Faculty of Science & Engineering
Department of Computer Science and Engineering
Program B.sc.in CSE

Assignment On

Artificial Intelligent Problems

Course Title: Artificial Intelligent

Course Code: CSE-417

Submitted To Type your text

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ASSIGNMENT 01A:

1. Define in your own words the following terms: agent, agent function, agent program, rationality, autonomy, reflex agent, model-based agent, goal-based agent, utility-based agent, learning agent.

2. Explain the difference between performance measure and the utility measure function.

What is AI?

The art science and engineering of making things that can think perceive and act as human beings and even better.

Agent:

An agent is a person who represents an insurance firm and sells insurance policies on its behalf.

Agent function:

The agent function, notionally speaking, takes as input the entire percept sequence up to that point.

Agent program:

The agent programs take the current percept as input from the sensors and return an action to the actuators.

Rationality:

An agent should strive to "do the right thing" based on what it can perceive and the actions it can perform the right action is the one that will cause the agent to be most successful.

Autonomy:

An autonomous agent is an *intelligent agent* operating on an owner's behalf but without any interference of that ownership entity.

Reflex agent:

We can summarize part of the table by formulating commonly occurring patterns as condition rules.

Model-based agent:

This knowledge about "how the world evolves" is called a model of the world, hence the name "model-based agent".

Goal-based agent:

Goal-based agents further expand on the capabilities of the model-based agents, by using "goal" information.

Utility-based agent:

A utility-based agent makes decisions based on the maximum utility of its choices. In this lesson, you'll learn more about these intelligent agents and how they interact with their environments.

Learning agent:

A learning agent is a tool in AI that is capable of learning from its experiences unlike intelligent agents that act on information provided by a programmer learning agents are able to perform tasks, analyze performance and look for new ways to improve on those tasks.

Explain the difference between performance measure and the utility measure function:

Performance measure function	Utility measure function
A performance measure is used to evaluate the behavior of the agent in environment.	A utility function is used by an agent itself to evaluate how desirable states are. Some paths to the goal are better than others.
Does agent do what it's supposed to do vs. does agent do it in optimal way.	The utility function may not be the same as the performance measure.
Whereas there is always a performance measure function.	An agent may have no explicit utility function at all.
So in general Performance measure is how we evaluate a agent behavior.	Utility function is a function internally used by the agent to evaluate its performance.
They could be same in some cases but it's not necessarily true. Also a performance measure exists always.	a utility function might not.

Reference by:

✓ Wikipedia
✓ YouTube

ASSIGNMENT 02A:

Problem 1:

Missionaries and Cannibals Problem:

Three Missionaries and three cannibals are on the left bank of a river. There is a boat on their side of the river that can be used to carry one or two people. The goal is to use this boat to cross the river in such a way that cannibals never outnumber missionaries on either bank of the river.

Solution:

Initial state:

