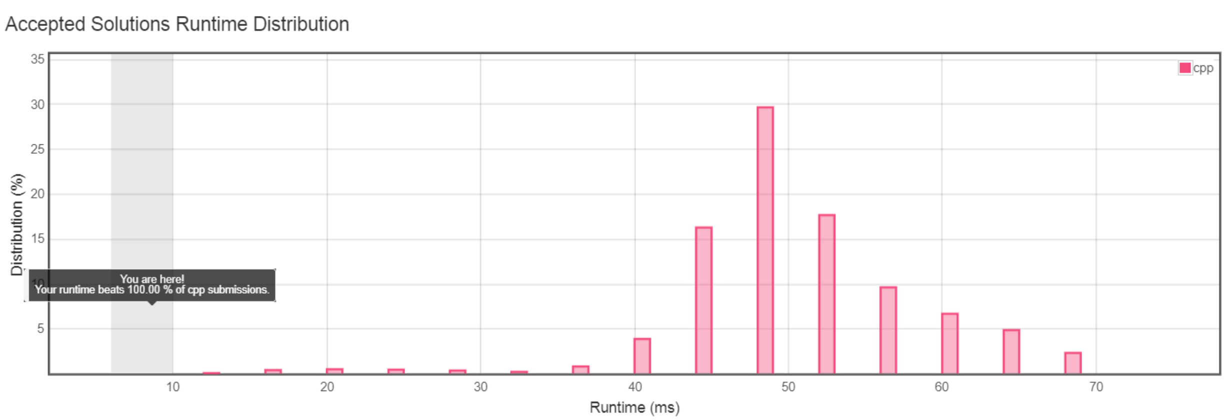
1. binary search. $O(n \log W)$.
2. Let $d$ denote the divisor, we know $f(d) \triangleq \sum_{i=1}^{n} \lceil \frac{a_i}{d} \rceil \geq \sum_{i=1}^{n} \frac{a_i}{d}$. each $\lceil \cdot \rceil$ has additive error at most 1, so if we set $d = \frac{\sum_{i=1}^{n} a_i}{t}$, $f(d)$ is an approximation for $t$ with additive error $O(n)$. if we maintain for each $a_i$ the next value $d$ s.t. $\lceil \frac{a_i}{d} \rceil$ will change (which can be computed in $O(1)$), then we need to test only $O(n)$ subsequent $d$'s to make sure $f(d) \leq t$. this can be maintained by heap in $O(n \log n)$ time.
For a fixed $d$, we can estimate $f(d) - \sum_{i=1}^{n} \frac{a_i}{d}$ by sampling $O(n^c)$ elements to get an $\tilde{O}(n^{1-\frac{c}{2}})$ additive approximation, by Chernoff bound (since $0 \leq \frac{a_i \bmod d}{d} < 1$). Set $c = \frac{2}{3}$ suffices. Then first perform $O(\log W)$ binary search steps (each step in sublinear time), then use heap to test a sublinear number of subsequent $d$'s (notice that build a heap only takes $O(n)$ time). $O(n + \log W \cdot n^{\epsilon})$, which is $O(n)$ if we reduce $W$ to poly$(n)$ by standard techniques.
3. We can directly use the results for finding the $m$-th largest element in the union of $n$ sorted arrays [2, 3, 4], and also get $O(n + \min\{n, m\} \log \frac{m}{\min\{n,m\}}) = O(n)$ time (since $m = O(n)$). see 004. Median of Two Sorted Arrays.
There's a simpler algorithm that finds the $m$-th largest element in the union of $n$ sorted array in $O(n+m)$ time, using linear-time median selection. Each round using $O(n)$ time, we either reduce $n$ by half, or decrease $m$ by at least $\frac{n}{2}$.

Remark.
1. it's possible to perform only $O(\log n)$ binary search steps, by known techniques. (extract the first $n$ largest elements in the union of $n$ sorted arrays, after using the observation of Alg. 2, and then binary search on those $n$ values.)
2. with clever implementation we don't need long long.
3. a related paper: [1].

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