

Ant Colony Simulation

1.0 About

This project is to simulate a virtual ant colony which the ants are gathering food from a randomly appearing food source and carry them in to the ant hill.

2.0 Implementation

An ant moves randomly until it came near to the food source or near to a pheromone path which another ant made. When it get near to a food it grab a piece of it and go back to the ant hill. If it get near to a pheromone path it travel in that path. When all the food is over another food source will be appear in another random location.

When an ant is not near the food source or pheromone path. It moves randomly (changes the directions in every five steps). When the food source or the pheromone path is whit in the “search space” of the ant (10 unites around the ant) it use the optimal path to the target. If it goes to the food source the pheromone path it lays will be highlighted in white. Then it uses it's own pheromone path to go back to the ant hill with a bit of the food. When an ant goes on a pheromone path which it or another ant layed the path will be faded by one unit. And If the ant goes back to ant hill it won't lay any pheromone path. But when it goes back to food from ant hill it lays a three times powerful pheromone path. So the most used path will be the path with the most powerful pheromone level.

The ants won't always take the pheromone path to travel to food. It travels the both factors, the distance to the food source and the pheromone level. It take the summation of the pheromone level and the change of the distance of eight directions and use the one with he highest value.

$$\text{direction} = \max [(pheromone_level + distance_change_form_the_current_location) \text{ for direction } d] \\ d = 1 \text{ to } 8$$

The yellow color circles represents the ants who find food and the red ones are the ants with food. The white color circles are pheromone paths. Their size represents how powerful they are. The blue color circle is the food source. The bigger red circle in the middle is the ant hill.

3.0 Running

This script is written in python. Install 'python' and 'Tkinter' to run the script. (use synaptic package manager in Ubuntu to install them) .

use command ,

```
python main.py
```

4.0 Screen Shots

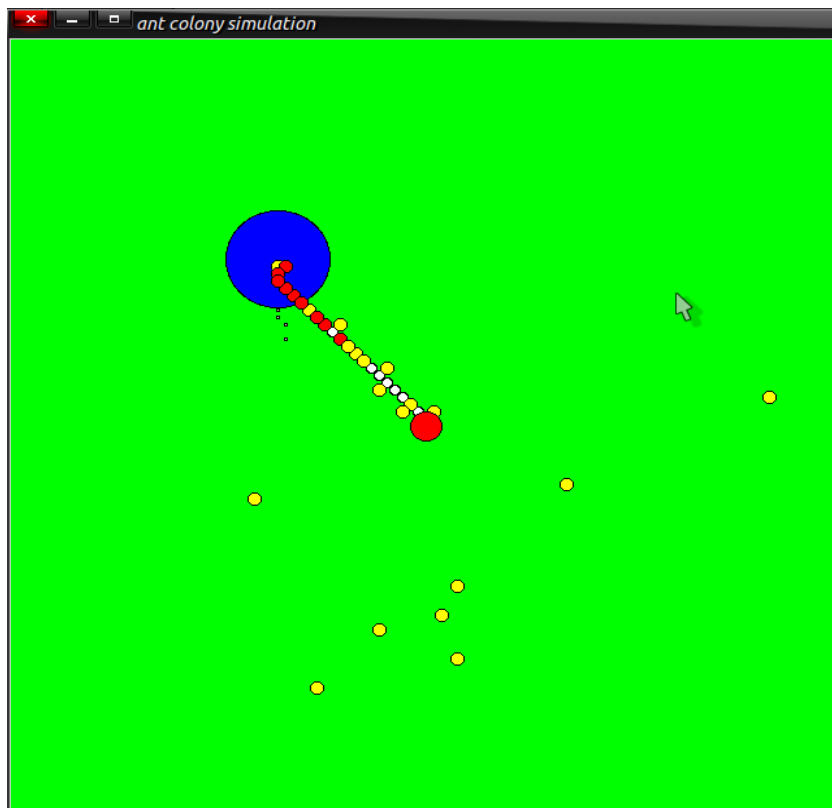


Figure 4.0

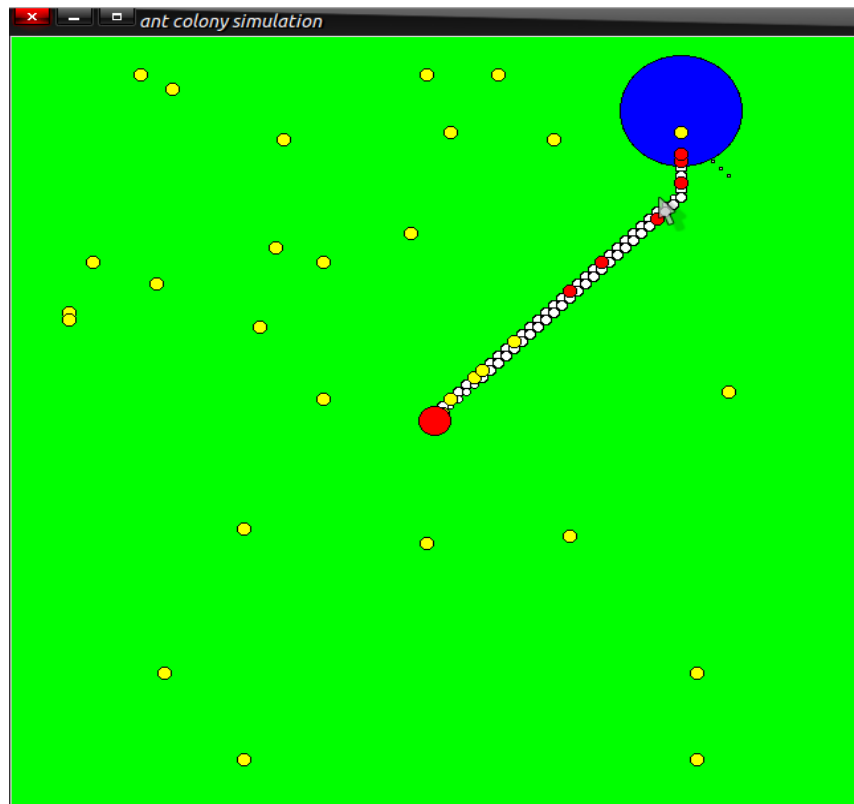


Figure 4.1

5.0 More Info

- tcg.galahena@gmail.com
- <http://www.inf0warri0r.blogspot.com>

6.0 Licenses

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