It is the state when Cannibals and Missionaries are on the left bank of the river with boat.
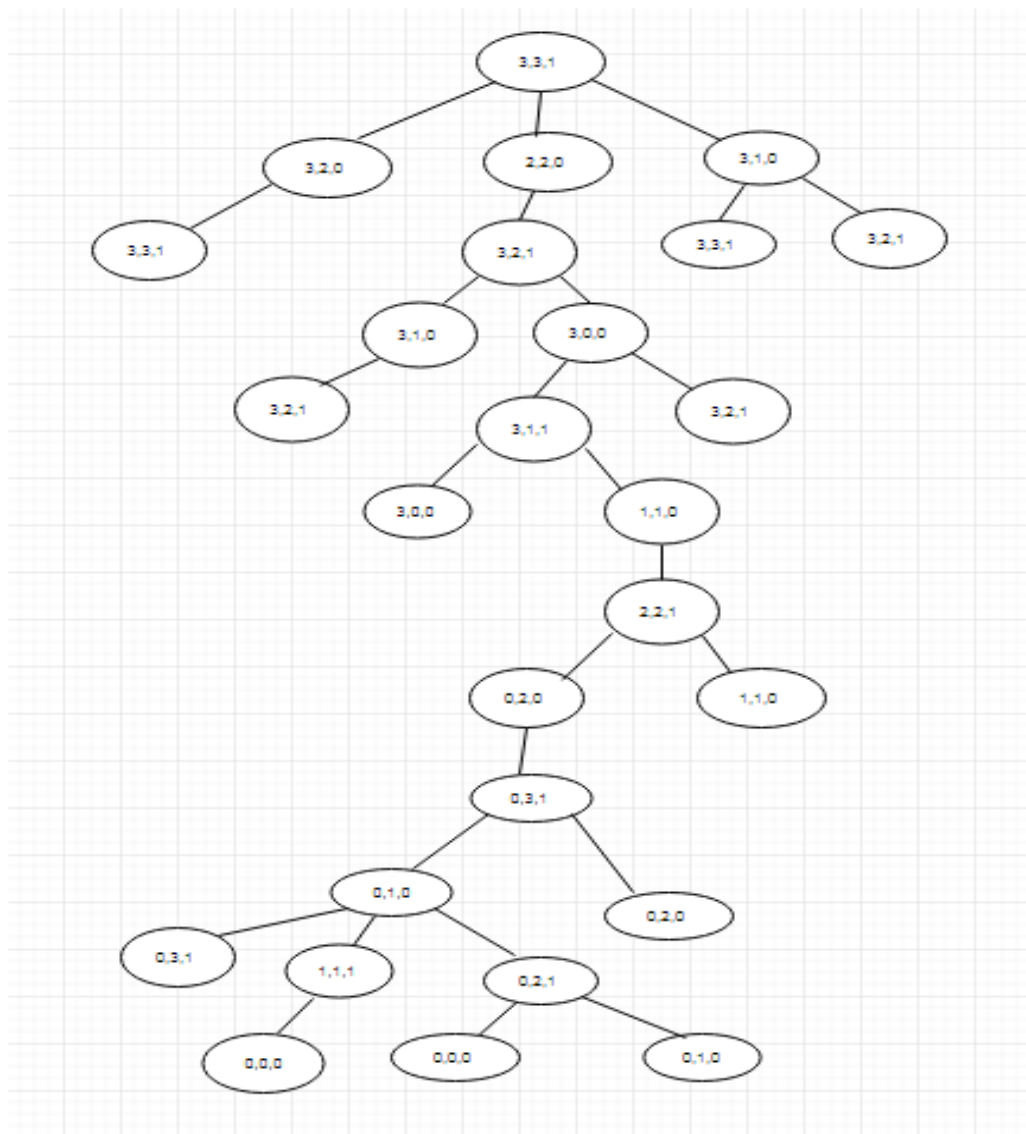
I stated this state with (3, 3,1)

Successor Function:

