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BTech CSE

Batch 52

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Sub: Algorithm Analysis and Design

Practical 7

A thief carrying a single knapsack with limited (W = 5) capacity. The museum you stole had (n=4) artefacts that you could steal. Unfortunately, you might not be able to steal the entire artefact because of your limited knapsack capacity.

Help the thief to cherry pick the artefact in order to maximise the total value (<=W) of the artefacts 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)

import streamlit as st

 # Knapsack function

def knapsack(values, weights, W):

  n = len(values)

  dp = [[0 for _ in range(W + 1)] for _ in range(n + 1)]

  for i in range(1, n + 1):

    for w in range(1, W + 1):

      if weights[i - 1] <= w:

        dp[i][w] = max(dp[i - 1][w], dp[i - 1][w - weights[i - 1]] + values[i - 1])

      else:

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```
            dp[i][w] = dp[i - 1][w]


    return dp[n][W]


# Streamlit UI
st.title("Knapsack Problem Solver")


# Input values
n = 4
W = 5
values = [3, 4, 5, 6]
weights = [2, 3, 4, 5]


st.write("Artifacts Values:", values)
st.write("Artifacts Weights:", weights)
st.write("Knapsack Capacity:", W)


# Calculate maximum value
max_value = knapsack(values, weights, W)
st.write("Maximum value that can be stolen:", max_value)
```

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