Greedy Algorithm (貪心演算法)

Activity Selection

n activities require exclusive use of a common resource.

$S = \{a_1, a_2, \cdots a_n\}$.

$s_1, s_2, \cdots s_n$

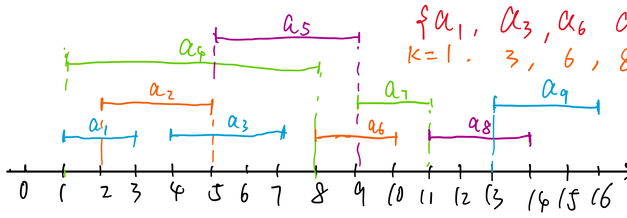
$f_1, f_2, \cdots f_n$

$f_1 \le f_2 \le f_3 \le \cdots \le f_{n-1} \le f_n$

Goal: Select the largest possible set of nonoverlapping activities.

Ex.

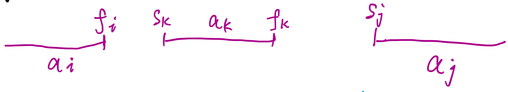
i	1	2	3	4	5	6	7	8	9
s_i	1	2	4	1	5	8	9	11	13
f_i	3	5	7	8	9	10	11	14	16



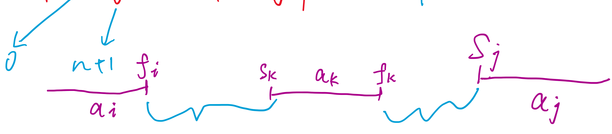
$\{a_1, a_5, a_6, a_8\}$ $\{a_1, a_5, a_7, a_9\}$

$\{a_1, a_3, a_7, a_8\}$,

$S_{ij} = \{a_k \in S : f_i \le s_k < f_k \le s_j\}$



$dp(i,j) = |S_{ij}|$ $dp(0, n+1)$



S_{ik} $dp(i,k)$ S_{kj} $dp(k,j)$

$dp(i,j) = \max_{a_k \in S_{ij}} \{dp(i,k) + dp(k,j) + 1\}$

$dp(i,j) = 0$, $S_{ij} = \phi$

$$dp(i,j) = \begin{cases} 0, & S_{ij} = \phi \\ \max_{a_k \in S_{ij}} \{dp(i,k) + dp(k,j) + 1\} \end{cases}$$

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Greedy_Activity_Selector(S, f, n)
A = {a1}
k = 1
for m ← 2 to n
    if s[m] ≥ f[k]
        A = A ∪ {am}
        k = m
return A
```