AIT-Rescue

RoboCupRescue Simulation League 2018

Agenda

- 1. Motivation of Approach
- 2. Approach for Developing Agent
 - 1. Experiments
 - 2. Improvements
- 3. Evaluation
- 4. Conclusion

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Motivation of Approach

Modularity of the ADF makes a readability of agent easier to understand.



Motivation of Approach

RRS-OACIS

makes running a number of simulations easier.

Agent	Мар	Score
agent 1	map 1	100
agent 2	map 1	90

Motivation of Approach

ADF and RRS-OACIS make

Comparison for each agent's modules possible.

module 1	module 2	module 3	 Мар	Score
agent 1	agent 1	agent 1	 map 1	100
agent 1	agent 2	agent 1	 	
agent 1	agent 2	agent 2	 	

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Overview of Approach

We developed an agent following a result of experiments and improved this agent.



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A comparison for agents typically would take an inordinate amount of time.

Formula of possible combinations

$$\frac{(t + mt - 1)!}{mt!(t - 1)!} m$$

where

- mt = the number of module types
- m = the number of maps

A comparison for agents typically would take an inordinate amount of time.

Example of comparison in RoboCup 2017

- 10 teams
- 4 module types

ExtClear, Transport, FireFighting, ExtMove

- 3 maps
 - ► 2145 possible combinations

A comparison for agents typically would take an inordinate amount of time.

The comparison for only Action modules will take about **22 days**.

Example of comparison in RoboCup 2017

- 10 teams
- 4 module types
 ExtClear Transport FireFighting

ExtClear, Transport, FireFighting, ExtMove

- 3 maps
 - ► 2145 possible combinations













Target Teams

the following five teams are chosen by some simulations.



Target Map



VC3 is simpler than other maps.

Example of Experiment



Computers for simulations or experiment

These spec of speed and memory are lower than RoboCup 2017 environment.





RoboCup 2017



Combinational Pattern 1

Rank	BA	RD	HD	BD	Score
1st	AUR	RAK	AUR	AUR	166.7
2nd	AUR	AUR	AUR	AUR	166.6
3rd	AUR	AUR	AUR	CSU	166.4

BA : BaseAgent, *RD* : *RoadDetector HD* : *HumanDetector*, *BD* : *BuildingDetector*

Combinational Pattern 2

Rank	BA	S_PF	S_AT	S_FB	Score
1st	AUR	RAK	Sample	Sample	179.3
2nd	AUR	RAK	Sample	Sample	178.3
3rd	AUR	MRL	Sample	CSU	177.2

S_PF: Search(PF), S_AT: Search(AT), S_FB: Search(FB)

Combinational Pattern 3

Rank	BA	AEC	AT	AFF	AEM	Score
1st	AUR	RAK	AUR	RAK	AUR	175.7
2nd	AUR	AUR	AUR	LAR	AUR	170.5
3rd	AUR	RAK	LAR	CSU	AUR	164.6

AEC : ActionExtClear, AT : ActionTransport, AFF : ActionFireFighting, AEM : ActionExtMove

Best Combination

Module Type	Team	PathPlanning
RD	AUR	-
HD	RAK	-
BD	AUR	-
S_PF	Sample	-
S_AT	RAK	-
<i>S</i> _FB	Sample	-
AEC	RAK	RAK
AT	RAK	RAK
AFF	AUR	AUR
AEM	AUR	AUR

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- 1. Improving modularity of the agent
- 2. Implementing pre-extinguish

Improvements

- 1. Modularity of the agent
- 2. Detection of extinguishing target

Some modules depend on some unique classes.



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Some process in modules should be Algorithm module.



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We separated these processes from modules.



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We separated these processes from modules.

Example of Implementation



Improvements

- 1. Modularity of the agent
- 2. Detection of extinguishing target

The *BuildingDetector* of the best combination treats only the burning building, as candidates of extinguishment.



We changed the module to treat unburning buildings that change own temperature, as candidates for extinguishment.



The *BuildingDetector* of the best combination choose a building that a agent cannot extinguish completely.



Improvements

We changed the module to calculate whether a agent can extinguish completely or not.



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Outline of Evaluation

Compared Teams

The combinational team with found modules

Combinational Team

Two teams included the modules

Aura(AUR) RoboAKUT(RAK)

The champion of 2017



Used Maps



Results of Evaluation

	EH3	IB2	Paris2	SF3	VC3
СТ	83.3	17.2	40.6	42.3	132.3
MRL	82.2	8.3	43.7	56.8	8.6
AUR	115.7	32.9	48.3	46.9	170.3
RAK	93.8	12.7	37.5	44.4	142.9

CT : Combinational Team EH3 : Elndhoven3, IB2 : Istanbul2

Results of Evaluation

Combinational Team's score are higher than the champion's score except in Paris2 and SF3.

	EH3	IB2	Paris2	SF3	VC3
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CT : Combinational Team EH3 : Elndhoven3, IB2 : Istanbul2

Results of Evaluation

Combinational team's scores are not highest than others.

VC3 has more randomness than other maps.

	EH3	IB2	Paris2	SF3	VC3
СТ	83.3	17.2	40.6	42.3	132.3
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Evaluation

There is no team has the highest score on every map.

better strategies are different for each map.

Rank	Strategy			
lst	Α			
2nd	В			
3rd	С			
Map 1				

Rank	Strategy			
lst	С			
2nd	А			
3rd	В			
Map 2				

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 A combinational team from various teams is better according to some experiments.

Better strategies may be different for each map.

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Thanks for Listening!