Simulating Ant Colonies To Investigate How Worker/Scout Distributions Affect Colony Energy

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May 9, 2018

Abstract

Ant colonies have the unique ability to dynamically search the terrain surrounding their environments, detect and retrieve sources of food. This is an emergent behaviour that has been well well explored by a variety of past studies [1] often with a focus on examining the way that paths to and from food sources are created and organised. In reality, many species of ants have a number of different castes of ants within their ranks [2]. This study examines what affect different distributions of two castes of ants in particular – the *minor-* and *major-worker* ants – within a colony have on that colony's overall health when faced with differing conditions.

Ant colonies are simulated in Matlab on train that has been descritised into chunks, and food is spawned randomoly throughout the terrain. Ant colonies with differing ratios of simulated minor and major worker ants are created, and their success – as measured by [MEASUREMENT HERE].We found that [FINDINGS HERE] These findings indicate that [INSIGHT INTO ANTS HERE], indicating that a mix of major and minor workers is the most suitable – with the minor workers excelling at [SOMETHING?] while the major workers [DO SOMETHING ELSE], as seen in nature [CITE THIS ACTUALLY HAPPENING - Or, I guess don't if it doesn't really happen and just state that our model was wrong.]

1 Introduction and Background

A number of past studies have examined the way that ant colonies search their surrounding areas to locate and retrieve food [3, **?**]. Often the aim of those studies focused on simulating ant colonies is to apply the emergent behaviour that ant colonies exhibit to solve abstracted technical problems [**?**, **?**], with a smaller number of past works focusing on simulating ant colony behaviour as it is seen in nature [**?**]

[**?**] paper implements ant trail following —- somehting about it modelling using deposition

Whereas this [**?**] introduces the concept of a dual-pheromone system, where one set of pheromone leads away, one toward

[**?**] discusses the benefits of simulating the ant's return path using pheromones or simply having the ants return directly

TODO: Cite one other thing here, giving it another piece of information

These pieces of information inspired us to do stuff like the other stuff

2 Methodology

3 Results

4 Discussion

5 Conclusions

References

[1] S. Camazine, J.-L. Deneubourg, N. R. Franks, J. Sneyd, and G. Theraulaz, *Self-Organization in Biological Systems*. Princeton studies in complexity, Princeton University Press, 2003.

[2] "Caste Terminology - AntWiki."

[3] K. Vittori, J. Gautrais, A. F. R. Arajo, V. Fourcassi, and G. Theraulaz, "Modeling Ant Behavior Under a Variable Environment," in *Ant Colony Optimization and Swarm Intelligence, 4th International Workshop, ANTS 2004, Brussels, Belgium, September 5 - 8, 2004, Proceedings*, pp. 190–201, 2004.

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