Artificial Intelligence

Lab Assignment # 2

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COMSATS UNIVERSITY ISLAMABAD

ATTOCK CAMPUS

Assignment 2:

Part A:

```
import time
start = time.time()
D={'O':['Z','S'],
         'Z':['A','O'],
         'A':['Z','S','T'],
         'T':['A','L'],
         'L':['T','M'],
         'M':['L','D'],
         'D':['M','C'],
         'C':['D','R','P'],
         'R':['C','P','S'],
         'S':['O','A','R','F'],
         'F':['S','B'],
         'P':['R','C','B'],
         'B':['G','P','U','F'],
         'G':['B'],
         'U':['B','H','V'],
         'H':['E','U'],
         'V':['U','I'],
         'I':['N','V'],
         'N':['I'],
         'E':['H']
         }
```

```
q=[]
explored=[]
goal='B'
q.append('A')
while len (q)!=0:
    node=q.pop(0)
    if node not in explored:
        explored.append(node)
    if node==goal:
        print(explored)
        break

    child=D.get(node)
    for i in child:
        if i not in q and explored:
            q.append(i)
count=0
for i in explored:
    count=count+1
print('Number of visited nodes for a ',count)
end = time.time()
print('start time of a ',start)
print('end time of a ',end)
print('Total time of a ',end - start)
```

Output:

```
['A', 'Z', 'S', 'T', 'O', 'R', 'F', 'L', 'C', 'P', 'B']
Number of visited nodes for a  11
start time of a  1648656690.6012225
end time of a  1648656690.6032214
Total time of a  0.0019989013671875
```

Part B:

```
q=[]
explored=[]
goal='B'
q.append('O')
while len (q)!=0:
    node=q.pop(0)
    if node not in explored:
        explored.append(node)
    if node==goal:
        print(explored)
        break

    child=D.get(node)
    for i in child:
        if i not in q and explored:
            q.append(i)
count=0
for i in explored:
    count=count+1
print('Number of visited nodes for b ',count)
end = time.time()
print('start time of b ',start)
print('end time of b ',end)
print('Total time of b ',end - start)
```

Output:

```
['O', 'Z', 'S', 'A', 'R', 'F', 'T', 'C', 'P', 'B']
Number of visited nodes for b  10
start time of b  1648656750.5264037
end time of b  1648656750.5284033
Total time of b  0.0019996166229248047
```

Part C:

```
q=[]
explored=[]
goal='B'
q.append('N')
while len (q)!=0:
    node=q.pop(0)
    if node not in explored:
        explored.append(node)
    if node==goal:
        print(explored)
        break

    child=D.get(node)
    for i in child:
        if i not in q and explored:
            q.append(i)
count=0
for i in explored:
    count=count+1
print('Number of visited nodes for c ',count)
end = time.time()
print('start time of c ',start)
print('end time of c ',end)
print('Total time of c ',end - start)
```

Output:

```
['N', 'I', 'V', 'U', 'B']
Number of visited nodes for c  5
start time of c  1648657390.16486
end time of c  1648657390.1668584
Total time of c  0.001998424530029297
```

Part D:

```
q=[]
explored=[]
goal='B'
q.append('T')
while len (q)!=0:
    node=q.pop(0)
    if node not in explored:
        explored.append(node)
    if node==goal:
        print(explored)
        break

    child=D.get(node)
    for i in child:
        if i not in q and explored:
            q.append(i)
count=0
for i in explored:
    count=count+1
print('Number of visited nodes for d ',count)
end = time.time()
print('start time of d ',start)
print('end time of d ',end)
print('Total time of d ',end - start)
```

Output:

```
['T', 'A', 'L', 'Z', 'S', 'M', 'O', 'R', 'F', 'D', 'C', 'P', 'B']
Number of visited nodes for d  13
start time of d  1648657473.3972833
end time of d  1648657473.3992858
Total time of d  0.0020024776458740234
```

