Spatial AI → Spatial Agents

Topic → Spatial Agents

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Spatial Agents

Spatial Agents

Spatial agents are our abstraction for occupants of space that can traverse that space... That is, they can exchange one location for another, adjacent or otherwise, typically of their own volition.

Ideally, our simulations mimic the real-world behavior of such agents, whether they are people, machines, computer worms, mail through a postal network, materials through a factory, etc.

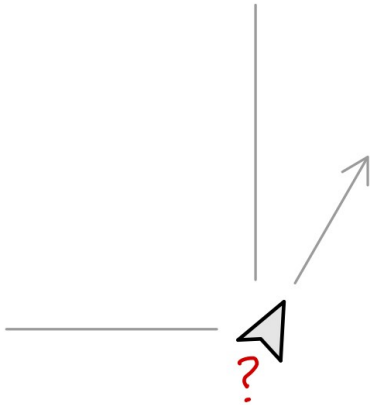
Spatial Agents

A lonely agent.



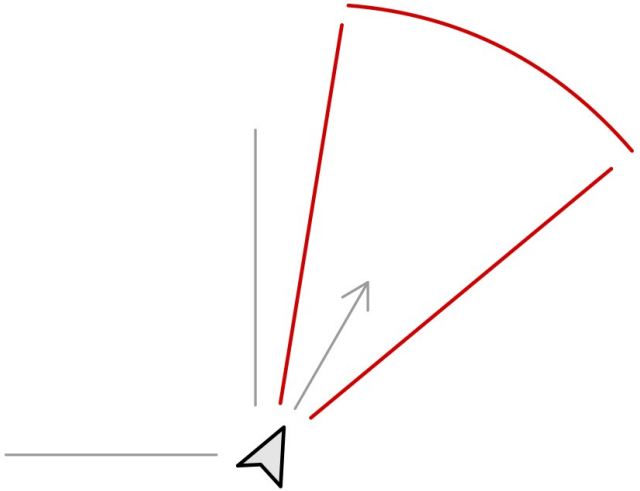
Spatial Agents

It has a location and direction, but it doesn't really "know" where it is or where it's headed.



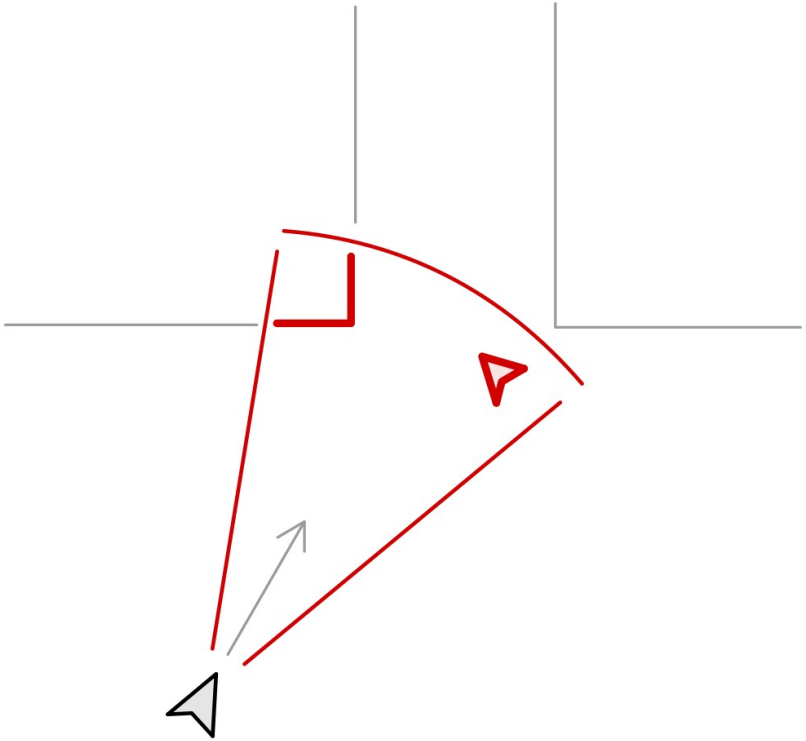
Spatial Agents

But it has sensors and a way to move around.



