Multiagent Coordination in Roombas: From a Neural Network Perspective

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Section 1

Problem Motivation

Structure of the Roomba Environment

- Objects:
  - Agent: dynamic dirt collectors (Black Disks)
  - Scrumb: static dirt to clean (Blue Dots)
  - Wall: static boundary of the world
  - Chair/Desk: static decorations as hidden obstacles

  Roomba pictures
- Objectives:
  - collect as many scrumbs as possible
  - make as fewer collision as possible

A Ideal Case

- The most ideal case is to set up a system with
  - Centrailization: full control over all agents
  - Global View: full observations over all scrumbs
- This can be formulated as an integer programming problem.
- No experiential learning is needed in this case.

A Slightly Realisitc Case

- Relax the "Centrailization" assumption and yield a decentralized system with
  - Autonomy: all agents should decide on its own
  - Global View: full observations over all scrumbs are still available for all agents
- We need
  - Local Optimizers that approximates the global optimizers
  - A collision-free protocol between agents

A More Realisitc Case

- Relax the ”Global View” assumption, but allow limited information sharing between agents. These yield a system with
  - Autonomy: all agents should decide on its own
  - Local View: only local observation of scrumbs are available for agents
  - Limited Sharing:

Section 2

Approaches and Architectures

Section 3

Experimental Results

We compared the fitness derived from

Section 4

Discussion

Discussion Time

- Any questions or suggestions?
  sert pictures
- Or email us at
  - jimmylin at utexas dot edu
  - chevron8 at gmail dot com

Acknowledgement

Thanks.