

Task 1&2: Implementation of a simplified SugarScape Model

The simulation runs in turns, with each turn consisting of the following phases in this order

1. Sugar growth phase – triggered by *SugarGrowth()* function from the program.
2. Agent movement phase – triggered by *movement()* function from the program.
3. Consumption phase – triggered by *metabolism()* function from the program.

Design pattern:

1. The world has wrap-around borders. This effect applies to agents movement and sight. The sugar scape is a 20X20 grid world, and the number of agents is 20.
2. Agents sight are set to 3. Agent can see their location as well.

Visualization and Analysis

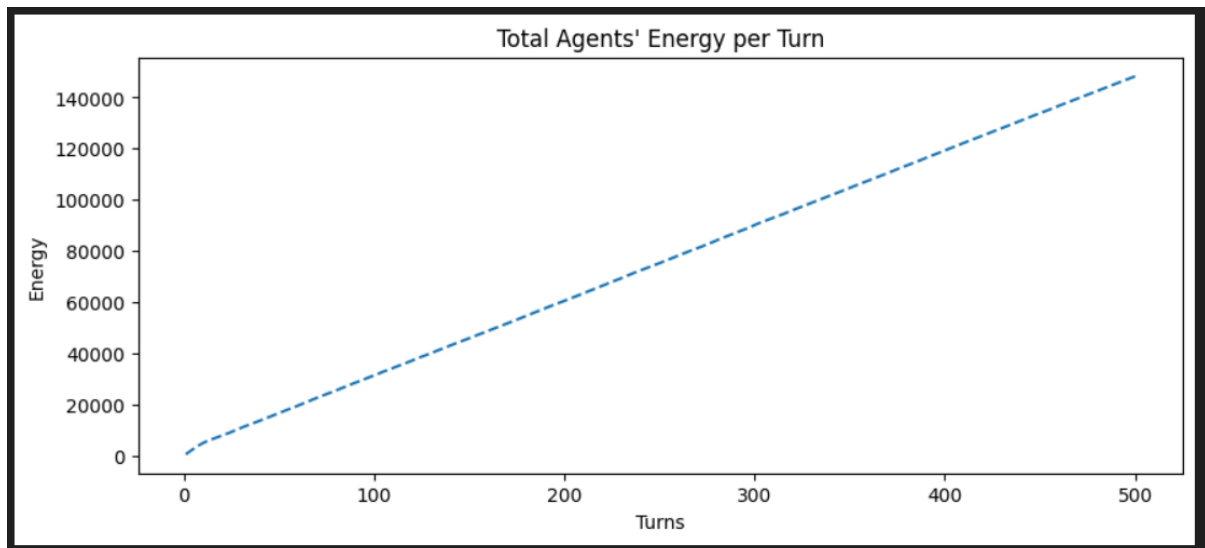


Figure 1. *showing plot of agents' energy with number simulation runs*

Analysis: The fig1 above shows a linear proportional relationship between the number of turns and the total energy produced by agents.

