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BTech CSE

Batch 52

Institute of Computer Technology
B. Tech Computer Science and Engineering

Sub: Algorithm Analysis and Design

Practical 9

- A thief is robbing a store and can carry a maximal weight of W into his knapsack. There are n items available in the store and weight of i^{th} item is wi and its profit is pi. What items should the thief take?
- In this context, the items should be selected in such a way that the thief will carry those items for which he will gain maximum profit. Hence, the objective of the thief is to maximize the profit.
- Implement Program for fractional knapsack using Greedy design technique.

Note: First solve the example:
W=60

Item	A	B	C	D
Profit	280	100	120	120
Weight	40	10	20	24

Sample Input:-
p=[280,100,120,120]
w=[40,10,20,24]
W=60

Sample Output:-
Profit [100, 280, 120, 120]
Weight [10, 40, 20, 24]
Ratio [10.0, 7.0, 6.0, 5.0]

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[1, 1, 0.5, 0]
Total profit : 440.0

```
import streamlit as st

# Fractional Knapsack function
def fractional_knapsack(W, weights, profits):
    ratio = [p / w for p, w in zip(profits, weights)]
    items = list(range(len(profits)))
    items.sort(key=lambda i: ratio[i], reverse=True)

    total_profit = 0.0
    weight_taken = [0] * len(weights)

    for i in items:
        if weights[i] <= W:
            weight_taken[i] = 1
            total_profit += profits[i]
            W -= weights[i]
        else:
            weight_taken[i] = W / weights[i]
            total_profit += profits[i] * weight_taken[i]
            break

    return total_profit, weight_taken, ratio

# Streamlit UI
st.title("Fractional Knapsack Problem")
```

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```
# Input data
profits = [280, 100, 120, 120]
weights = [40, 10, 20, 24]
W = 60

# Display input data
st.write("Given the following items:")
st.write("Profits:", profits)
st.write("Weights:", weights)
st.write("Max Weight (W):", W)

