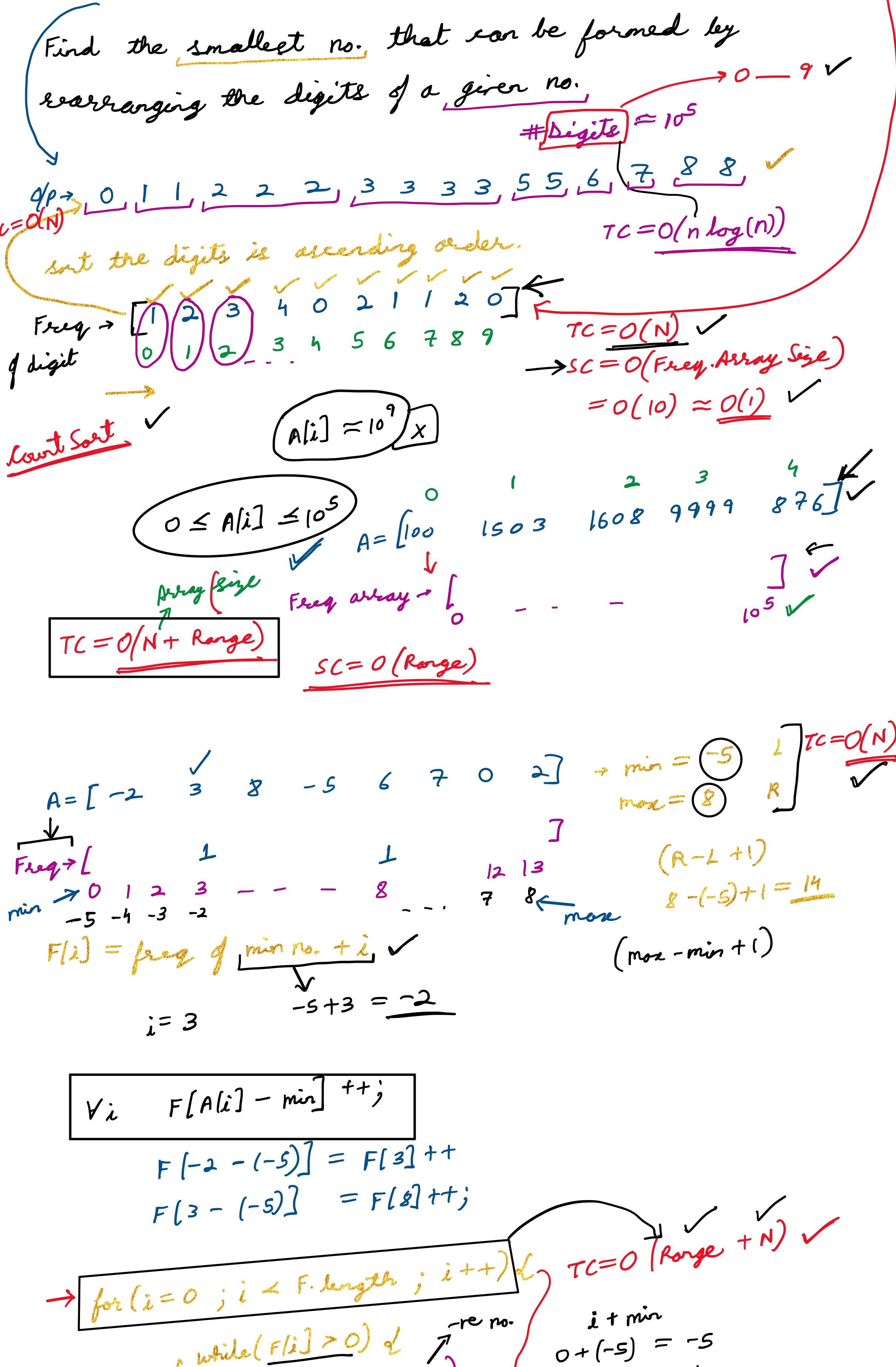


Sorting 3

Wednesday, 24 November 2021 9:01 PM



$$A = [-2, 3, 8, -5, 6, 7, 0, 2] \rightarrow \min = -5 \quad L \quad R \quad TC = O(N)$$