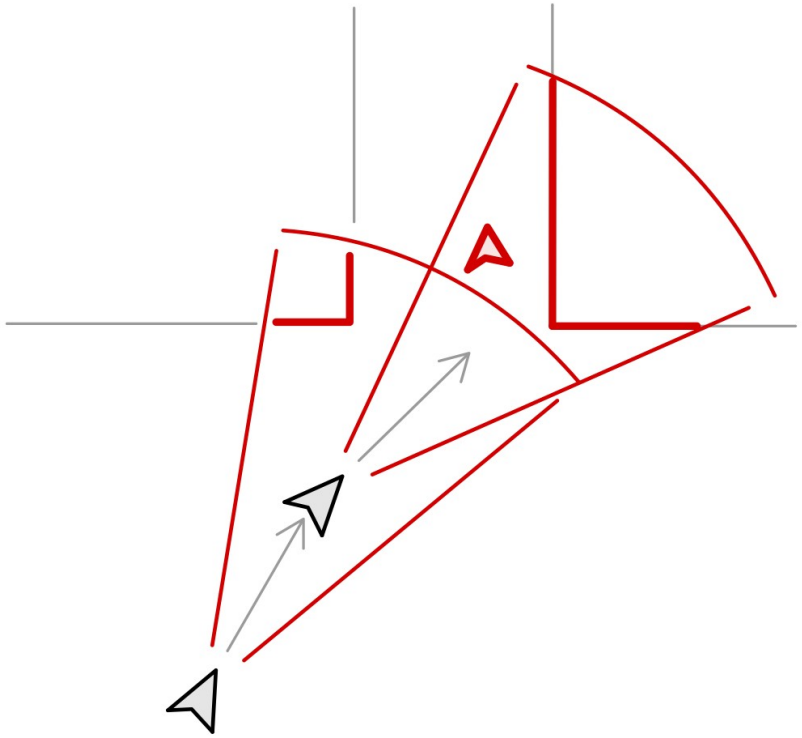
Spatial Agents

So it starts mapping its environment, looking out for obstacles and agents.



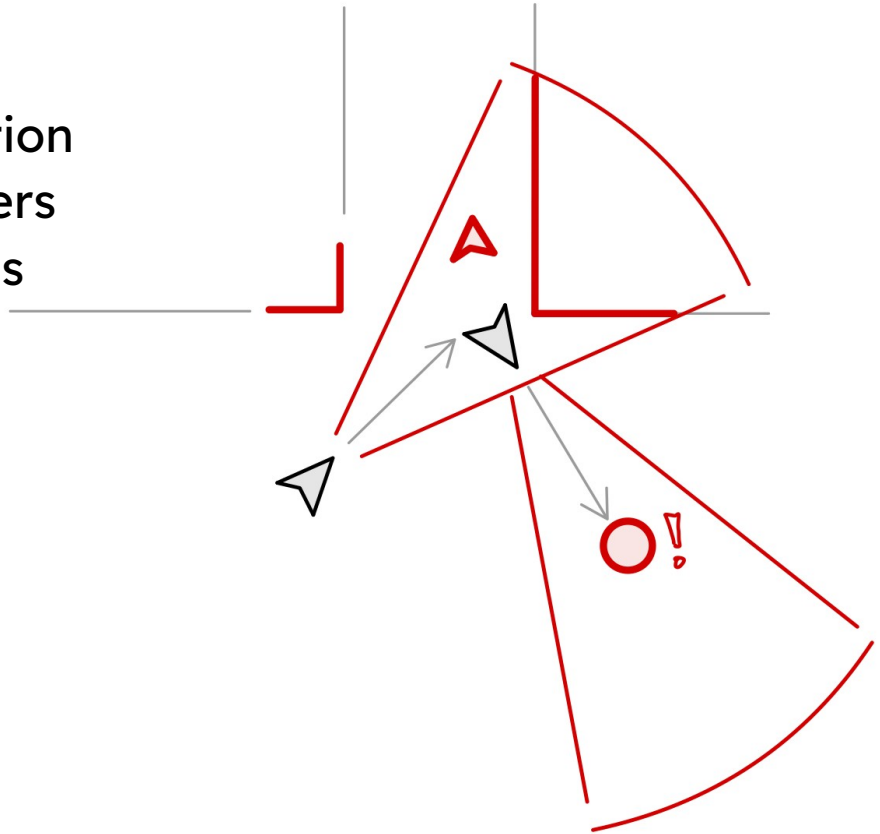
Spatial Agents

And keeping track of everything it sees, even other agents when the move around.



