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AAD Practical 11

Institute of Computer Technology
B. Tech Computer Science and Engineering

Sub: Algorithm Analysis and Design

Practical 11

Problem : A thief carrying a single knapsack with limited (W = 5) capacity. The museum you stole had (n=4) artifacts that you could steal. Unfortunately, you might not be able to steal the entire artifact because of your limited knapsack capacity. Help the thief to cherry pick the artifact in order to maximize the total value (<=W) of the artifacts you stole.

First solve the given below example:
Let n = 4, W=5
(P1, P2, P3, P4) = (3,4,5,6)
(w1, w2, w3, w4) = (2,3,4,5)

Code :

```
import YSL_io


def knapsack(W, wt, val, n):
k = [[0 for x in range(W + 1)] for x in range(n + 1)]


for i in range(n + 1):
for w in range(W + 1):
if i == 0 or w == 0:
k[i][w] = 0
```

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```
elif wt[i - 1] ⩽ w:
k[i][w] = max(val[i - 1] + k[i - 1][w - wt[i - 1]], k[i - 1][w])
else:
k[i][w] = k[i - 1][w]

YSL_io.printBLU("\nMaximum profit : ", end='')
print(k[n][W])
YSL_io.printRED("\nKnapsack Matrix : ")
for i in range(n + 1):
for j in range(W + 1):
YSL_io.printRED(f'{k[i][j]} ', end='')
print()

selected = []
res = k[n][W]
w = W
i = n
while i > 0 and res > 0:
if res == k[i - 1][w]:
i -= 1
else:
selected.append(wt[i - 1])
res -= val[i - 1]
w -= wt[i - 1]
```

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```
i -= 1
YSL_io.printORNG("\nSelected knapsack(s) : ", end='')
print(selected)




n = int(YSL_io.inputGRN("Number of entries (n) : "))
print()
W = int(YSL_io.inputGRN('Maximum capacity (W) : '))
print()
val = []
wt = []

for i in range(n):
val.append(int(YSL_io.inputMGNTA(f"Enter the price {i+1} : ")))

print()
for i in range(n):
wt.append(int(YSL_io.inputCYN(f"Enter the weight {i+1} : ")))

knapsack(W, wt, val, n)
```

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Screenshot :