CS378
Autonomous Multiagent Systems
Spring 2005

Prof: Peter Stone
TA: Mazda Ahmadi

Department of Computer Sciences
The University of Texas at Austin

Week 7b: Thursday, March 3rd

Good Afternoon, Colleagues

Are there any questions?

Good Afternoon, Colleagues

Are there any questions?

- How does the Roomba work?
- Examples of randomization leading to specialization

Good Afternoon, Colleagues

Are there any questions?

- How does the Roomba work?
- Examples of randomization leading to specialization
- Real experiments vs. simulation: pros and cons
- Why does the trail-laying use black markers?

Logistics

- Surveys

Logistics

- Surveys
- Faculty hiring talks start next week: T/R @ 11am

Robot Applications

Trail-Laying Robots :

- An application to **real robots**
- Trails marked with a pen

Robot Applications

Trail-Laying Robots :

- An application to **real robots**
- Trails marked with a pen
  - Future options(?): odor, fluorescence

Robot Applications

Trail-Laying Robots :

- An application to **real robots**
- Trails marked with a pen
  - Future options(?): odor, fluorescence
- Also use simulations (applet)

Robot Applications

Trail-Laying Robots :

- An application to **real robots**
- Trails marked with a pen
  - Future options(?): odor, fluorescence
- Also use simulations (applet)

Task Allocation :

- Also on real robots
- How many is too many?

Propose an ant-based algorithm to...

- ...

Propose an ant-based algorithm to...

- ...Sort a dynamic set of items
  - Each item has a key and a rank
  - Goal: keep the ranks in ascending order of the keys

Propose an ant-based algorithm to...

- ...Sort a dynamic set of items
  - Each item has a key and a rank
  - Goal: keep the ranks in ascending order of the keys
- ...Create ant cemeteries
  - Goal: dead ants should all be piled in the same place
  - (it doesn't matter where)

Propose an ant-based algorithm to...

- ...Sort a dynamic set of items
  - Each item has a key and a rank
  - Goal: keep the ranks in ascending order of the keys
- ...Create ant cemeteries
  - Goal: dead ants should all be piled in the same place
  - (it doesn't matter where)
- ...Do network routing
  - build routing table mapping destinations to links at each node
  - Goal: minimal transit time for packets

Other ant-based research

- AntNet – Network routing solution
  - Randomized algorithm (packets sent probabilistically)

Other ant-based research

- AntNet – Network routing solution
  - Randomized algorithm (packets sent probabilistically)

- Holland – picking up pucks
  - Goal: robot putting pucks in a pile
  - Rules: move randomly, drop if you have 3
  - Analogy: ant burial

Other ant-based research

- AntNet – Network routing solution
  - Randomized algorithm (packets sent probabilistically)

- Holland – picking up pucks
  - Goal: robot putting pucks in a pile
  - Rules: move randomly, drop if you have 3
  - Analogy: ant burial

- Balch – ant tracking
  - Computer vision success

Other ant-based research

- AntNet – Network routing solution
  - Randomized algorithm (packets sent probabilistically)

- Holland – picking up pucks
  - Goal: robot putting pucks in a pile
  - Rules: move randomly, drop if you have 3
  - Analogy: ant burial

- Balch – ant tracking
  - Computer vision success

- Missionaries and Cannibals – An optimization problem

Other ant-based research

- AntNet – Network routing solution
  - Randomized algorithm (packets sent probabilistically)

- Holland – picking up pucks
  - Goal: robot putting pucks in a pile
  - Rules: move randomly, drop if you have 3
  - Analogy: ant burial

- Balch – ant tracking
  - Computer vision success

- Missionaries and Cannibals – An optimization problem

- Character animation (Reynolds, Star Wars)

Continue ML crash course

- Genetic algorithms/programming
- **Neural networks**
- Reinforcement learning

What evolves?

- In nature, is it the individual, the colony, or the gene?

What evolves?

- In nature, is it the individual, the colony, or the gene?
- How does "altruism" arise?

What evolves?

- In nature, is it the individual, the colony, or the gene?
- How does "altruism" arise?
- What does this mean about agent-based systems?

What evolves?

- In nature, is it the individual, the colony, or the gene?
- How does "altruism" arise?
- What does this mean about agent-based systems?
  - Should we create self-interested ants?
  - Or do we need to give them a global objective function?