

divide and conquer, compare the middle elements of two arrays, and recurse. $O(\log(n + m))$.

in general, finding the t -th largest element in the union of k sorted array with respective sizes n_1, \dots, n_k takes time:

1. $O(\sum_{i=1}^k \log n_i)$ [1].

<https://cstheory.stackexchange.com/questions/20944/select-in-union-of-sorted-arrays-already-known/20955#20955>.

2. let $p = \min\{k, t\}$, the running time is $\Theta(k + p \log \frac{t}{p})$ [2].

i.e. if $t \geq k$, $O(k \log \frac{t}{k})$. if $t < k$, $O(k)$.

References

- [1] Greg N Frederickson and Donald B Johnson. Generalized selection and ranking: sorted matrices. *SIAM Journal on computing*, 13(1):14–30, 1984.
- [2] Andranik Mirzaian and Eshrat Arjomandi. Selection in $x+y$ and matrices with sorted rows and columns. *Information processing letters*, 20(1):13–17, 1985.