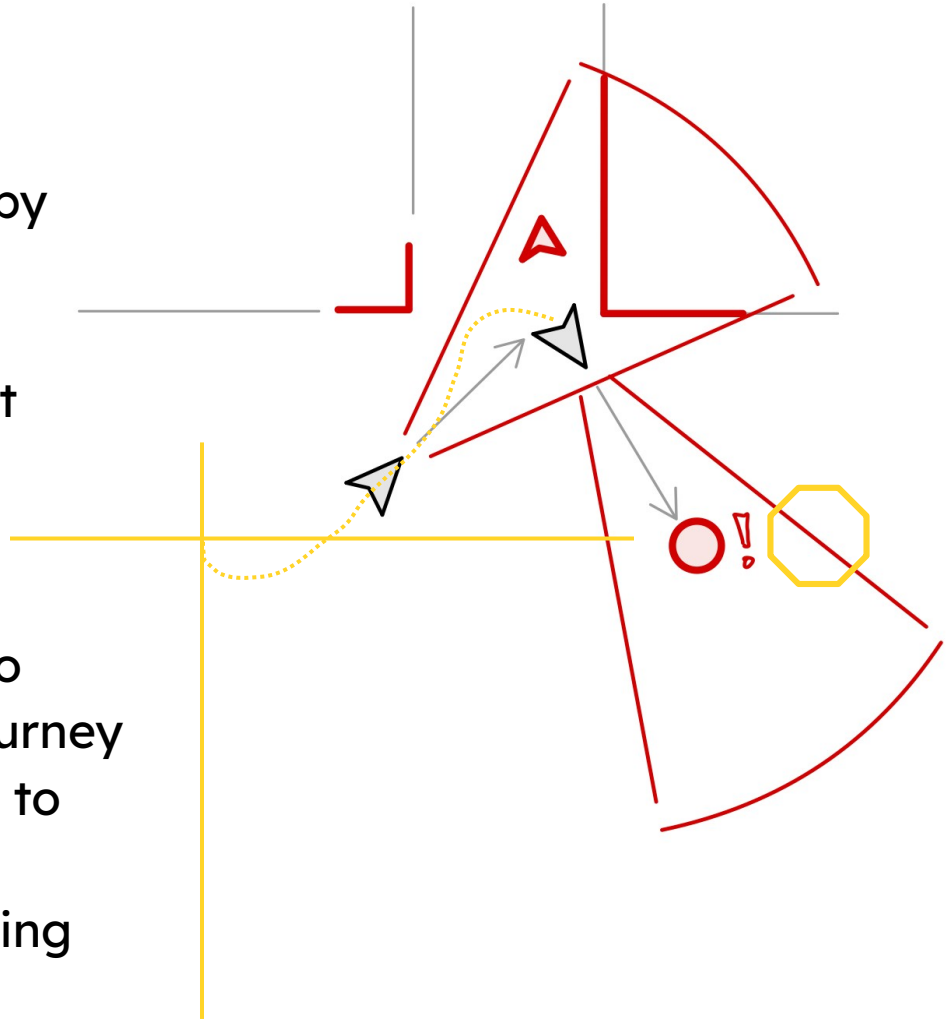
Spatial Agents

When it encounters information that it needs that it encounters at a specific location, it saves this as a “landmark.”



Spatial Agents

Landmarks though aren't necessarily remembered by the agent in the global coordinate system, but a location relative to what it already knows.



For example:

- coordinates relative to where it started its journey
- a "position" like "next to the rock"
- along a path it's keeping track of

Spatial Agents – Assignment (pg 1 of 2)

Develop agent behaviors for 2+ types of spatial agents in your simulations:

1. Agents have limited knowledge of their environments when they spawn
2. Agents have a limited “cone of vision” to discover obstacles, hindrances, and affordances in their environment
3. Agents can consider other agents obstacles and avoid them
4. Agents have explicit goals and performance criteria guiding their traversal:
    1. **goal** → see all the exhibits, find the shoe store in the shopping mall
    2. **performance criterion** → see all the exhibits within 2 hours, travel using as little fuel as possible
5. Agents map their environments to reveal info relevant to their goal(s)
6. When they find relevant information or encounter a significant place, they leave a “landmark” that contains that information they can reference later.

Spatial Agents – Assignment (pg 2 of 2)

And then…

7. Agents can then use its own landmarks to accelerate its traversal (for example, a person finding their way back to their parked car)
8. Give the ability to visualize a single agent's "spatial knowledge," aka the map of occupants, hindrances, affordances, obstacles it has encountered, its landmarks, etc.
9. Start adding many more agents to observe their aggregate behavior.
10. Visualize commonalities between the agents' spatial knowledge… For example, an overlay of all paths, a heatmap of landmarks, etc.
11. Take a short video or series of screenshots (as a slide deck). Post it with your URL and team names to the assignment thread on Discord.