Creating Strong AIWolf Agents using Systematic Tactical Evaluation

SHUNSUKE HATTA, KEISUKE TAKAHASHI, KAZUNARI FURUKAWA, JUNJI YAMATO

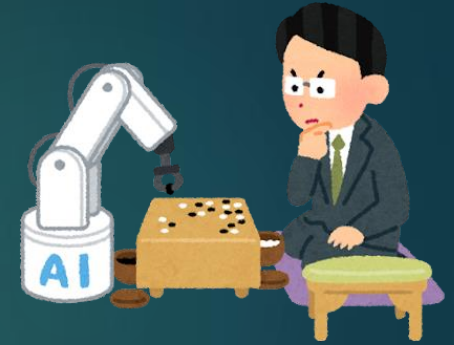KOGAKUIN UNIVERSITY, TOKYO, JAPAN

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1.Introduction

▶ Game with perfect information ・・・ all players can observe all previous decisions made by all players. AI > human

→GO and Shogi

▶ Game with imperfect information ・・・ all players cannot observe all previous decisions made by all players. Ai < human

→mahjong and poker

1.Introduction

▶ Among them, the "AIWolf Project" is a project to conduct AI research using the communication game "werewolf game".

▶ The AIWolf Project is holding international competitions once a year starting in 2019.

▶ We created a variety of agents to achieve excellent results in the "Protocol division" of AIWolf.
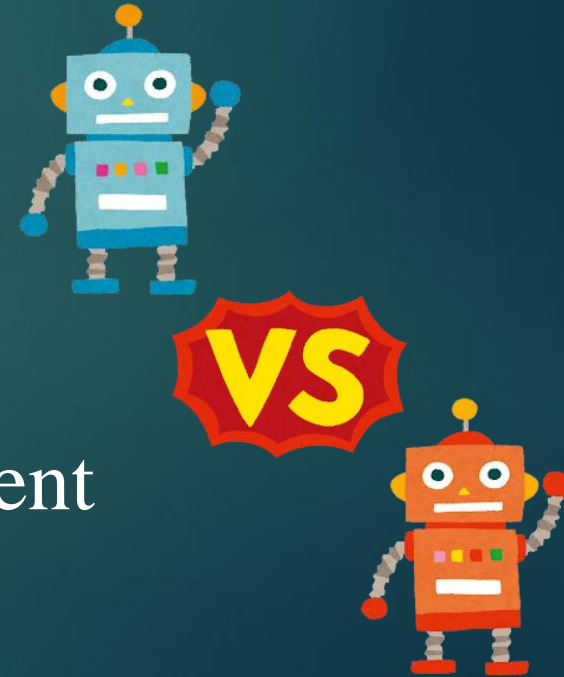
2.Objectives

▶ The purpose of this study is
  - To evaluate the effectiveness of selecting agents by evaluating their tactics.
  - To find effective tactics for each role.
  - To submit strong agents to the "3rd International AI Werewolf Competition" in conjunction with IJCAI 2021.

3. Experimental Procedures

3.1 Agent Selection

▶ The roles used are the same as in the real tournament Chosen randomly in each game.

▶ 8 "villager", 3 "werewolf", 1 "seer", 1 "possessed", 1 "bodyguard", 1 "medium".

3. Experimental Procedures

3.1 Agent Selection

- ► We created several agents each role with different combinations of tactics and compared their winning rate.

- ► Instead of implementing tactics that are considered to be strong , we selected strong agents through evaluation experiments.

- ► We used several agents created using agents creation system called the "Simple Generation System" .

3. Experimental Procedures

3.2 Evaluation Methods

► We prepared three base agents, Agnet1,2,3, and created multiple agents based on them.

► We played 100 games, 10 times each, for each agent to be evaluated.

► The opponents, 14 agents were selected mainly from the agents of the teams participating in the "International AIWolf Competition. "

3. Experimental Procedures
3.2 Evaluation Methods(Hachi)

- ► Hachi is an agent based on Agent1.

- ► In a 5-player village, we selected the tactic of speaking out aggressively.

- ► In the 15-player village, we focused mainly on the tactics of the werewolf team. We analyzed the concept of "Hiding," .

3. Experimental Procedures
3.2 Evaluation Methods(Hachi)

▶ Hiding is not to do many conspicuous actions and leave the early stages to other fellow werewolves.

▶ We paid particular attention to the reported results of deceiving a seer when it was a possessed.

	Winning rate	Number of time
Behaving like a real role	0.36	5
More predict that werewolf	0.25	4
More predict that werewolf as villager	0.3	6

▶ After analysis, we selected the tactic of behaving like a real role.

3. Experimental Procedures

3.2 Evaluation Methods(KP22)

- KP22 is designed based on Agent2.

- In a 5-player village, we selected the tactic of hiding.

- In a 15-player village, we analyzed the concept of taking the tactic of "disrupting the village".

3. Experimental Procedures
3.2 Evaluation Methods(KP22)

▶ we paid particular attention to the tactics of the werewolf to deceive a seer.

▶ After analysis, we selected the tactic of predicting that werewolf regardless of allied werewolves.

3. Experimental Procedures

3.2 Evaluation Methods(Tomatoken)

► Tomatoken is designed based on Agent3.

