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CSCI-570 - SPRING 2018 - HW6

1) Graded Problems :

1.)

k types : $1 \le k \le n$

$0 \le w \le W$

$$OPT(k, w) = \max \{ OPT(k-1, w), OPT(w - w_k) + v_k \times i \}$$

↓ do not include item of type k

↓ include item of type k

Base cases:

$OPT(0, 0) = 0$

$OPT(k, w) = OPT(k-1, w)$, if $w_k > w$

$\Rightarrow$ Complexity = $\Theta(nW)$

2.)

$s_i, s_{i+1} \cdots s_k$ be the sub-string in s.

$0 \le k \le n$

$$OPT(k) = \max_{0 < i < k \,\&\, s_{i+1,k} \text{ is in dict.}} (0, Opt(i))$$

Base cases: OR(∓) $OPT(0) = -1$

$\Rightarrow$ Complexity- $\Theta(nm)$

- To traverse the given string
- To find all words in dict.

3)

Let balloons be l to r

$l \ldots k \ldots r$

$$OPT(l, r) = \max_{l \le k \le r} \{ OPT(l, k-1) + OPT(k+1, r) + nums[l] \times nums[k] \times nums[r] \}$$

$0 \le k \le n$

Base cases :

$OPT(0,0) = 0$, if $s_2 < l$

$\Rightarrow$ Complexity : $O(n^2) \times O(n) = \Theta(n^3)$

$O(n^2)$ ↓ Array & sub-array

$O(n)$ ↓ max

4.)

$Opt(i) \rightarrow$ score of 1st i characters

$j \leq i$

$1 \leq i \leq n$

$$Opt(i) = \min_{j \leq i} \{ opt(j-1) + Quality(j \ldots n) \}$$

Base case : $OPT(0) = 0$

$\Rightarrow$ Complexity = $\Theta(n^2)$

String — Sub-string