Cannibals never outnumbered the missionaries on either side of the river. Which means the missionaries will always be more in number than the cannibals.
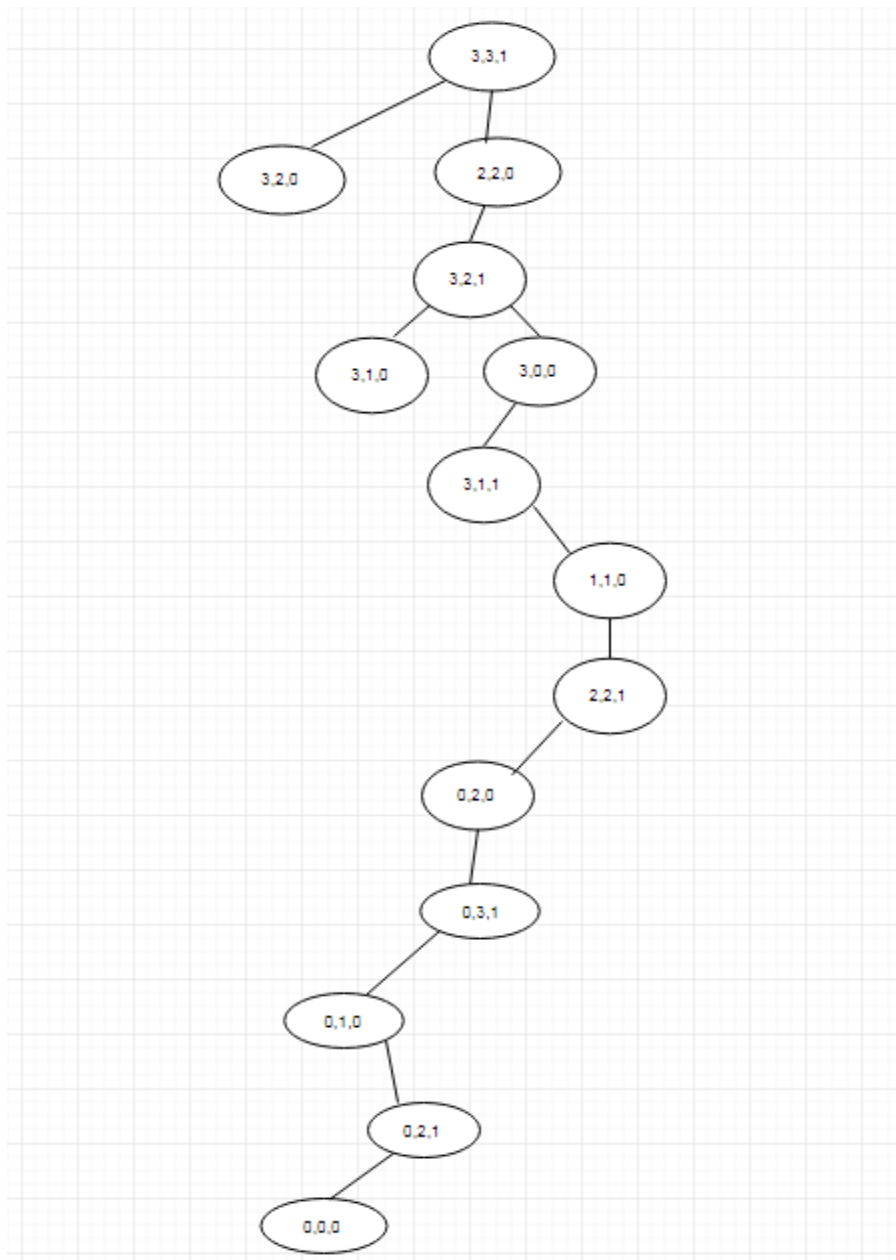
Final state:

Final state is they all cross the river and goes to the other side. Which I stated as (0, 0,0).

State space diagram is drawn below:

To solve this problem, I used DFS because it will take fewer steps than best first search .The solution is given below:

```
                                              3,3,1
                                             /    \
                                3,2,0            2,2,0
                                                   |
                                                 3,2,1
                                                /    \
                                       3,1,0         3,0,0
                                                        |
                                                     3,1,1
                                                        \
                                                        1,1,0
                                                           |
                                                        2,2,1
                                                       /
                                                0,2,0
                                                   |
                                                0,3,1
                                               /
                                        0,1,0
                                           |
                                        0,2,1
                                       /
                                0,0,0
```

Problem 2:

Lion, Lamb and grass problem:

A person has one lion, one lamb and a bundle of grass. He wants to cross a river but there is only one boat and it can't sustain the weight of more than two articles at time. Also, he has to make sure that the lion doesn't eat the lamb and the lamb doesn't eat the grass. How will he get to the other side of the river with all three intact?

Solution:

Initial state:

It is the state when Lion, Lambs and grass are on the left bank of the river with boat.

