Institute of
Artificial Intelligence

Leibniz
Universität
Hannover

Advanced Topics in Reinforcement Learning

Artur Ganzha 10019651

Dogs vs. Ants

- If we ignore the more complex behavior (e.g. emotions) dogs can be a more memory efficient way to design an agent
- Dogs can be modelled with 4 joints = 4D action space
- It is scalable as we can decide to implement more complex behavior for dog agents
  - e.g. Emotions, more cognitive capabilities
  - Ants only have simple behavior and are useful for swarm intelligence
- We get different type of inferences (competitive vs cooperative Multi-agent systems)
  - Swarm intelligence (ants) vs. Competitive behavior of dogs
- Parameter variation can define dog classes/breeds (aggression, physicality, etc.)
- Dog agents can support more ethical animal research
- With generative algorithms or aspects from neuroevolution you could create different Multi-Agent setups with different dogs or create a superior dog which learns to solve a task faster

Cooperative vs. Competitive Multi-Agent Settings

Cooperative MA

- Shared communication which influences the reward shaping
  - E.g. already visited states change the reward value if another agent visits
- Possibly never converges or ends up in deadlock situations (e.g. in state coverage settings where only one unvisited state is left)

Competitive MA

- Try to maximize own rewards against other agents
- Do not share the same information for own reward "greed"
- Different strategy for either agent

Combination

- Can be combined (e.g. team-like formation)