Assignment 2 – Planning for Drunks

In this assignment the objective is to produce an ABM format program in Python which in summary, models 25 drunks leaving a pub, finding their way home and monitoring their movements.

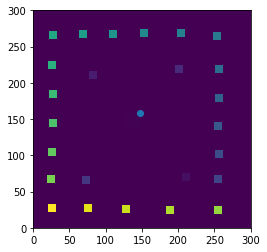
The IDE tool Spyder was used to compile and debug the code, all outputs and Python code is available on Git Hub at <https://github.com/cman2000/assignment2>

Core objectives this program sets out to achieve include:

1. Pull in the source data file and find 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.

The first stage required the source environment data, provided, to be imported into the program. The data file, ‘drunk.plan’, was imported using a csv reader. The data import was then inserted into a new list named ‘drunkworld’, this is the primary environment in which agents (drunks) move around (Figure 1)

Figure 1 House and pub locations



The environment is 300 by 300 cells/pixels and contains the house and pub locations. (Figure 1)

Also presented, on Figure 1, as a scatter plot point, a specific cell location for the pub – represented by cells containing 1’s. For this assignment I decided to make the drunks start/exit point of the pub the last coordinate in the range of values – (148,158). This was obtained using a for loop with enumerate to translate cell value 1’s to respective coordinates.

I’m sure the first few blocks of code here, import and pub coordinate value could have been consolidated into a single function, however I have chosen to use separate functions, as I could get them to work how I needed.

The program then defines how to move each drunk, when they reach home, and how to loop through all 25 drunks.

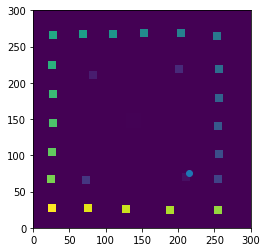
The ‘move\_drunk’ functions asks for a single random move in x and y direction, while also ensuring any movement off the end of the grid results in a flow back on at a different end.

A key piece part to the program is in identifying when the drink is home, i.e when an arrival condition is true. An if else statement is used in the ‘is\_drunk\_home function’ to match the house number and movement coordinates of the drunk to ascertain if condition is true.

Using both functions above, plus taking the number of drunks, a ‘for loop’ and ‘while not’ will continue to move a drunk until the drunk world value equals the house number value.

Figure 2 Drunk 10 arrival home in drunkworld

Drunk with house number [10] Has arrived at home on coordinate [215, 75]



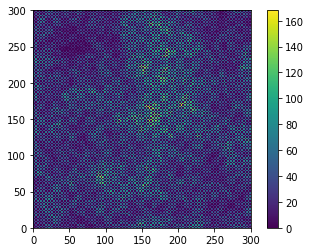
Drunk with house number [10] Has arrived at home on coordinate [215, 75]

The final part is getting the program to provide information on where drunks have been, as result how many movements though each cell, presented both as data and a density grid.

An initial issue that came up was how to avoid changing values in ‘drunkworld’ cells and not affecting ABM calculations and movements by changing the source values by recording density values in these cells. The answer was to make a mirror environment from the reader but only consisting of 0’s (in the first function) which can be used separately, to record and present accumulated data from drunk movements.

‘Drunk density.png’ (Figure 3) - image output showing colour shaded density of number of drunk interactions at any given cell.

Figure 3 Drunk travel history density



‘Drunk density.txt’ – a text file (csv) output of numbers of drunk interactions with any given cell, on route to finding home.

These outputs provide the main evidence of drunk movements and the model, however, in reference to Figure 2 I would ideally want to place all final drunk coordinates on the same scatter plot, unfortunately I could not get the syntax or code just right to achieve this, therefor I set the code to present a plot for each drunk end/arrival point with reference to house number and final coordinate.

Index of outputs on GIT Hub

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| **File name** | **Description** |
| Assignment2.py | .py Main model - python code |
| drunk.plan | .plan format containing source data |
| Drunk 10 arrival.png | (Example) .png file displaying house 10 arrival |
| Drunk density.png | .png Density grid of drunk movements |
| House and pub locations.png | .png Grid showing locations of |
| Assignment 2 notes.docx | .docx Notes describing the model |