

Homework2 for EECS 340

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1 Give a recursive algorithm to find the average (mean) value of an array of 2^k decimal numbers, where $k \in \mathbb{N}$.

Answer: The proposed algorithm is as follow:

Algorithm A1: Average(L)

Data: A list of 2^k decimal numbers L .

Result: The average of all the numbers in L .

if $L.length() = 0$ **then**

return $L[0]$

else

$length \leftarrow L.length()$

return $0.5 \times (\text{Average}(L[0, length/2 - 1]) + \text{Average}(L[length/2, length]))$

end if

2 R-12.6

Question: Suppose we are given a set of telescope observation requests, specified by triples, of (s_i, f_i, b_i) , defining the start times, finish times, and benefits of each observation request as

$$L = (1, 2, 5), (1, 3, 4), (2, 4, 7), (3, 5, 2), (1, 6, 3), (4, 7, 5), (6, 8, 7), (7, 9, 4)$$

Solve the telescope scheduling problem for this set of observation requests.

Answer: The time of scheduling can be shown in Fig.1, the number in the bar means the value of such task.

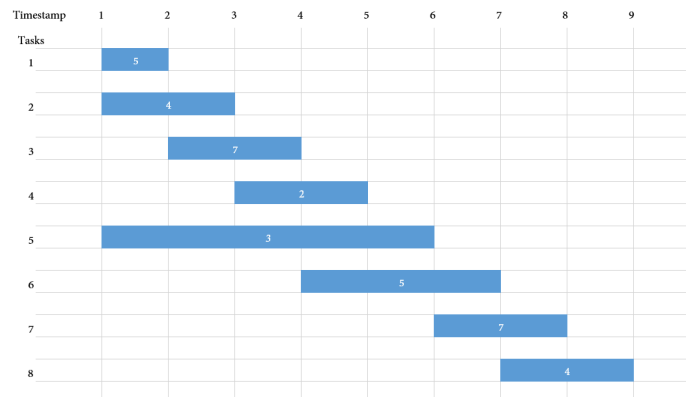


Figure 1: Time of tasks

Based on what we have discussed on class, we can have a table of B_i which stands for the maximum benefit that can be achieved with the first i requests in the task list.

To fill this table, we follow the algorithm as follow:

$B[0] \leftarrow 0$

for $i = 1$ to n **do**

$B[i] \leftarrow \max(B[i-1], B[P[i]] + b_i)$

end for

Here the $P[i]$ stands for the array which gives the predecessor index for each request i , and b_i means the value of each single task. The table is shown as Table 1.

Table 1: B_i values

i	0	1	2	3	4	5	6	7	8
B_i	0	5	4	12	6	3	17	13	21

As we can see, the highest value is B_8 , which includes task 1,3,6,8 that we should select. The corresponding triples are (1,2,5), (2,4,7), (4,7,5), (7,9,4).

3 Implement *det-bogoSort* in pseudocode using recursion