I stated this state with (L, La, gs, 1)

Where L=Lion

La=Lamb and gas=Grass,

1 means boat on that side and
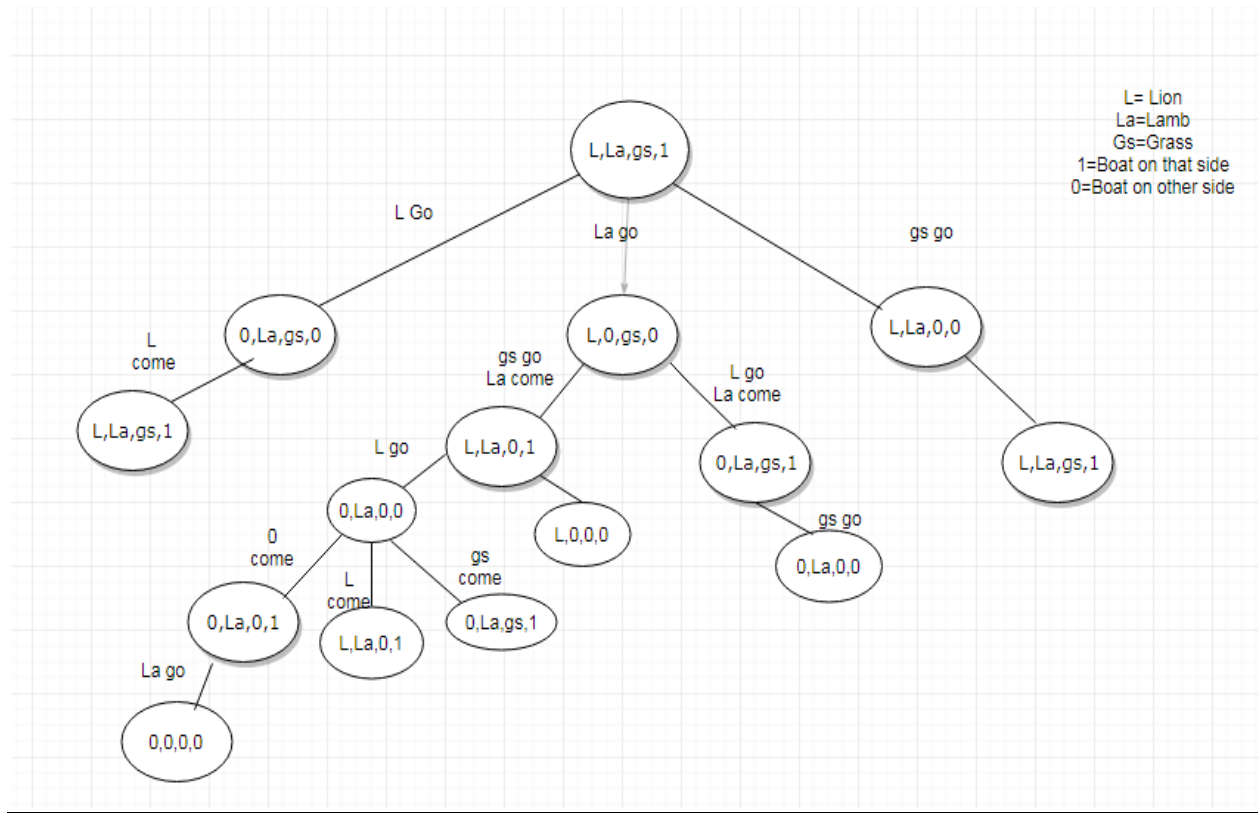
0 means boat on the other side.

