Application and Testing of a Cougaar Agent-Based Architecture

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I. Problem Description

II. Cougaar
   A) General Overview
   B) System-specific Overview

III. Testing (paper)

IV. Additional Testing

V. Future Directions

VI. Questions
I. Problem Description

- RAVE Technologies, TSA
- Airport door/area secure access
- Autonomous decision making at the door
II. Cougaar

- Cognitive Agent Architecture
  - Created by BBN Technologies under DARPA sponsorship
  - Open source Java-based architecture
  - Designed for large-scale, logistics applications
    - Motivated by known equipment losses during Gulf War I
II. A. Cougaar: General Overview

- Cougaar Node:
  - Agent
  - Blackboard
  - Message Queue
  - Plug-ins
II. B. Cougaar: System-specific Overview

- **Plug-ins:**
  - Sensor
  - Comparator
  - Authenticator
II. B. Cougaar: Community Design
III. Testing (paper): Simulation

- Interactive Simulation
  - Proof of Concept
  - Preliminary Testing
III. Testing (paper): File-based

- Fast, repeatable, and controlled
- Agent layouts:

Separate

Intersecting

Overlapping
III. Testing (paper):

Results

- Separate: 100%
- Intersecting: 88-96%
- Overlapping: 88-96%

Analysis of Error
- Not always the same test case
- During high CPU load
- Increasing delay time improves result
IV. Additional Testing

- Intersection cases only
- Randomly generated 100 events
- Increasing delay times 0-3000 ms
- 2-4 Nodes
- 1 machine simulation
- 5 machine simulation
IV. Additional Testing: Results on 1 machine

![Graph showing% Accuracy vs Time Delay (ms) for single machine simulation with 2, 3, and 4 sensors.]}
IV. Additional Testing: Results on 5 machines

Multiple Machine Simulation

% Accuracy

Time Delay (ms)

2 Sensors
3 Sensors
4 Sensors
V. Future Directions

- Analysis of decreasing performance past a certain threshold
- Further study into Cougaar
- Hardware integration
Questions?