RoboCup Rescue Simulation League 2022

Overview

- Dynamic Task Manager(Framework)

- Search Strategy

  - Expansion of Agent's Search Area

  - Prediction of Civilian's Position

- Result

Ri-one

Framework

Task determination

- Dynamic Task Manager

Ri-one

Dynamic Task Manager

Disadvantages of Previous method
- Sequentially execution
  - Target is determined sequentially

Dynamic Task Manager solved these problems.
- Implemented flexible evaluation
  - *Priority* and *Unstableness*
  - Weight of importance of criteria

Calculation of priority using Message

Limitation of Dynamic Task Manager (2022)
- Targets for nearby agents are the same
  - same type agents are concentrated
  - reducing search efficiency

Message improved the problem
- Make more flexible indicators
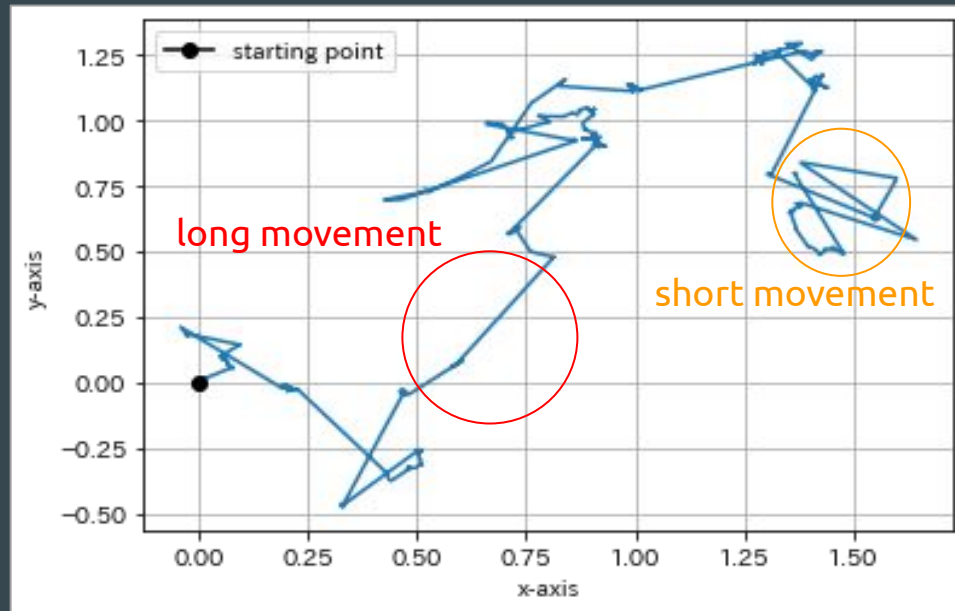 - Agent can determine an appropriate target

Search Strategy

Search Civillian

- Expansion of Agent's Search Area
- Guess of Civilian's Position

Ri-one
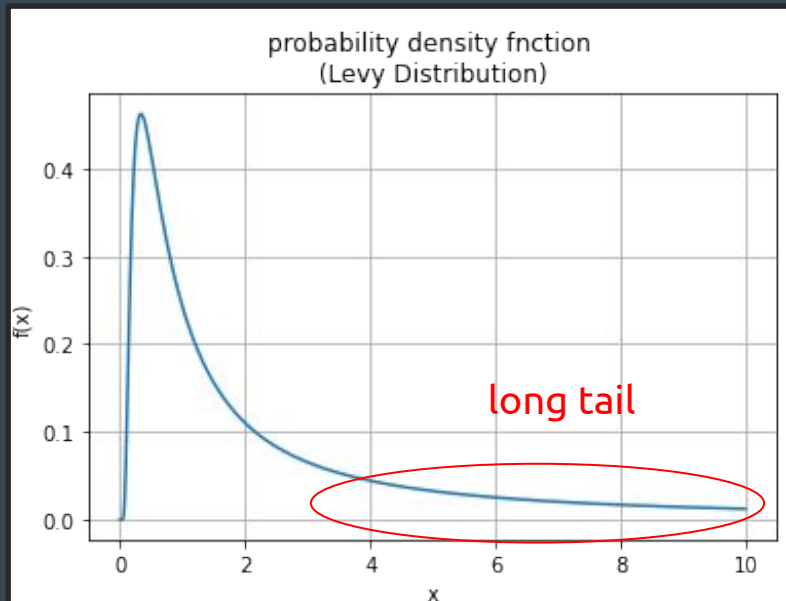
Expansion of Agent's Search Area

the Levy Walk appear animal's movement.