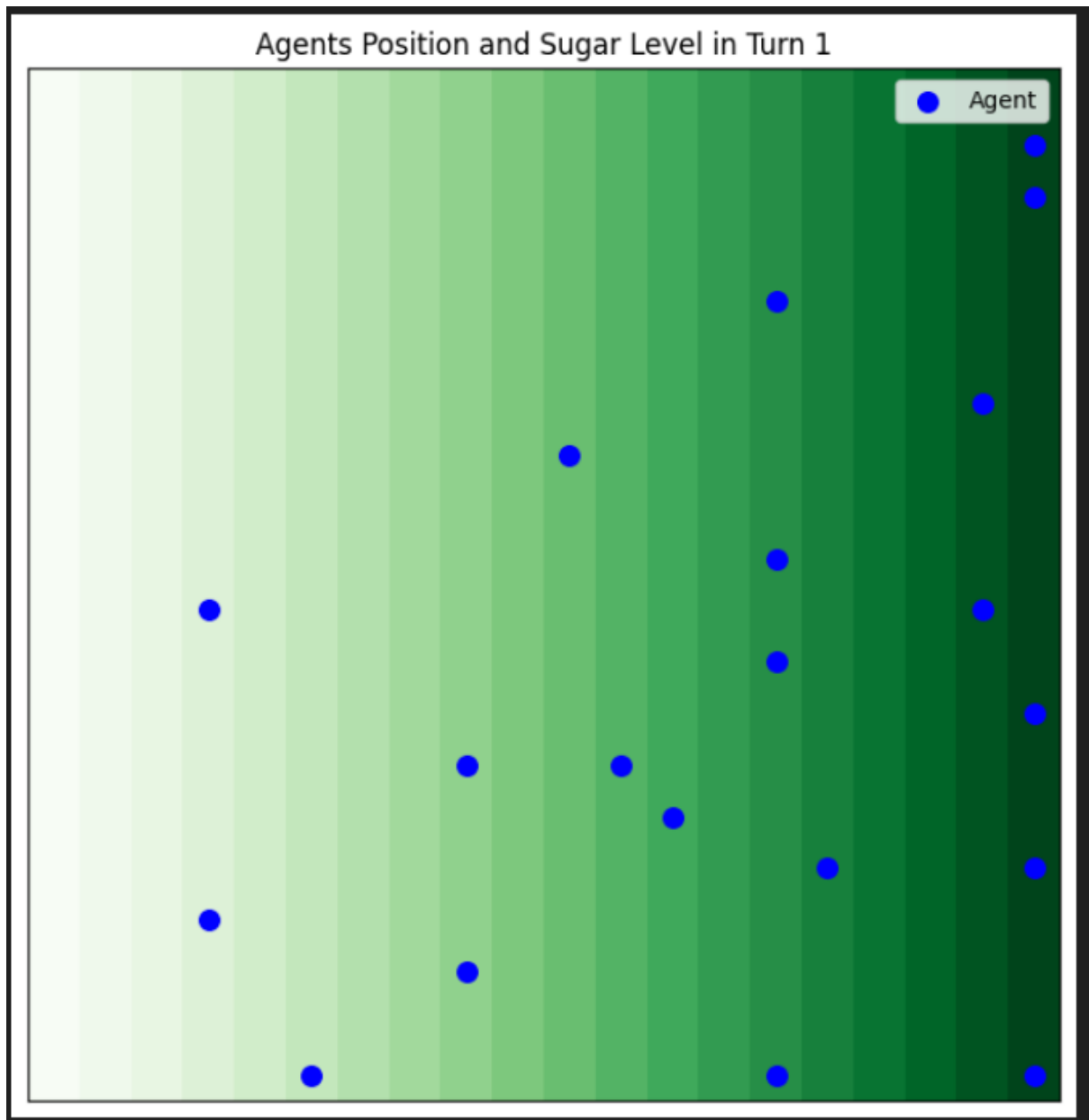


Fig. 2 shows a Colour Map displaying 20X20 grid and agents position and sugar level in turn 1