► In both the 5-player and 15-player village, we selected the tactic of adjust to other players when it was a werewolf.

► We also paid particular attention to the medium's tactics, selecting not to act in a way that would protect his allies.

4. Results
4.1 Selection Results(5-player village)

5-player village	villager	seer	werewolf	possessed
1. Voting Policy	H,K: For werewolf T: Balance	H,K: For werewolf T: Balance	H,K: Adjust to other players T: Balance	H,K: Adjust to other players T: Balance
1. 2. Protecting seer in voting	Yes	Yes	H,T: Yes K: No	H,T: Yes K: No
1. 3. Speeching Policy	H,K: Express suspicious people T: Balance	H,K: Express suspicious people T: Balance	H: Express suspicious people K,T: Act like other players	H,T: Express suspicious people K: Act like other players
1. 4. Predicting and Attacking Policy		Player who think is a werewolf	H: The seer K,T: Balance	
1. 5. About 4 in the winning rate		H,K: Higher winning rate player K: No weighting	H,K: Higher winning rate player K: No weighting	
1. 6. Predicting policy		Communicate honestly		
1. 7. Deceiving seer policy			H: More predict that werewolf K,T: Behave like a real role	H,K: Predict that villager for werewolf T: Behave like a real role
1. 8. Learning	H,K: More learning T: No learning	More learning	H,K: More learning T: Not much learning	More learning

4. Results

4.1 Selection Results(15-player village)

15-player village	villager	seer	werewolf	possessed	medium	bodyguard
1. Voting Policy	H,K: For werewolf T: Balance	H,K: For werewolf T: Balance	H: Adjust to other players K,T: Balance	H: Adjust to other players K,T: Balance	H,K: For werewolf T: Adjust to other players	H,K: For werewolf T: Balance
2. Protecting seer, medium, bodyguard in voting	Yes	Yes	H,T: Yes K: No	H,T: Yes K: No	H,K: Yes T: No	Yes
3. cut off relations with allies			H,K: Yes T: No			
4. Speeching Policy	H,K: Express suspicious people T: Balance	H,K: Express suspicious people T: Balance	H,T: Act like other players K: Express suspicious people	H: Act like other players K: Balance T: Express suspicious people	Express suspicious people	H,K: Express suspicious people T: Balance
5. Predicting and Protecting and Attacking Policy		H: A player of suspected K,T: Player who think is a werewolf	H,T: Balance K: The seer			H,K: The seer T: Balance
6. About 5 in the winning rate		H,K: Higher winning rate player K: No weighting	H,K: Higher winning rate player K: No weighting			H,K: Higher winning rate player K: No weighting
7. Predicting policy		Communicate honestly				
8. Deceiving seer policy			H: More predict that villager K: More predict that werewolf T:Behaving like a real role	H,T: Behaving like a real role K: More predict that villager		
9. Treatment of allied werewolf in 8			H: Not care werewolf or not K,T: Predict that villager for werewolf			
10. Learning	H,K: More learning T: No learning	More learning	H,K: More learning T: Not much learning	More learning	More learning	More learning

4. Results
4.2 Tournament Results

Rank	Agent Name	Programming Language	Using a Simple Generation System
1	toku/ICE	Java	
2	TOT	C#/ Java	
3	KP22	Java	✓
4	Syu	Java	✓
5	CanisLapus	Java	✓
6	Tomatoken	Java	✓
7	SORA	Java	✓
8	Hideto	Java	✓
9	HALU	python	
10	Tomato	Java	
11	OKAMI	python	
12	karma	Java	
13	wasabi	Java	
14	Sashimi	Java	

▶ Hachi did not qualify, KP22 finished 3rd, and Tomatoken finished 6th. indicating that the overall results were good.

5. Discussion

▶ The stronger agent is…

- ・ Actively identifying suspicious agent.
- ・ Proactively predicting that werewolf when deceiving a seer.
- ・ Randomly attacking without learning much.

5. Discussion

▶ In addition, the adoption of somewhat unconventional tactics and the combination of agents may have something to do with the winning rate.

▶ From that fact, there might be a kind of "Metagame" in which we take into account our own composition by predicting the composition of our opponents.
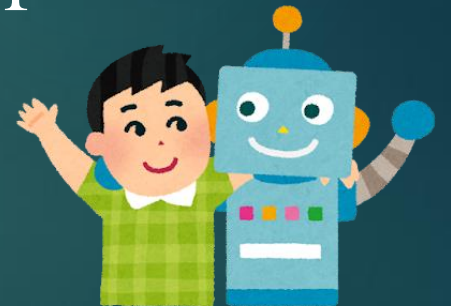
6. Conclusion

▶ In order to improve the win rate of AI in the "Protocol division" of AIWolf, we created agents based on Agent1,2,3 and analyzed the win rate.

▶ Two of them made it to the finals, and the best result was 3rd place.

6. Conclusion

▶ We would like to challenge research on the "Natural language division".

▶ The division is evaluates whether AI is capable of natural dialogue, with the aim of having AI and humans fight in werewolf game.

▶ See you again at the 4th International AI Werewolf Competition.

Thank you for listening!