Successor Function:

Lion doesn't eat the Lamb and the Lamb doesn't eat the grass
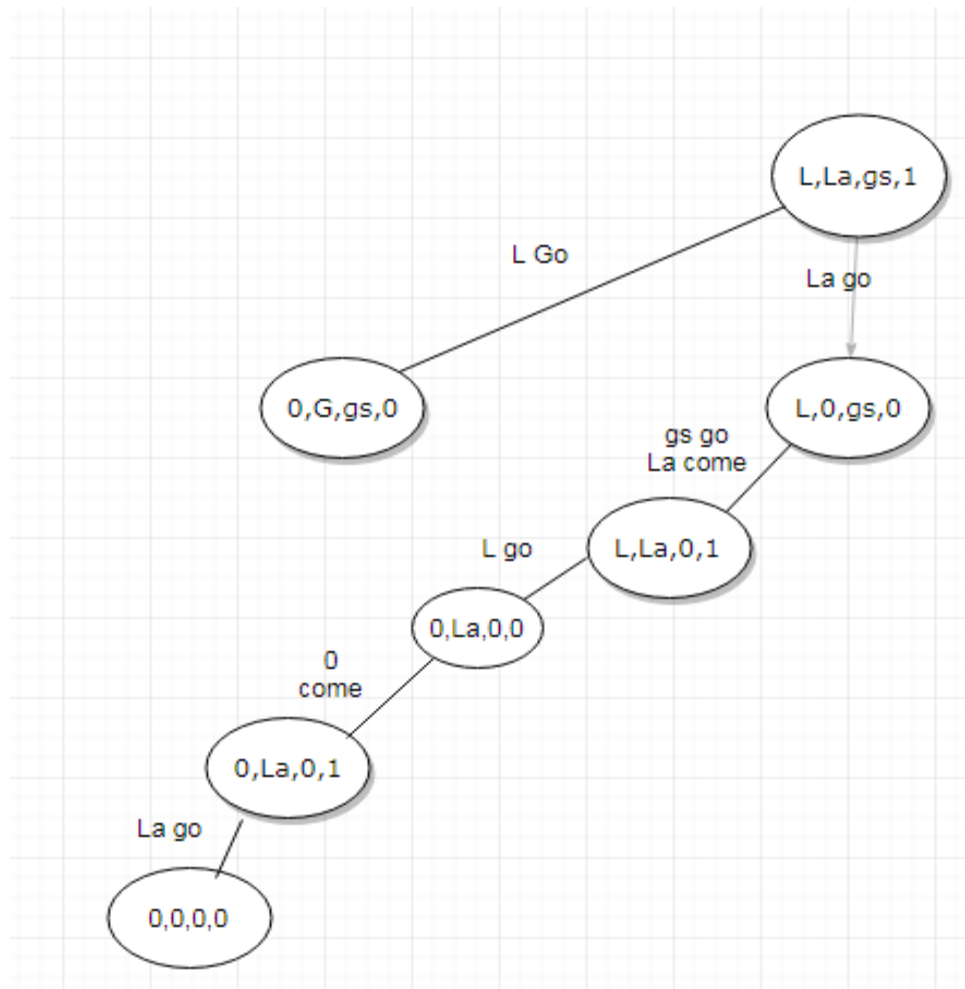
Final state:

Final state is they all cross the river and goes to the other side. Which I stated as (0, 0, 0, 0).

State space diagram is drawn below:

L= Lion
La=Lamb
Gs=Grass
1=Boat on that side
0=Boat on other side

To solve this problem, I used DFS because it is optimal solution.

The solution is given below:

Problem 3:

Man, Woman and two children problem:

A man and a woman of equal weight, together with two children, each of half their weight, wish to cross a river using a boat which can only carry the weight of one adult. The goal is to use this boat to cross the river.

Solution:

Initial state:

It is the state when man woman and two children are on the left bank of the river with boat.

