

Artificial Intelligence: Lab Assignment-1

Group Members-

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1 Question-1

Three jealous husbands and their wives need to cross a river using a single boat. At no time should any of the women be left in company with any of the men, unless her husband is present. The boat can carry up to two passengers and can not move by itself.

1.1 Psuedo Code-

choose a couple h-i:w-i to move
move w-i and another wife across
move the other wife back
move both remaining wives across
move one of the other wives back
move h-i and another husband across
move the other couple back

River crossing number of iterations-

$$C(n) = 6 + C(n-1)$$

$n > 2$

1.2 State-Space Search-

For $n = 3$, (n is the number of couples), the minimum path has a state space of 11 states.

1.3 Implementation-



Figure 1: States For The Optimal path

```

songoku@songoku-hr-Pavilion-notebook: ~/Desktop/ML-Course $ java JealousHusbands
Wife A is on the left side of the river
Wife B is on the left side of the river
Wife C is on the left side of the river
Husband 1 is on the left side of the river
Husband 2 is on the left side of the river
Husband 3 is on the left side of the river
Boat is on the left side of the river
First Person who should go into the boat (a, 1, b, 2, c, 3)
a
Second Person who should go into the boat (a, 1, b, 2, c, 3)
2
This move would make Husband 1 Jealous
Wife A is on the left side of the river
Wife B is on the left side of the river
Wife C is on the left side of the river
Husband 1 is on the left side of the river
Husband 2 is on the left side of the river
Husband 3 is on the left side of the river
Boat is on the left side of the river
First Person who should go into the boat (a, 1, b, 2, c, 3)
a
Second Person who should go into the boat (a, 1, b, 2, c, 3)
1
Wife A is on the right side of the river
Wife B is on the left side of the river
Wife C is on the left side of the river
Husband 1 is on the right side of the river
Husband 2 is on the left side of the river
Husband 3 is on the left side of the river
Boat is on the right side of the river
First Person who should go into the boat (a, 1, b, 2, c, 3)

```

Figure 2: Code Output Results for the first results

1.4 Code-Implementation-

Link for the Code on github[1]

2 Question-2

Objective is to use the given six numbers to arithmetically calculate a random chosen number. Only the four arithmetic operations of addition, subtraction, multiplication and division may be used, and no fraction may be introduced into the calculation.

Each number may be used at most once.

The initial six numbers should be taken as input from the user. The target number should be generated randomly from 100 to 999.

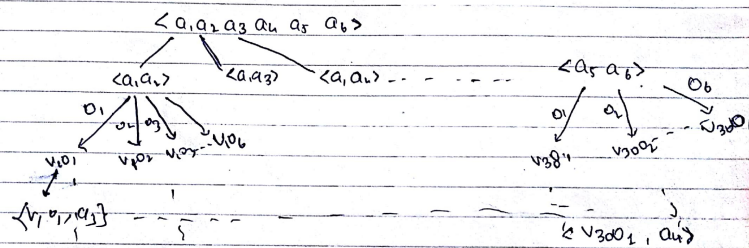
If the exact expression is not found, the program should print out the expression that evaluates to a value that is the closest to the target value.

2.1 Implementation-

Question: 2:-

Given numbers $\langle a_1, a_2, a_3, a_4, a_5, a_6 \rangle = \text{List}$

(a) State-Space search



(b) pseudocode

Create tree.

Chose two numbers from a numlist (L1, L2). chose an operator from map (ops)

calculate the iteration

if (r value == 0 & operator == ~~(*)~~ '/') break;

break;

else

continue (with Multiplication, addition, subtraction)

target value

create tree:

declare best value

if $\text{abs}(\text{target} - \text{value}) < \text{best_value}$:

$\text{best_value} = \text{abs}(\text{target} - \text{value})$

return best value;

```
percount.cpp x chatgpt.cpp x chatgpt.cpp x marfays.cpp x mamez.cpp x
10 for i in range(len(seg)):
11     left, right = seg[:i], seg[i:] # split input list at i-th place
12     # recursive process
13     for l_str in iter_combinations(left):
14         for r_str in iter_combinations(right):
15             for op in ops:
16                 if op_map[op] is div and r == 0: # Constraint "/! zero"
17                     continue
18                 else:
19                     yield op_map[op](float(l), r), \
20                         (l_str + op + r_str)
21
22 print "Enter those 6 magical numbers "
23 a = input("Enter a1 value: ")
24 b = input("Enter a2 value: ")
25 c = input("Enter a3 value: ")
26 d = input("Enter a4 value: ")
27 e = input("Enter a5 value: ")
28 f = input("Enter a6 value: ")
29
30 print "Enter Target Value"
31 target = input()
32
33 num_list = [a,b,c,d,e,f]
34 best_value = target
35 final = None
36
37 for i in range(len(num_list)):
38     for current in itertools.permutations(num_list, i+1): # permutations
39         for value, item in iter_combinations(list(current)):
40             if value < 0:
41                 continue
42             if abs(target - value) < best_value:
43                 best_value = abs(target - value)
44                 final = item
45
46 print final
```

```
abhi@abhi:~/Documents/AI_Lab
[abhi@abhi ~]$ cd Documents/
[abhi@abhi Documents]$ mkdir AI_Lab
[abhi@abhi Documents]$ cd AI_Lab/
[abhi@abhi AI_Lab]$ python q2.py
Enter those 6 magical numbers
Enter a1 value: 1
Enter a2 value: 2
Enter a3 value: 3
Enter a4 value: 4
Enter a5 value: 5
Enter a6 value: 6
Enter Target Value
120
4*5*6
[abhi@abhi AI_Lab]$ python q2.py
Enter those 6 magical numbers
Enter a1 value: 1
Enter a2 value: 2
Enter a3 value: 3
Enter a4 value: 4
Enter a5 value: 5
Enter a6 value: 6
Enter Target Value
999
1+3+2+4+5*6
[abhi@abhi AI_Lab]$ python q2.py
Enter those 6 magical numbers
Enter a1 value: 1
Enter a2 value: 1
Enter a3 value: 3
Enter a4 value: 4
Enter a5 value: 5
Enter a6 value: 7
Enter Target Value
311
1+1+3+4+7*5
[abhi@abhi AI_Lab]$
```

Figure 3: Code Output Results for the Second results

Source Code link is given in references.

References

Question-1-Source-Code

https://github.com/Ujwal2910/AI_Lab_Assignments/blob/master/Lab_Assignment_1/river_jealous.java

Question-2-Source-Code

https://github.com/Ujwal2910/AI_Lab_Assignments/blob/master/Lab_Assignment_1/q2.py