UWI

Design and Analysis of Algorithms

Tutorial 8

Greedy Approach

It is important that we learn the theory behind the greedy approach.

1. Explain the theory behind the greedy approach
   (a) What is meant by the greedy approach?
   (b) Does the greedy approach always lead to a globally optimal solution.
2. Solve the 0/1 knapsack problem using the greedy approach for the instance shown in table 1 with a knapsack capacity of **12**.

Item	Weight	Value
1	5	$20
2	3	$15
3	9	$30
4	4	$25

Table 1: A small instance of the 0/1 knapsack problem

3. Solve the assignment problem using the greedy row-by-row and column-by-column approaches for the instance shown in table 2.

	Job 1	Job 2	Job 3
Person 1	5	7	9
Person 2	3	8	5
Person 3	7	4	9

Table 2: A small instance of the assignment problem

4. You are given the following data for this question.

Symbol	A	B	C	D	-
Frequency	0.4	0.1	0.2	0.15	0.15

Table 3: Data for a the question

(a) Construct a huffman code from the above data.

(b) Encode ABACABAD using the above generated code.

(c) Decode 100010111001010 using the above generated code.

Exercise

1. Solve the following linear programming problem geometrically. Maximize $3x + y$, subject to $-x + y \leq 1$ and $2x + y \leq 4$, where $x \geq 0$ and $y \geq 0$.

2. Solve the all-pairs shortest-path problem by Floyd's algorithm for the following diagram:

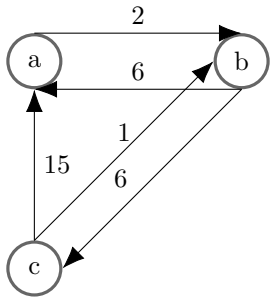

Figure 1: A small instance of the travelling salesman problem