

CS3243 Tutorial 6

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Announcements

1. Assignment 4 scores are now on turnitin, please check.
2. Midterm Examination is 5 October, check announcements on Luminus.
3. Mark your attendance.

Good thinking question to further understand AC-3 algorithm

From student 1

If you did change the domains of the variables you need to recheck some constraints.

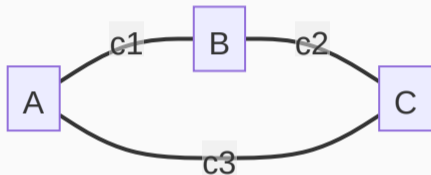


Figure 1: Fully connected situation, may need to check again.

From student 2

Can we consider bidirectional filtering instead of unidirectional filtering?

Previously from T05, Q3

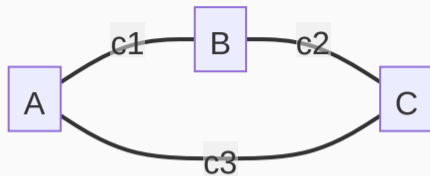


Figure 2: T05,Q3 constraint graph.

Question 3a

$$A = \{1, 2\}, B = \{2, 4\}, C = \{1, 2, 3\}$$

Question 3b

$$(A, B, C) = (1, 2, 1)$$

Question 1

Assignment Question; we will go through this question next week.

Question 2

We have an attacker looking at three targets: t_1, t_2, t_3 . A defender must choose which of the two targets it will guard; however, the attacker has an advantage: it can observe what the defender (strategy) is doing before it chooses its move. If an attacker successfully attacks it receives a payoff of 1 and the defender gets a payoff of -1.

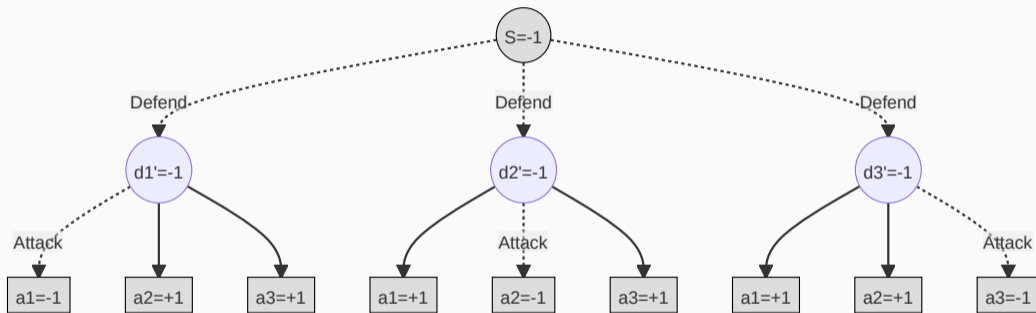
- a. Model this problem as a minimax search problem.
- b. Draw out the search tree.
- c. What is the defender's payoff in this game?

Recap

1. What is the minimax algorithm?
2. Why is it used?
3. What are the ingredients needed to setup?

Answer

1. **Actors:** Min - Attackers, Max - Defenders
2. **Leaf Cost:** -1 if attack successful, $+1$ otherwise



No matter how the attackers choose, the value for the defenders would always be -1 .

Question: How to get around this issue?

Question 3

With the MINIMAX algorithm, we know that the value v , computed at the root (i.e, the utility for the MAX player), is a worst-case value. This means that if the opponent MIN does not act optimally, the actual outcome v' for MAX can only be better, and never worse than v . That said, the MINIMAX algorithm may not select the optimal move given sub-optimal play from the MIN player.

Recap

1. What is the impact of choosing min/max in our computation?
2. When was MINIMAX famously used in AI?

Question 3

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Recap

1. What is the impact of choosing min/max in our computation?
2. When was MINIMAX famously used in AI?

IBM Deep Blue versus Garry Kasparov in Chess.

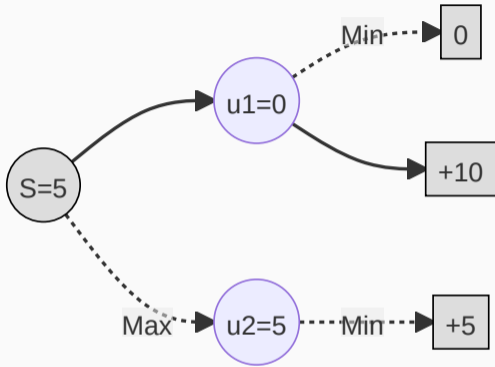


Figure 3: Sub Optimal Example

Limitations of MINIMAX:

- Assumes that Min player plays optimally: ie. when it sees 0 and +10 it will choose 0.
- So to avoid the case of Min player choosing 0
- It selects the action that eliminates the option of choosing 0.

Bonus Question - Work for Snack

To help you further your understanding, not compulsory.

Tasks

1. Read and research on DeepBlue:
 - 1.1 <https://stanford.edu/~cpiech/cs221/apps/deepBlue.html>.
 - 1.2 And more...
2. Share with us a brief description on how it works.
3. Comment on the use of MINIMAX on chess especially in IBM Deep Blue versus Garry Kasparov;
 - 3.1 Why do you think it worked so well?
 - 3.2 Would it work well on regular chess players?; What are the limitations and how to mitigate them?

Suggested activities

1. Attempt Question 1
 - Feel free to discuss with your friends
2. Chitchat
 - Make some new friends on your table
 - Talk with me to find out more about . . .
3. Revise for Midterms
 - Feel free to ask me any questions
4. Go for lunch early