I stated this state with (2A, 2C, 1)

Where A=Adult

C=Children

1 means boat on that side and

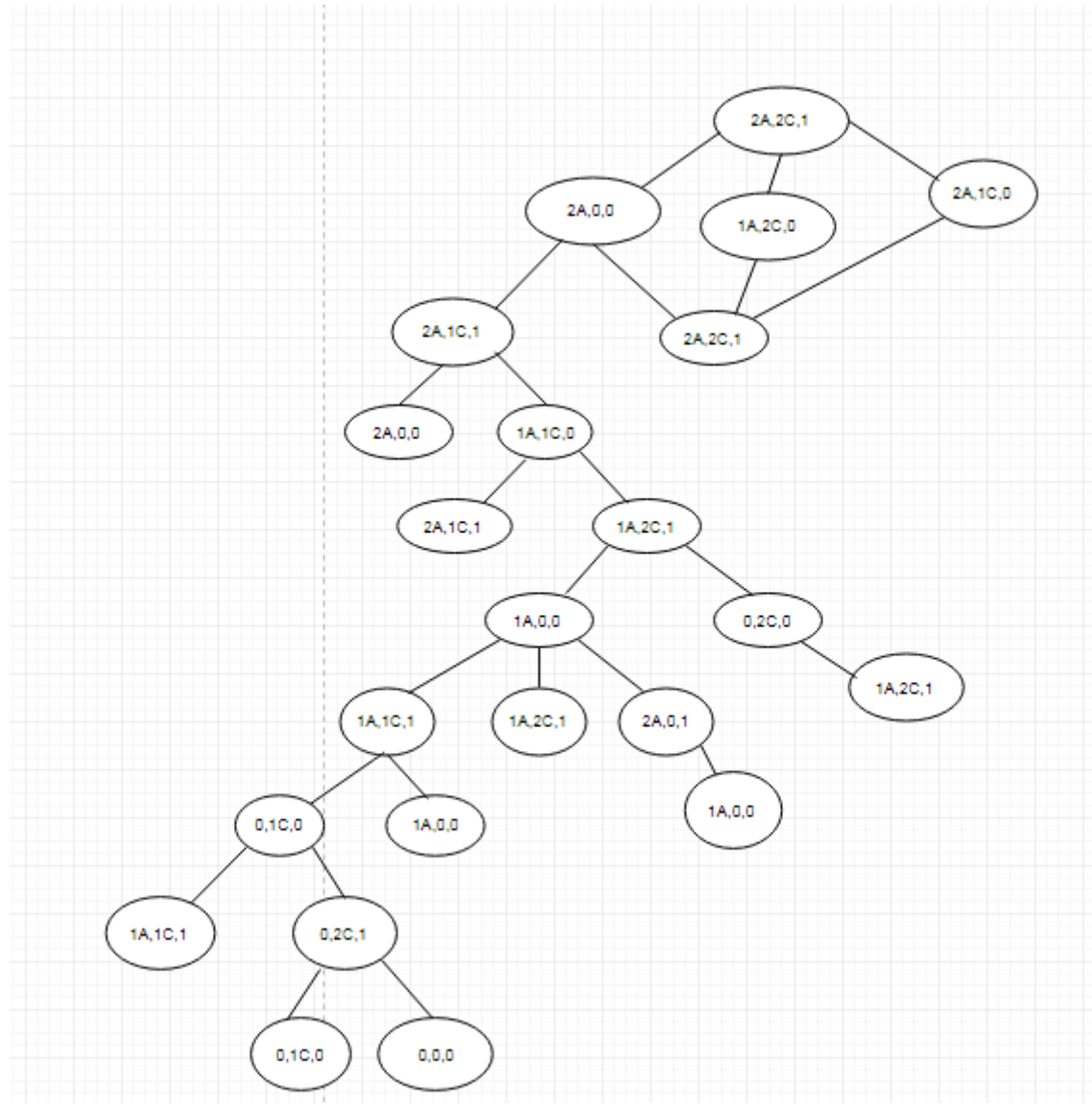 0 means boat on the other side.

Successor Function:

Goal is to use this boat to cross the river.
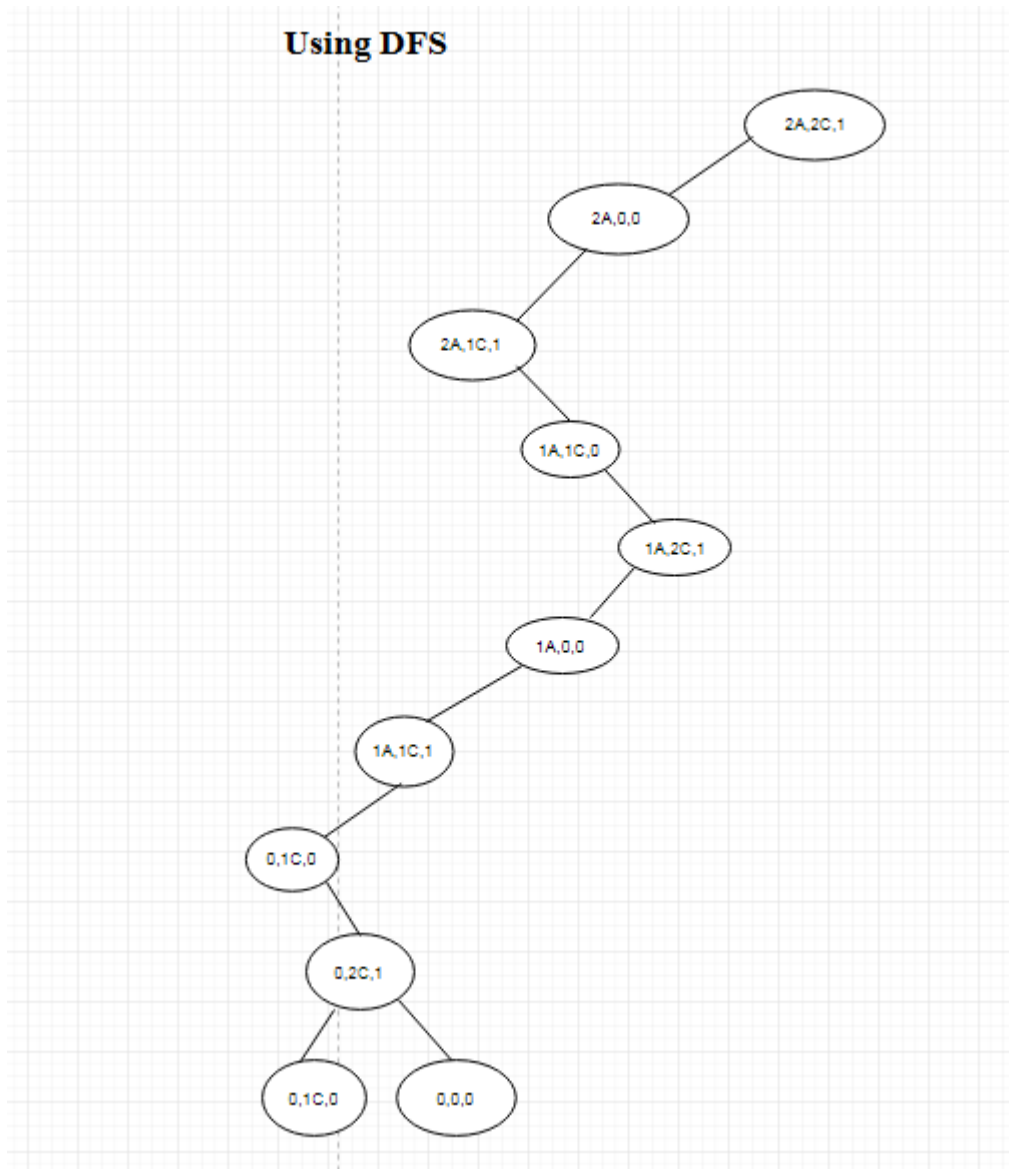
Final state:

Final state is they all cross the river and goes to the other side.

Which I stated as (0, 0,0).

State space diagram is drawn below:

To solve this problem, I used DFS because it is optimal solution. The solution is given below:

Using DFS

Reference by:

✓ Wikipedia
✓ YouTube