Expansion of Agent's Search Area

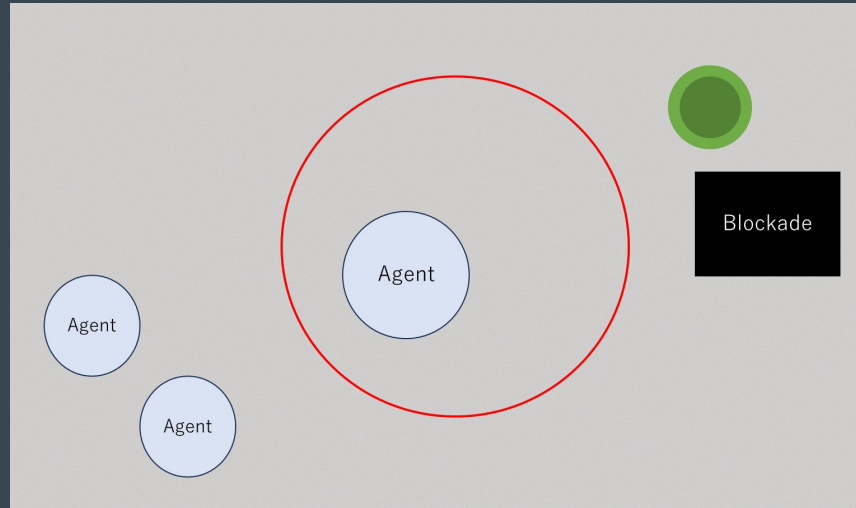Levy Walk decide travel distances following Levy Distribution
- Levy Distribution
  - long tail

probability density fnction
(Levy Distribution)

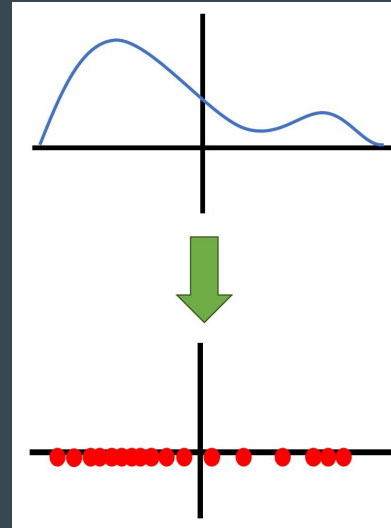long tail

Expansion of Agent's Search Area

Agent's movement direction decided by situation around the agent.
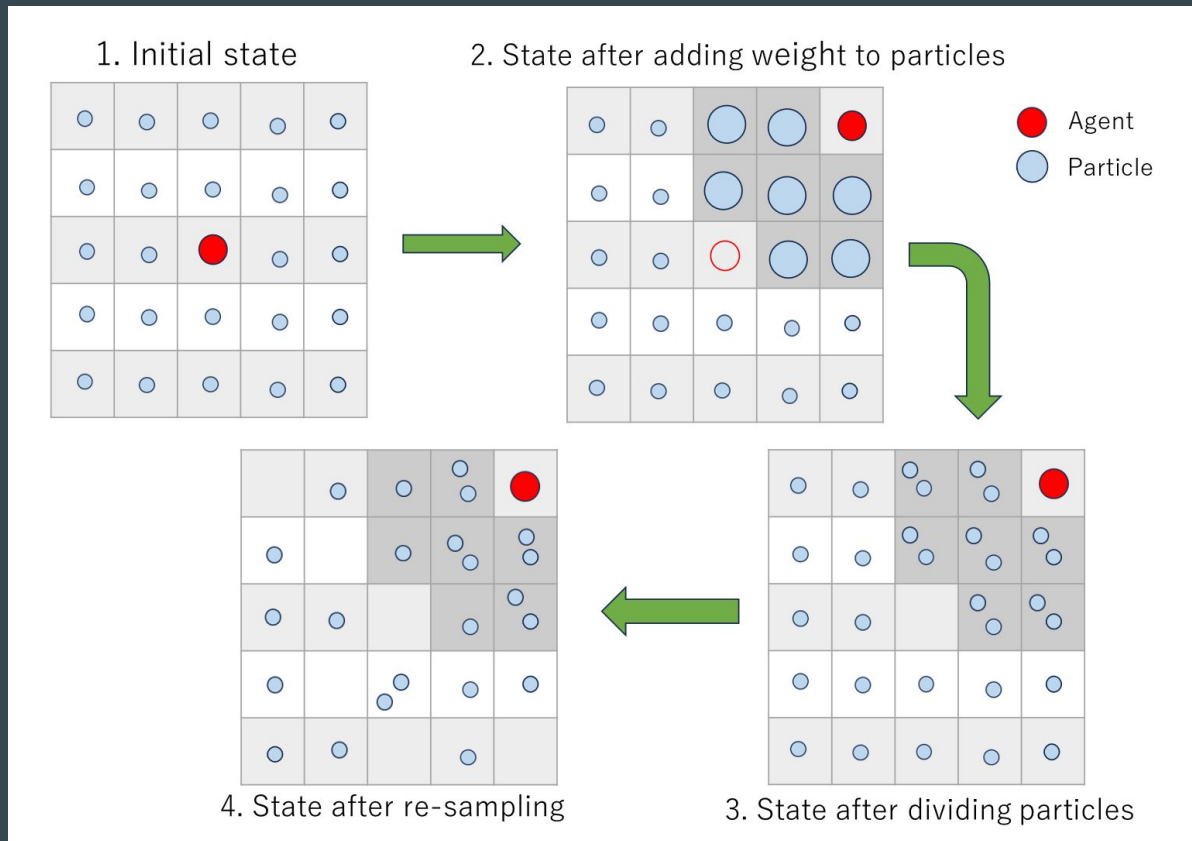
Guess of Civilian's Position