# Calculate knapsack solution
total_profit, weight_taken, ratio = fractional_knapsack(W, weights, profits)

# Display results
st.write("Profit:", profits)
st.write("Weight:", weights)
st.write("Ratio (Profit/Weight):", ratio)
st.write("Weight Taken (as fraction):", weight_taken)
st.write("Total Profit:", total_profit)
```

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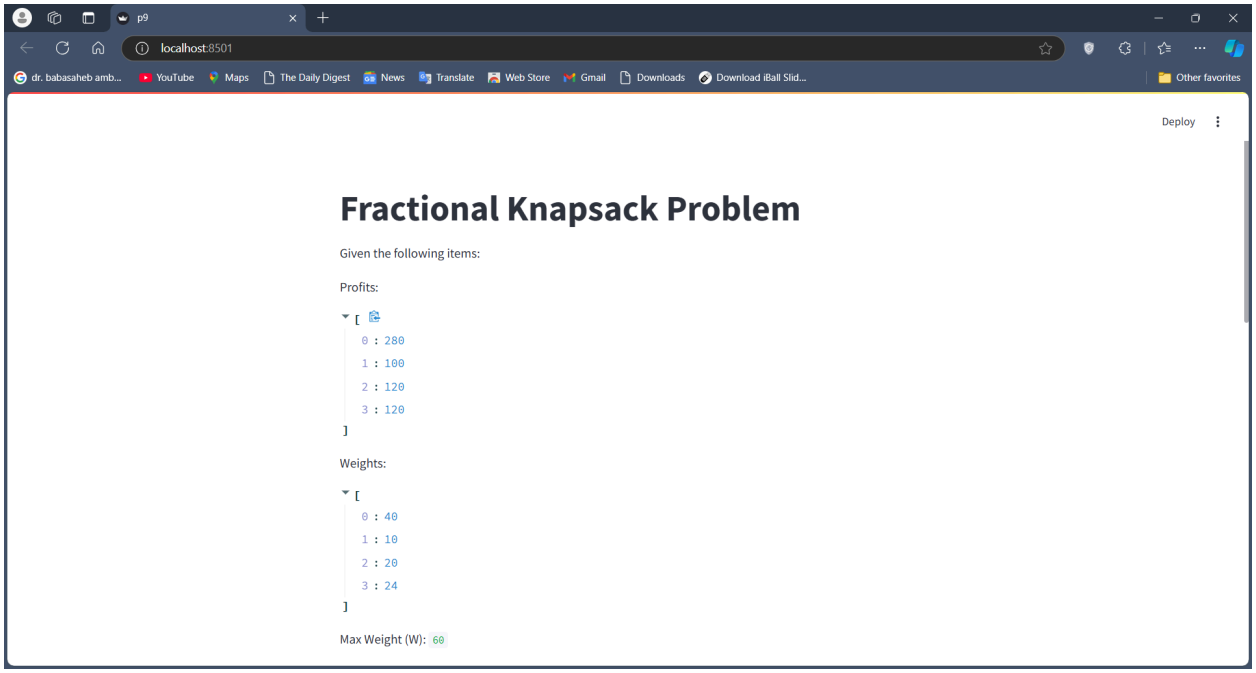

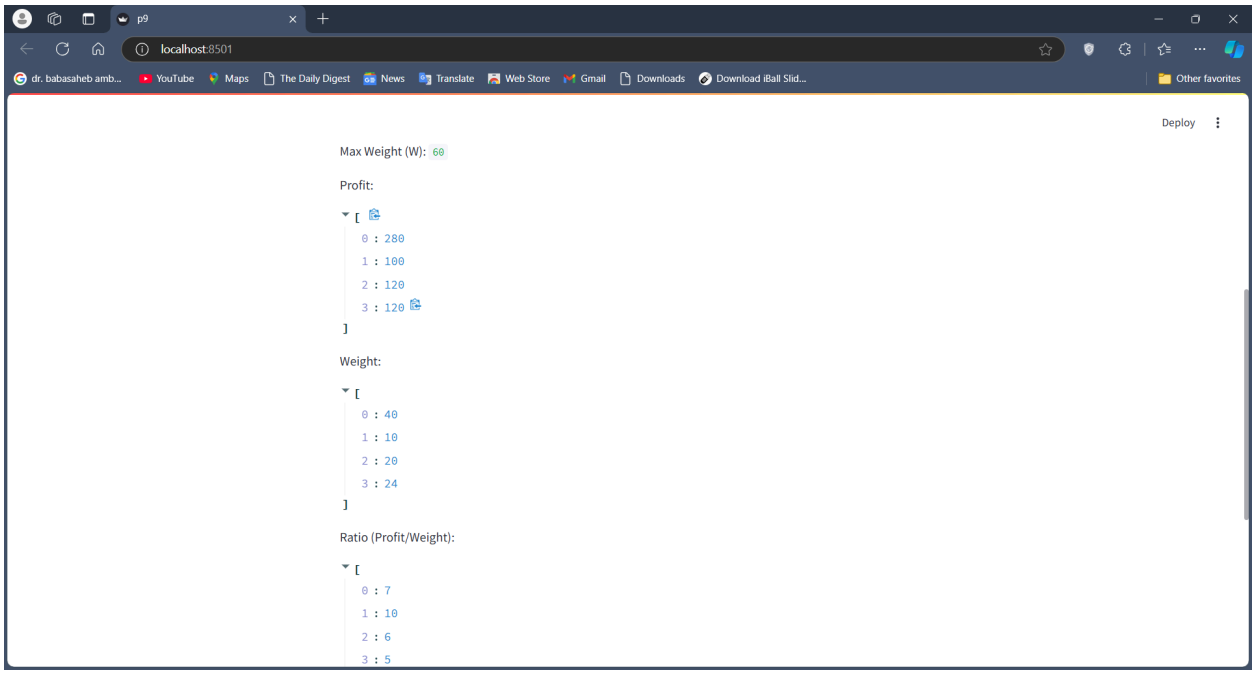

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