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AAD Practical 3

Institute of Computer Technology
B. Tech Computer Science and Engineering

Sub: Algorithm Analysis and Design

Practical 3

Problem : Redington India Ltd is a fast growing IT industry and wants to implement a function to calculate the monthly income generated from all projects from their N no of clients like C1,C2,C3,C4....CN. The team wants to compare the time/steps required to execute this function on various inputs and analyse the complexity of each combination. Also draw a comparative chart. In each of the following functions N will be passed by user. Design the algorithm for the same and implement using the programming language of your choice. Make comparative analysis for various use cases & input size.

1. To calculate the sum of 1 to N number using loop.
2. To calculate the sum of 1 to N number using the equation.
3. To calculate sum of 1 to N numbers using recursion

Code :

```python
import matplotlib.pyplot as plt

import YSL_io as YSL

import matplotlib

matplotlib.use('GTK3Agg') # use GTK3 as graphical backend for pyplot

windows


def loop(n):
```

```python
cnt = 0
sum = 0
for i in range(1, n + 1):
    sum += i
    cnt += 1
return cnt


def eq(n):
    return 1


def rcrsn(n):
    if n == 1:
        return 1
    else:
        return 2 + rcrsn(n - 1)


def cmp():
    total = []
    inpt = [5, 10, 15, 20]
    fn = ["Sum using loop", "Sum using equation", "Sum using recursion"]
    colors = ["#a347ba", "#5e81cc", "#b75969"]

    for i in range(3):
        counts = []
```

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```python
for n in inpt:
if i == 0:
counts.append(loop(n))
elif i == 1:
counts.append(eq(n))
else:
counts.append(rcrsn(n))
total.append(counts)


plt.plot(inpt, counts, label=fn[i], color=colors[i], linewidth=5)


plt.xlabel("Input Size (n)")
plt.ylabel("Count")
plt.title("Comparison of time complexities")
plt.legend()
plt.ion()
plt.show()

print(f"\nThe counts in each methods of summation are : ")
YSL.printBLU(f"Using loop : ", end="")
print(total[0])
YSL.printMGNTA(f"Using loop : ", end="")
print(total[1])
YSL.printGRN(f"Using loop : ", end="")
```

```
print(total[2])


plt.ioff()

plt.show()


cmp()
```

Output :