

Project: Threshold-Based/Market-Based Algorithms Clustering using task-allocation

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Swarm Intelligence Course Project
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February 8, 2007

Outline

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 - Experiences
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Problem Description

- Sort data of different shape
- No global a priori knowledge of the space
- Can nature inspire us?
- Trade-off between complexity and time

Framework

- Rectangular environment
- Two kinds of objects
- Two kinds of agents
- Agents have only local perceptions

$P_{pickup} & P_{drop}$

- The probability of picking up an object is described as:

$$P_{pickup}^k(i_j) = \begin{cases} 0 & \text{if } k \neq j \text{ and } \delta_{collab}^k \leq collab_thresh, \\ \left(\frac{K_p}{K_p + f(i_j)}\right)^2 & \text{otherwise.} \end{cases}$$

- The probability of dropping an object is described as:

$$P_{drop}^k(i_j) = \begin{cases} 0 & \text{if, in the neighborhood, } \exists \text{ object } o_l \text{ s.t. } l \neq j, \\ 2f(i_j) & \text{if } f(i_j) < K_d, \\ 1 & \text{otherwise.} \end{cases}$$

$P_{pickup} & P_{drop}$

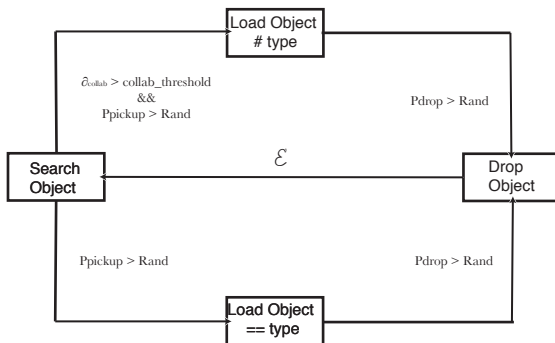
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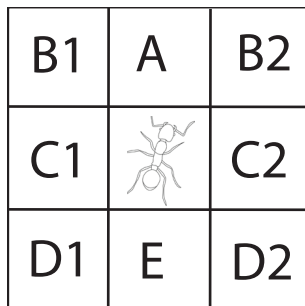
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State-Transition Diagram



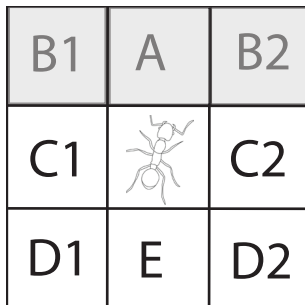
Movement Strategies

- Random Walk
- Straight Walk



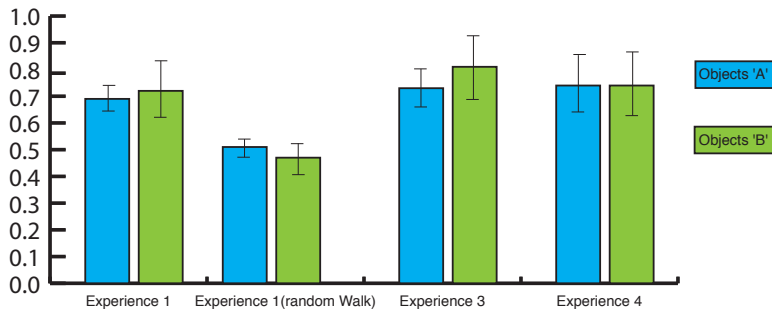
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Experiences

Fitness Chart Experiences



Take Home Messages

- Self organised behavior can arise from local actions
- Collaboration is an important element for flexibility in the swarm colony
- Movement strategy is crucial for fast convergence
- The quality of a solution is always in function of the time needed to achieve it

Thank you for your attention.

Enjoy the simulation!