

{tag} International Journal of Computer Applications
Foundation of Computer Science (FCS), NY, USA

[Volume 130](#)

-
[Number 8](#)

Year of Publication: 2015

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10.5120/ijca2015907078

{bibtex}2015907078.bib{/bibtex}

Abstract

Swarm cognition is the field that explores the possibility of implanting human cognitive functions on machines by transplanting the processes in naturally self-organized colonies. These natural colonies, especially ant colony, honey bee colony, etc, have been deeply studied to explore the factors which enable them to simulate high cognitive functions, such as decision making, labor division, etc. In swarm cognition a human neuron is matched to an ant or a honeybee in a colony, because both have limited capabilities and their reactions mainly depend only on local interactions with their neighbors. This paper has postulated that any individual in a swarm is itself a network of neurons and thereby swarm is a network of networks. Each child network react to its neighboring networks such a way that where the mother network will be enabled to respond appropriately to the environmental changes. Accordingly, the paper models a honeybee as a network of neurons. The basic model is evaluated by simulating the behavior that a honeybee generates when it reports the food sources to the colony members. A neuron was modeled as a spiking neuron and the network consists of excitatory and inhibitory spiking neurons. The results have demonstrated that the proposed model is capable of demonstrating

food reporting process of a honeybee.

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Index Terms

Computer Science

Artificial Intelligence

Keywords

Swarm Cognition, Spiking Neurons, Honeybee Foraging