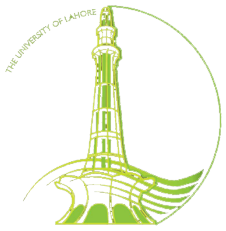

THE UNIVERSITY OF LAHORE
ISLAMABAD CAMPUS

Artificial Intelligence
(CS13217)

Lab Report

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Experiment # 2
Tower Of Hanoi Problem

Objective
To understand and implement the Tower of Hanoi Problem

Software Tool
1. Python
2. Sublime, version 3.0
3. Operating System, window 8.1

1 Theory

The Tower of Hanoi is a mathematical game or puzzle. It consists of three rods, and a number of disks of different sizes which can slide onto any rod. The puzzle starts with the disks in a neat stack in ascending order of size on one rod, the smallest at the top, thus making a conical shape.
The objective of the puzzle is to move the entire stack to another rod, obeying the following simple rules:
1. Only one disk can be moved at a time.
2. Each move consists of taking the upper disk from one of the stacks and placing it on top of another stack i.e. a disk can only be moved if it is the uppermost disk on a stack.
3. No disk may be placed on top of a smaller disk.
With three disks, the puzzle can be solved in seven moves.
The minimum number of moves required to solve a Tower of Hanoi puzzle is 2n - 1, where n is the number of disks.

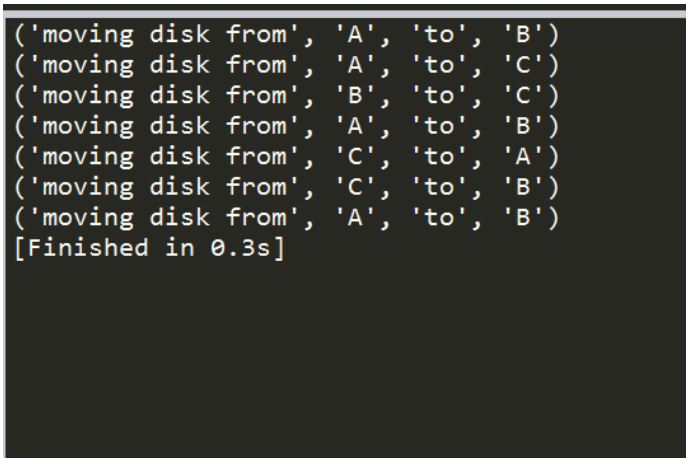

Figure 1: Time Independent Feature Set

2 Task

2.1 Procedure: Task 1

The minimum number of moves required to solve a Tower of Hanoi puzzle is 2n - 1, where n is the number of disks

2.2 Procedure: Task 2

```
def moveTower(height,fromPole, toPole, withPole):
    if height >= 1:
        moveTower(height-1,fromPole,withPole,toPole)
        moveDisk(fromPole,toPole)
        moveTower(height-1,withPole,toPole,fromPole)

def moveDisk(fp,tp):
    print("moving disk from",fp,"to",tp)

moveTower(3,"A","B","C")
```

3 Conclusion

In order to move 64 disks from the first peg to the third, the monks would need over 590 billion years, assuming that they can move one disk per second. The function 2n - 1 was found by recognizing the geometric progressions in the recursive formula and using it in an explicit pattern. This function can be used to find the most optimal number of moves it would take to move any number of disks to the third peg.