

**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)

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

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

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

1. 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:

[1,3,3]

[0,2,2] [0,3,1]

[1,2,3] [1,3,2]

1. Search tree for 3×3 puzzle game

|  |  |  |
| --- | --- | --- |
| 1 | 2 | 3 |
| 8 | 0 | 4 |
| 7 | 6 | 5 |

|  |  |  |
| --- | --- | --- |
| 1 | 0 | 3 |
| 8 | 2 | 4 |
| 7 | 6 | 5 |

|  |  |  |
| --- | --- | --- |
| 1 | 2 | 3 |
| 8 | 4 | 0 |
| 7 | 6 | 5 |

|  |  |  |
| --- | --- | --- |
| 0 | 1 | 3 |
| 8 | 2 | 4 |
| 7 | 6 | 5 |

|  |  |  |
| --- | --- | --- |
| 1 | 3 | 0 |
| 8 | 2 | 4 |
| 7 | 6 | 5 |

|  |  |  |
| --- | --- | --- |
| 1 | 2 | 3 |
| 8 | 0 | 4 |
| 7 | 6 | 5 |

|  |  |  |
| --- | --- | --- |
| 1 | 2 | 3 |
| 8 | 4 | 5 |
| 7 | 6 | 0 |

1. Search tree for Tower of Hanoi problem

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

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,

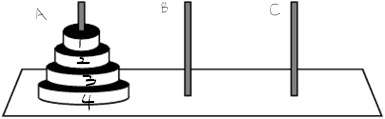
Move 1 cannibal back to the right.

Move 2 cannibals to the left.

1. 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.

1. 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: