Artificial Intelligence(AI)

CS6659 - AI Notes

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Water-Jug Problem

Water Jug Problem:

Problem: You are given two jugs, a 4-gallon one and a 3-gallon one. Neither has any measuring mark on it. There is a pump that can be used to fill the jugs with water. How can you get exactly 2 gallons of water into the 4-gallon jug.

Solution:

The state space for this problem can be described as the set of ordered pairs of integers **(x,y)** Where,

X represents the quantity of water in the 4-gallon jug X=0,1,2,3,4

Y represents the quantity of water in 3-gallon jug Y=0,1,2,3

Start State: (0,0) Goal State: (2,0)

Generate production rules for the water jug problem

Production Rules:

Rule	State	Process
1	(X,Y X<4)	(4,Y)
		{Fill 4-gallon jug}
2	(X,Y Y<3)	(X,3)
		{Fill 3-gallon jug}
3	$(X,Y \mid X>0)$	(0,Y)
		{Empty 4-gallon jug}
4	$(X,Y \mid Y>0)$	(X,0)
		{Empty 3-gallon jug}
5	$(X,Y \mid X+Y>=4 \land$	(4,Y-(4-X))
	Y>0)	{Pour water from 3-gallon jug into 4-gallon jug
		until 4-gallon jug is full}
6	$(X,Y \mid X+Y>=3 \land X>0)$	(X-(3-Y),3)
		{Pour water from 4-gallon jug into 3-gallon jug
		until 3-gallon jug is full}
7	$(X,Y \mid X+Y \le 4 \land Y > 0)$	(X+Y,0)
		{Pour all water from 3-gallon jug into 4-gallon
		jug}
8	$(X,Y \mid X+Y \le 3^{\wedge})$	(0,X+Y)
	X>0)	{Pour all water from 4-gallon jug into 3-gallon
		jug}

9	(0,2)	(2,0) {Pour 2 gallon water from 3 gallon jug into 4 gallon jug}
Initializatio		

Start State: (0,0) Apply Rule 2:

 $(X,Y \mid Y<3) \rightarrow$ (X,3)

{Fill 3-gallon jug}

Now the state is (X,3)

Iteration 1:

Current State: (X,3)

Apply Rule 7:

 $(X,Y \mid X+Y \le 4 \land Y > 0)$ (X+Y,0)

{Pour all water from 3-gallon jug into 4-gallon

Now the state is (3,0)

Iteration 2:

Current State: (3,0)

Apply Rule 2:

 $(X,Y \mid Y<3) \rightarrow$ (3,3)

{Fill 3-gallon jug}

Now the state is (3,3)

Iteration 3:

Current State: (3,3)

Apply Rule 5:

 $(X,Y \mid X+Y>=4 \land$ (4,Y-(4-X))

Y>0) {Pour water from 3-gallon jug into 4-gallon jug

until 4-gallon jug is full}

Now the state is (4,2)

Iteration 4:

Current State: (4,2)

Apply Rule 3:

 $(X,Y \mid X>0)$ (0,Y)

{Empty 4-gallon jug}

Now state is (0,2)

Iteration 5:

Current State: (0,2)

Apply Rule 9:

(0,2)(2,0)

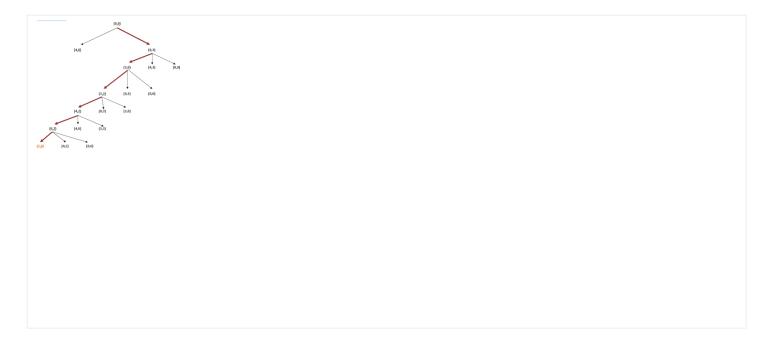
{Pour 2 gallon water from 3 gallon jug into 4

gallon jug}

Now the state is (2,0)

Goal Achieved.

State Space Tree:





6 comments:



Hitesh Verma 26 September 2016 at 10:23

nice

Reply



dineshtak 8 April 2017 at 10:24

nice sir thanx

Reply



SimpleMaryam 28 June 2017 at 01:09

Tank you

Reply



SimpleMaryam 28 June 2017 at 01:12

Tank you

Reply



Let me tell you that: 29 October 2017 at 05:47

fuckyou

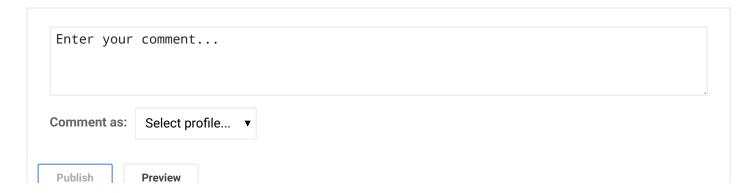
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Lalita Chaple 30 October 2017 at 07:02

Thanks for sharing information about Artificial Intelligence. Artificial Intelligence Solutions

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