$$\min \rightarrow 0, 1, 2, 3, -4, -3, -2, -1, -8, \dots, 7, 8 \rightarrow \max = 8 \quad (R-L+1) \quad 8 - (-5) + 1 = 14$$

$$F[i] = \text{freq of } [\min \text{ no.} + i] \quad (max - min + 1)$$

$$i=3 \quad -5+3 = -2$$

$$\forall i \quad F[A[i] - \min]++;$$

$$F[-2 - (-5)] = F[3]++$$

$$F[3 - (-5)] = F[8]++;$$

$$\rightarrow \text{for}(i=0; i < F.length; i++) \quad TC = O(\text{Range} + N) \checkmark$$

$$\begin{cases} \text{while}(F[i] > 0) \\ \quad \text{rem. } i + \min \\ \quad \text{point } (i + \min); \\ \quad F[i]--; \\ \end{cases}$$

$$\begin{cases} i + \min \\ 0 + (-5) = -5 \\ 1 + (-5) = -4 \\ \vdots \end{cases}$$

$A = [361, 432, 12, 78, 500, 112]$ sort the array based on digit at 10's location

$i = 0 \rightarrow 10 \leftarrow i$ $n = n$ $(n/100) \% 10$ $(n/10) \% 10$ $(n/10) \% 10$ $\rightarrow F[i] \rightarrow$ Freq of numbers that have i at 10's location \leftarrow Travel array $\forall i$ \checkmark freq.

$O(N)$ \rightarrow $M[i] = \text{List of all nos. present in } A \text{ that have } i \text{ at 10's location.}$

$F[i] = \text{size of } M[i]$ $SC = O(N) \checkmark$

$A = [361, 432, 12, 78, 500, 112] \quad M \quad [(A[i]/10) \% 10]$

size of $M[i] \Rightarrow$ # elements having i at 10's location

$\forall i \quad M[(A[i]/10) \% 10].add(A[i])$ \rightarrow adding in list \rightarrow $SC = O(N) \checkmark$

2D space \rightarrow $TC = O(N)$

$0 \rightarrow \{500\}$ $1 \rightarrow \{12, 112, 3\}$ $2 \rightarrow \{3\}$ $3 \rightarrow \{432, 2\}$ $4 \rightarrow \{1\}$ $5 \rightarrow \{3\}$ $6 \rightarrow \{361\}$ $7 \rightarrow \{78\}$ $8 \rightarrow \{2\}$ $9 \rightarrow \{3\}$

$SC = O(N) \checkmark$

Radix Sort \rightarrow $A[i] = 10^{18}$ $\# \text{non empty subsets} = 2^n - 1 \checkmark$

Find sum of $(\max - \min) \times$ # subsets of the array contribution \checkmark

$\text{Ans} = \sum \text{contribution of all elements}$ \rightarrow How to get contribution?

$A[i] * (\# \text{subset having } A[i] \text{ as max value}) - \# \text{subsets having } A[i] \text{ as min value}$

\rightarrow $\# \text{subsets having } A[i] \text{ as max/min value?} \rightarrow$ H.W. \rightarrow How to deal with duplicates?

$A \rightarrow [3, 2, 8, 7, 4, 6] \quad \# \text{subsets in which } 6 \text{ is max.} \checkmark$

$\rightarrow 2 \times 2 \times 1 \times 1 \times 2 \times 1 = 8 \quad \# \text{subset value then } A[i]$

$\# \text{subsets in which } 6 \text{ is min} = 4 \quad 2 \rightarrow \text{sort} \quad TC = O(n \log(n))$

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