THOMPSON RIVERS UNIVERSITY

COMP 3710 - 3

Applied Artificial Intelligence (3,1,0)

Fall 2017

Seminar/Lab 1.

Search Space

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Search Space:

- Missionaries and cannibals problem
- 3×3 puzzle game
- Tower of Hanoi problem

- Define a state for each one of the following problems.

1. Possible state at the beginning side: (0, 2,2)
   Possible state at the ending side: (1,1,1)

2. Possible state for this puzzle game: [5,8,7,4,3,2,0,1,6]

3. One possible state in the problem is:
   T1 [4,3,0,0]
   T2 [0,0,2,0]
   T3 [0,0,0,1]

- Give initial states and goal states.

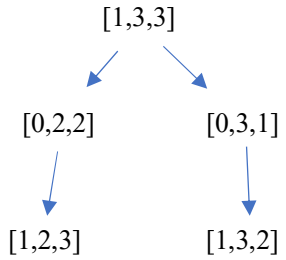
1. Initial state: (3,3,1) at the starting side; (0,0,0) at the ending side
   Goal state: (0,0,0) at the starting side; (3,2,1) at the ending side

2. Initial state: [5,8,4,3,6,7,1,2,0]
   Goal State: [1,2,3,4,5,6,7,8,0]

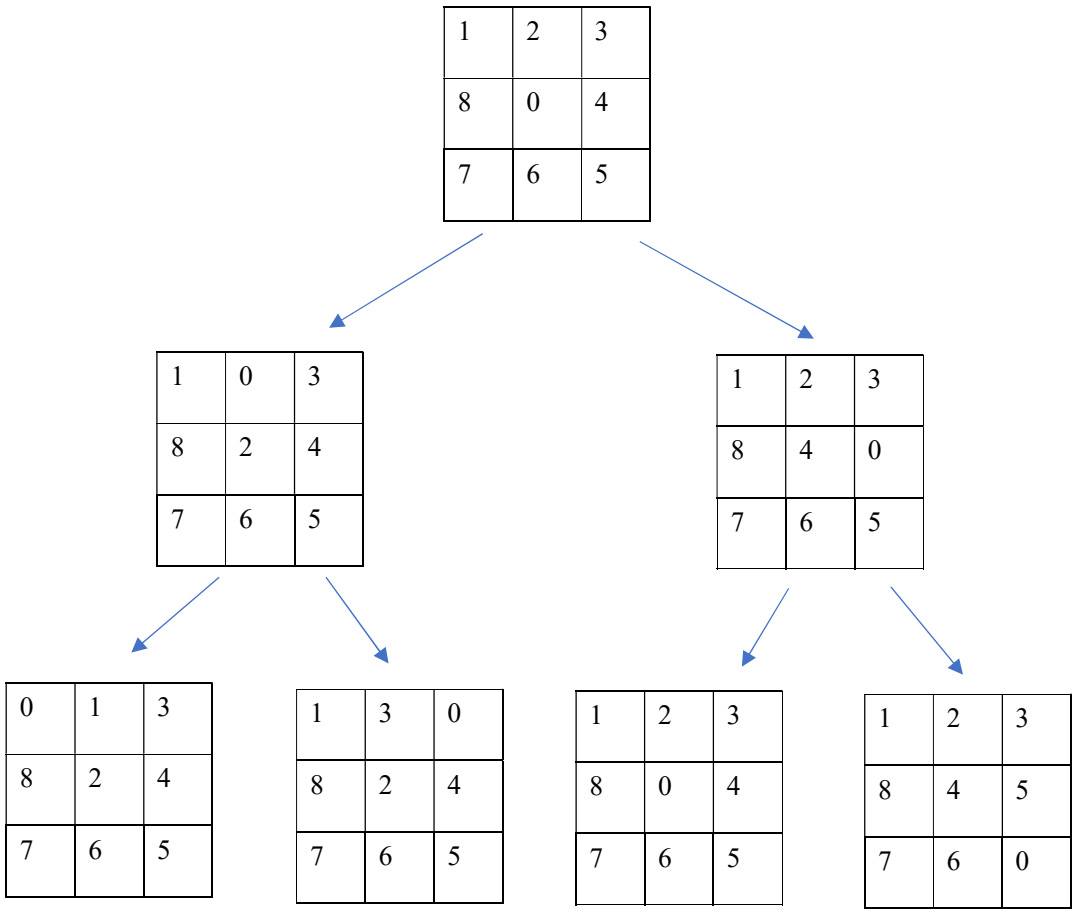
3. Initial state:
   T1 [4,3,2,1]
   T2 [0,0,0,0]
   T3 [0,0,0,0]
   Goal state:
   T1 [0,0,0,0]
   T2 [4,3,2,1]
   T3 [0,0,0,0]

- Draw search trees. Not full trees. 3 levels are good.

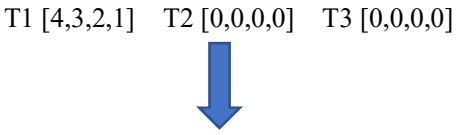
1. Search tree for Missionaries and cannibals problem:



2. Search tree for 3×3 puzzle game



3. Search tree for Tower of Hanoi problem



T1 [4,3,0,0] T2 [0,0,2,0] T3 [0,0,0,1]

T1 [4,3,0,0] T2 [0,0,2,1] T3 [0,0,0,0]

- Devise an idea or algorithm to find a solution.

1. Solution for Missionaries and cannibals problem:

   Move 2 cannibals to the left,
   Move 1 cannibal back to the right.

   Move 2 cannibals to the left,
   Move 1 cannibal back to the right.

   Move 2 missionaries to the left,
   Move 1 missionary and 1 cannibal back to the right.

   Move 2 missionaries to the left,
   Move 1 cannibal back to the right.

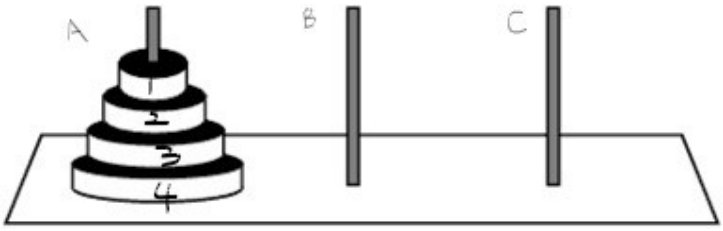
   Move 2 cannibals to the left,
   Move 1 cannibal back to the right.

   Move 2 cannibals to the left.

2. Solution for 3x3 puzzle game:

   Seems there is no absolute correct solution for this problem, because it always with random number in a 3x3 square, a good logical way for this problem is solve it by part, start with the first line (1,2,3) and then go the second line (4,5,6); finally move the third line.

3. Solution for Tower of Hanoi problem



Move A(1) to C,	A: 4,3,2	B:	C: 1
Move A(2) to B,	A: 4,3	B: 2	C: 1
Move C(1) to B,	A: 4,3	B: 2,1	C:
Move A(3) to C,	A: 4	B: 2,1	C: 3
Move B(1) to A,	A: 4,1	B: 2	C:3
Move B(2) to C,	A: 4,1	B:	C: 3,2
Move A(1) to C,	A: 4	B:	C: 3,2,1
Move A(4) to B,	A:	B: 4	C: 3,2,1
Move C(1) to B,	A:	B: 4,1	C: 3,2
Move C(2) to A,	A: 2	B: 4,1	C: 3
Move A(1) to A,	A: 2,1	B: 4	C: 3
Move C(3) to B,	A: 2, 1	B: 4,3	C:
Move A(1) to C,	A: 2	B: 4,3	C: 1
Move A(2) to B,	A:	B: 4,3,2	C: 1
Move C(1) to B,	A:	B: 4,3,2,1	C: