Variations on Error Strategy of Foraging Ants

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Abstract

Foraging efficiency of ant colony is studied along the idea of "strategy of errors". The strategy of errors is a seemingly-paradoxical group-tactics proposed by Deneubourg(1983)[1], indicating that errors of individual ants in following trail pheromone, in some cases, increase the efficiency of pheromone-trail-mediated group foraging. In this study, we attempt to extend Deneubourg's original idea of the strategy of errors to entrain more realistic forging behaviors of ants in the model. Specifically, we introduce a multi-agent model[2] in which we incorporate the unsteady supply of food and the non-uniform distribution of errors in sensing and following ability of pheromone trail by foraging ants. The numerical outcomes indicate that, according to the spatial setup of feeding, non-uniform distribution or uniform distribution of the degree of errors alternatively leads a colony to make an optical foraging.

We further discuss the above obtained alternative two strategies of errors with a mixed idea of game theory and variational method.

References

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