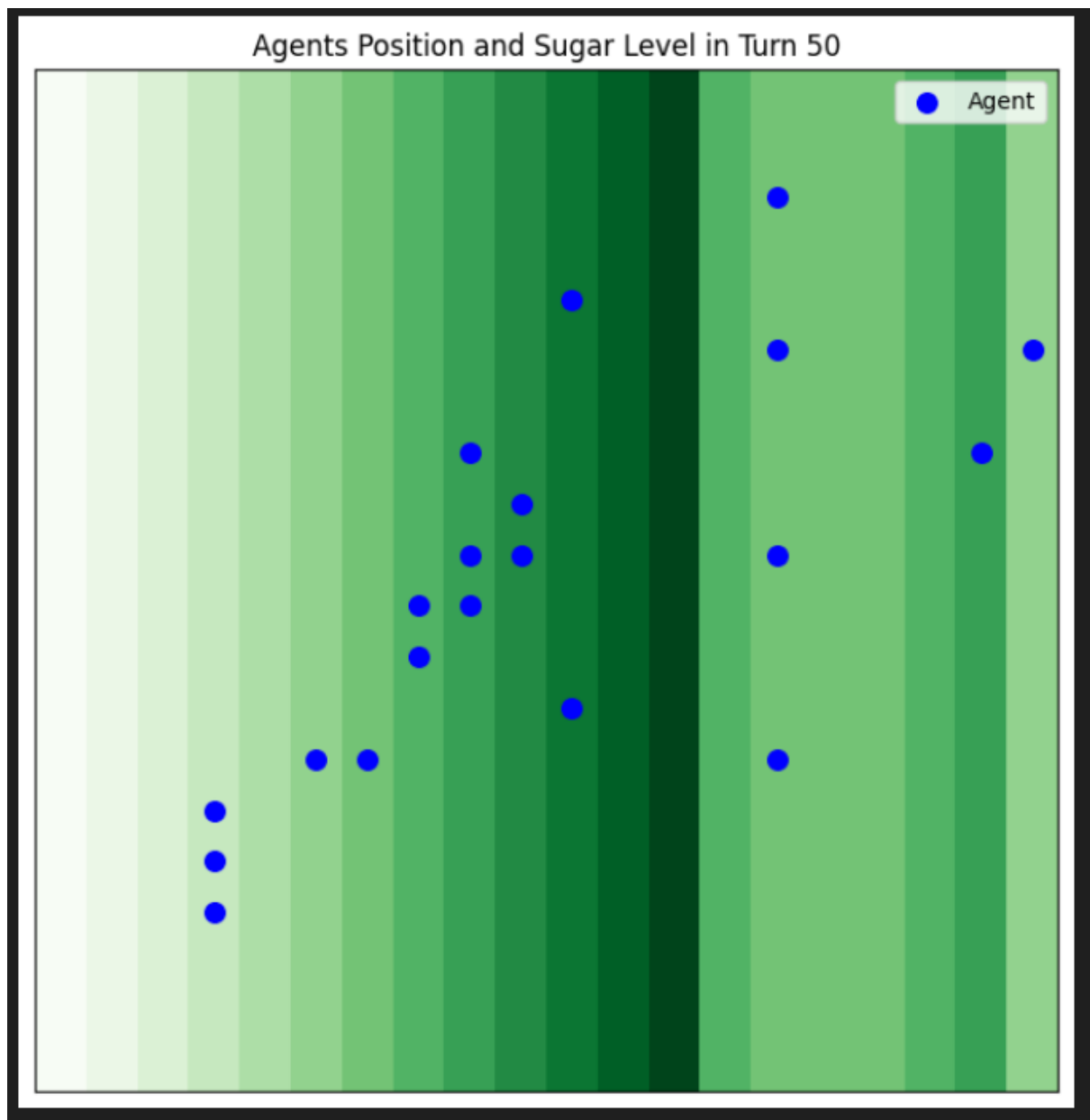


Fig. 3 shows a Colour Map displaying 20X20 grid and agents position and sugar level at turn 50

