Simulating Societies using Distributed AI

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Distributed AI

- Distributed AI (DAI) is the study of what happens when a set of “intelligent” computational entities (“agents” in a “multiple agent system”) are allowed to interact and possibly intercommunicate

- The objectives of DAI are:
  - to establish the (precise and formal) properties of multiple agent system
  - to build useful multiple agent system for applications such as air traffic control, cooperative engineering, and distributed sensing
  - to use multiple agent system as models of naturally occurring multiple agent systems.

Basic reactive agent

- consists of the following main components:
  - a ‘working memory’ (comprising a changing set of tokens derived from “perception”)
  - a set of rules of the form IF <condition> THEN <action>. Such rules are often called “production rules” or “condition-action” rules. The condition part of the rule typically specifies a required conjunction of tokens (the specification may involve variables) and the action part a specification of an executable procedure.
  - a mechanism that repeatedly identifies a rule whose condition part *matches* the contents of the working memory, and then executes that rules’ action procedure -- thereby causing the agent to perform or more actions in its environment.

Agents with Beliefs and Emotions

- Expectation to agents: rationality and knowledge must be the corner stones of any “intelligent” agent in any context
- Belief – misbelief
- Emotions

Decision making amongst the Tsembagan people of New Guinea

- Simulation variables:
  - group size,
  - the shape of the total meeting area,
  - the size of the range of opinions that might be held,
  - and the extent to which the available set of opinions is inconsistent
- An interesting result was obtained: the agents' collective decision process may be seen as a special case of distributed constraint satisfaction problem solving

Belief and Affect in Hierarchical Organizations

- Hierarchy of agents, when individual agent are located randomly in 2D space
- Agents have:
  - beliefs about the workrates of those spatially close to them
  - ‘feelings’ about their situation in a certain limited sense
- The beliefs that agents have are subject to error and are communicated from one agent to another.
- The scientific interest, of course, is in the connection between micro-level specifications of agents and their reaction to their circumstances, and the macro-level behavior of the hierarchy as a whole
- There is a speculation, that a degree of misbelief by agents about the workrates of those around them **improves** the performance of the organization as a whole

The EOS Project

- The Emergence of Human Social Complexity

- This chapter negotiates the collectional misbelief in communities topic in antropological context

Thank you for your attention!

- Q & A