

Lab Assignment 7

Question 1:

Consider the following problem on a dictionary of n words, W_1, \dots, W_n , each with exactly k characters.

You can transform a word W_i into word W_j if they differ in at most $d \leq k$ characters. (both d and k are specified as part of the input, along with n and the words)

For example, if the dictionary is

$W_1 = \text{'hit'}$; $W_2 = \text{'cog'}$; $W_3 = \text{'hot'}$; $W_4 = \text{'dot'}$; $W_5 = \text{'dog'}$; $W_6 = \text{'lot'}$; $W_7 = \text{'log'}$;

and $d = 1$, one way to change 'hit' to 'cog' is:

$\text{'hit'} \rightarrow \text{'hot'} \rightarrow \text{'dot'} \rightarrow \text{'dog'} \rightarrow \text{'cog'}$

Find the fewest number of steps required to transform W_i to W_j for any given input. Design and implement this as a shortest path problem using greedy approach.

Question 2:

As the last question of the successful interview, your boss gives you a pieces of paper with numbers on it and asks you to compose a largest number from these numbers. The result is going to be your salary, so you are very much interested in maximising this number. Design and implement an algorithm using greedy technique to find the maximum salary from the randomly drawn n input numbers. The input can include single digit, double digit or many digits.

Example:

2, 21 = 221

1, 10, 9 = 9110

23, 39, 92 = 923923

Question 3:

You are going to travel to another city that is located d miles away from your home city. Your car can travel at most m miles on a full tank and you start with a full tank. Along your way, there are gas stations at distances $stop_1, stop_2, \dots, stop_n$ from your home city. What is the minimum number of refills needed? Design and implement an algorithm using greedy approach.

<p>Sample 1: $d = 950, m = 400, n = 4$ $Stop_1 = 200, Stop_2 = 375, Stop_3 = 550,$ $Stop_4 = 750$ Output : Minimum number filling required is 2</p>	<p>Sample 2: $d = 10, m = 3, n = 3$ $Stop_1 = 1, Stop_2 = 5, Stop_3 = 9$ Output: -1 (Cannot reach gas station as it is far away)</p>
---	---