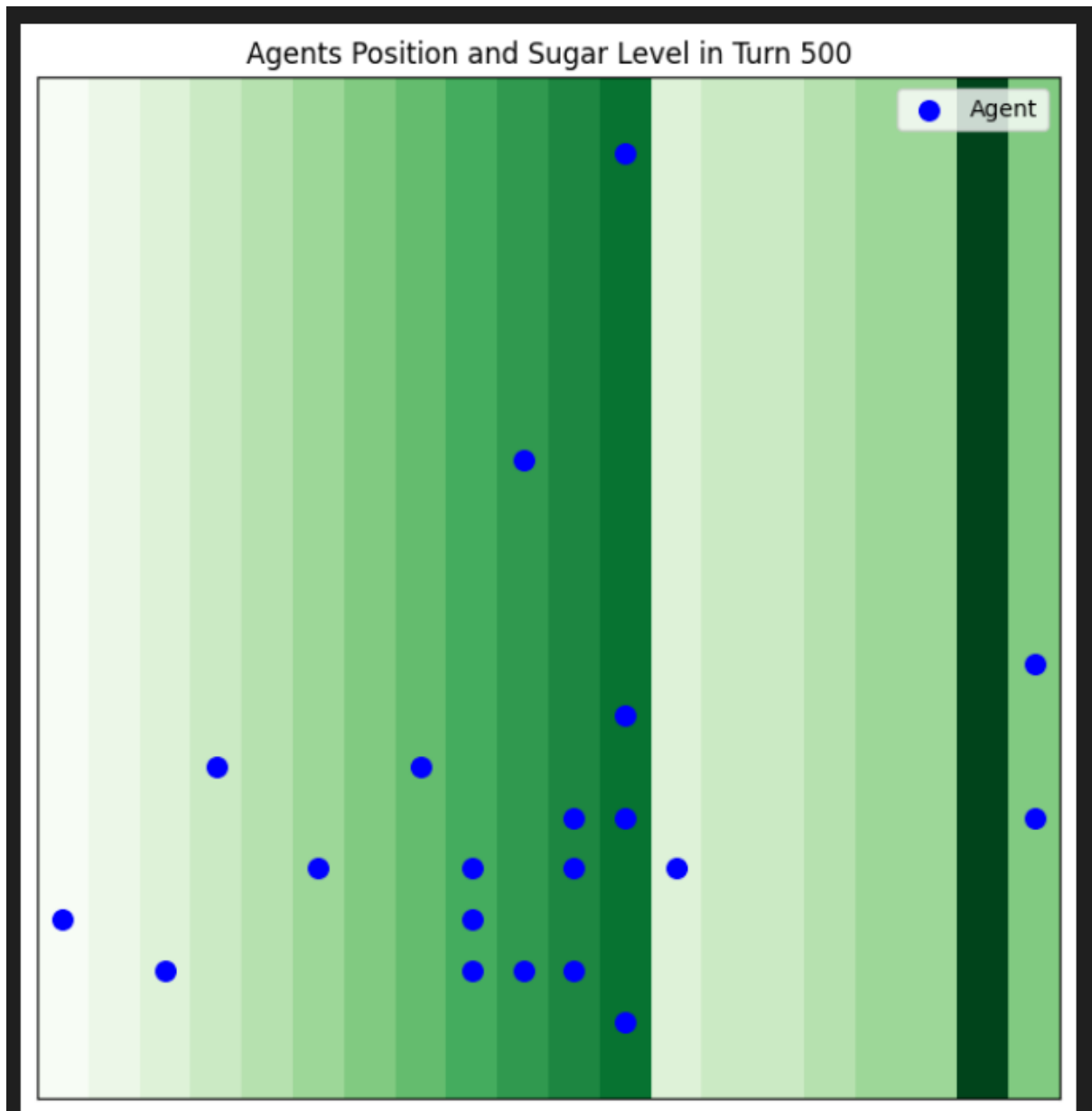


Fig. 4- shows a Colour Map displaying 20X20 grid and agents position and sugar level at turn 500

Analysis: Figure 2, 3&4 show the sugar scape (20X20) grid world, the sugar level in turn 1,50 and 500 and the position of agents in those turns. From the plots, it is obvious that agents move to position with high sugar level. *Deeper colour (green) means high sugar level and light green (signifies low sugar).* When agents move away from locations it become lighter signifying low sugar and as the sugar growth phase is active and replenishing sugar, the colour deepens signifying high sugar.

Observation

Agents do not die even with consumption phase in every turn. Reason behind this is because the sugar growth phase is active in every turn and agents are not reproducing. Agent will only die, if placed in position 0,0 in the world, where no sugar grows.