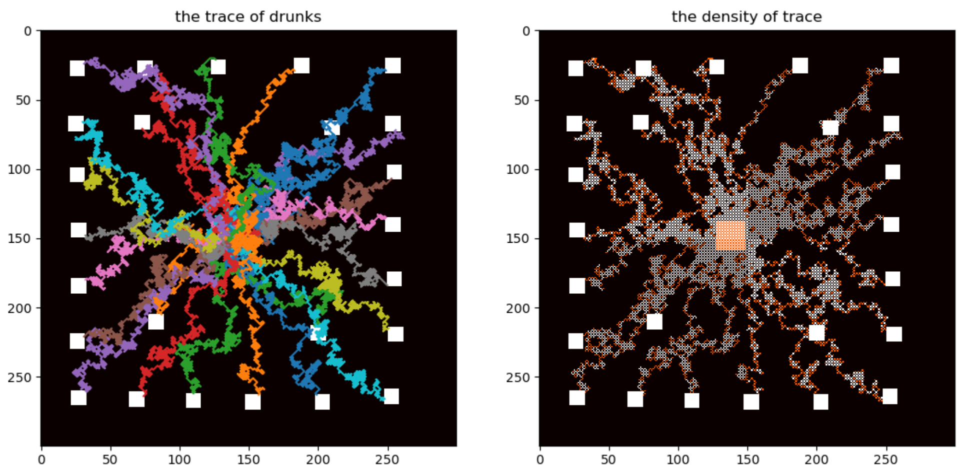
```
    def move(self):
        Step = 1
        if random.random() < 0.5:
            self.y = self.y + Step
        else:
            self.y = self.y - Step

        if random.random() < 0.5:
            self.x = self.x + Step
        else:
            self.x = self.x - Step

        if self.x < 20:
            self.x = self.x + Step
        if self.x > 270:
            self.x = self.x - Step

        if self.y < 20:
            self.y = self.y + Step
        if self.y > 270:
            self.y = self.y - Step
```

If you set the `step` to a small value, such as `1`, it will take a long time to find the trajectory, and a large number of trajectory points will be generated.



Since need to adjust the value of `step` to get better trajectory.

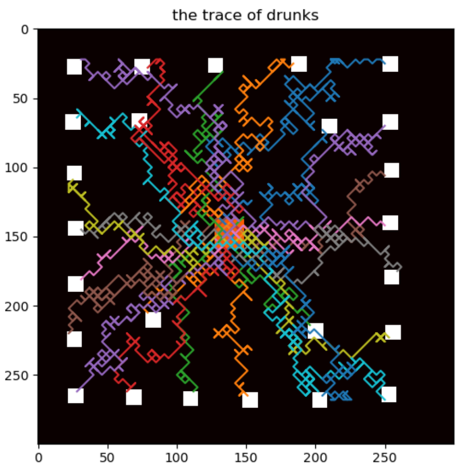
3. drunks' step number

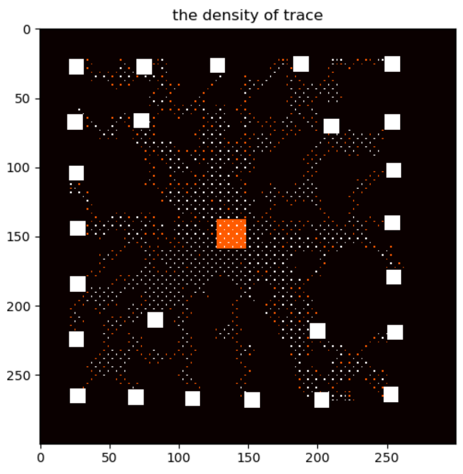
Because drunks move randomly, it is found during the experiment that the number of steps to return home is not large. Therefore, a rule was designed during the software design process to dynamically increase the number of steps, thereby reducing the number of steps in the process.

```
step_num = step_num + num_iter/100
```

Dynamically increase the number of steps as the number of iterations increases.

A result


the trace of drunks
0
50
100
150
200
250
0
50
100
150
200
250


the density of trace
0
50
100
150
200
250
0
50
100
150
200
250