Ri-one guesses civilian's position from civilian's voice.

- Particle Filter

    probability distribution

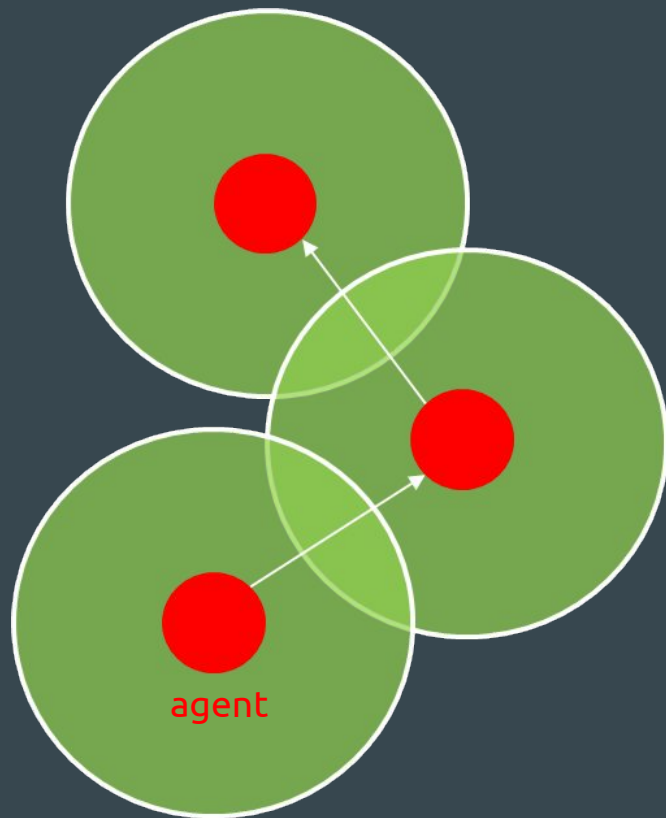   ↓

    the collection of particles

Guess of Civilian's Position

1. We consider grid as a map

2. Range that Agent can hear civilians voice is 5×5 square.

1. Initial state
2. State after adding weight to particles
3. State after dividing particles
4. State after re-sampling

- Agent
- Particle

Guess of Civilian's Position

agent

Result

Result

Team	map		
	istanbul	kobe	montreal
Ri-one 2023	166.60	**174.52**	75.29
Ri-one 2022	166.60	174.12	75.68

- **montreal**
  - score deviation to be larger
- **istanbul**
  - search method did not work effectively

Summery

Dynamic Task Manager

- Dynamic Task Manager become able to use messages to decide Agent's target

Search Strategy

- Expansion of Agent's Search Area using Levy walk.
- Prediction of Civilian's position using Particle Filter.

Previous Method (Sequentially execution)

```
if (criteria A) {
    return …
} else if (criteria B) {
    return …
}
```

Priority and Unstableness (Ri-one 2021)