Assignment 3:

```
import time
start_time= time.time()
import random
num=int(input("enter the numbers "))
def Rand(start,end,num):
    res=[]
    for i in range(num):
        res.append(random.randint(start,end))
    return res

start=20000
end=30000
print(Rand(start,end,num))

print("---%seconds---"%(time.time()-start_time))
```

```
import time
start_time= time.time()
import random
num=int(input("enter the numbers "))
def Rand(start,end,num):
    res=[]
    for i in range(num):
        res.append(random.randint(start,end))
    return res

start=30000
end=40000
print(Rand(start,end,num))

print("---%seconds---"%(time.time()-start_time))
```

```
import time
start_time= time.time()
import random
num=int(input("enter the numbers "))
def Rand(start,end,num):
    res=[]
    for i in range(num):
        res.append(random.randint(start,end))
    return res

start=50000
end=60000
print(Rand(start,end,num))

print("---%seconds---"%(time.time()-start_time))
```

```
import time
start_time= time.time()
import random
num=int(input("enter the numbers "))
def Rand(start,end,num):
    res=[]
    for i in range(num):
        res.append(random.randint(start,end))
    return res

start=80000
end=90000
print(Rand(start,end,num))

print("---%seconds---"%(time.time()-start_time))
```

```
import time
start_time= time.time()
import random
num=int(input("enter the numbers "))
def Rand(start,end,num):
    res=[]
    for i in range(num):
        res.append(random.randint(start,end))
    return res

start=90000
end=100000
print(Rand(start,end,num))

print("---%seconds---"%(time.time()-start_time))
```

Output:

values	20k	30k	50k	80k	90k
Time for BFS	3.52743101 1199951 seconds	3.5521037578 582764 seconds	6.66997027 3971558 seconds	4.31364870 0714111 seconds	9.4310505390 16724seconds

Assignment 4:

Question 1:

```
1]: List1_keys=["a","b","c","d","e"]
    List2_values=[1,2,3,4,5]
    print("original key list is ",str(List1_keys))
    print("original value list is ",str(List2_values))
    res=dict(zip(List1_keys,List2_values))
    print("resultant dictionary ",str(res))
```

```
original key list is  ['a', 'b', 'c', 'd', 'e']
original value list is  [1, 2, 3, 4, 5]
resultant dictionary  {'a': 1, 'b': 2, 'c': 3, 'd': 4, 'e': 5}
```

Question 2:

```
]: vowels=['a','e','i','o','u',]
   x=(input("Enter String : "))
   s=list(x.split(" "))
   print(s)
   for i in range(0,len(s)):
    for j in range(0,5):
        if(s[i][-1]==vowels[j]):
            s[i]+='hay'
        if(s[i][-1]!='hay'):
            s[i]+='ay'
```

```
Enter String : tooba
['tooba']
['toobahayayayayayay']
```

Question 3:

```
#Python program to illustrate
# how to calculate BMI
def BMI(height, weight):
    bmi = weight/(height**2)
    return bmi

# Driver code
height = 1.79832
weight = 70

# calling the BMI function
bmi = BMI(height, weight)
print("The BMI is", format(bmi), "so ", end='')

# Conditions to find out BMI category
if (bmi < 18.5):
    print("underweight")

elif ( bmi >= 18.5 and bmi < 24.9):
    print("Healthy")

elif ( bmi >= 24.9 and bmi < 30):
    print("overweight")

elif ( bmi >=30):
    print("Suffering from Obesity")
```

```
The BMI is 21.64532402096181 so Healthy
```

Question 4:

```
email=input('Enter your Email for test: ')
dot=email.index('.')
at=email.index('@')
first=email[0:dot]
last=email[dot+1:at]
domain=email[at+1:]
print("First name: ",first)
print("Last name: ",last)
print("Domain name: ",domain)
```

```
Enter your Email for test: tooba.liaquat@gmail.com
First name:  tooba
Last name:  liaquat
Domain name:  gmail.com
```

Question 5:

```
str=input("enter string : ")
f = {}
for i in str:
    if i in f:
        f[i] += 1
    else:
        f[i] = 1
print(f)
```

```
enter string : tooba
{'t': 1, 'o': 2, 'b': 1, 'a': 1}
```