Algorithm Sketch

The algorithm needs two parameters: $\gamma \in [0,1]$ and s a positive integer, which have to be tuned. γ should be like $\alpha - 2\varepsilon_4$ of Step 4.1 2. of our ICML paper. s should be about $4/\varepsilon_0$ of our ICML paper.

1. For each i, $i = 1, 2, \ldots, d$ do the following:
   (a) Sort the i th row of A and find $a(1,i)$ = sum of highest n/s elements of the row; $a(2,i)$ = sum of the next highest n/s elements and so on up to $a(s,i)$.
   (b) Find largest $t \in \{1, 2, \ldots, s\}$ with $a(t,i) \geq \gamma a(1,i)$.
   (c) Set Q_i = the set of tn/s j 's (t as in last step) consisting of the highest tn/s elements of row i of A.
2. Set $R = [d]$. Sort the $|Q_i|$ in ascending order. For convenience, renumber the i so that now $|Q_i|$ are in the ascending order.
3. For $i = 1, 2, \ldots,$ in R: (If $Q_i \tilde{\subseteq} Q_{i'}$, we "prune" i' out of R.)
   (a) For $i' > i$ with $i' \in R$, and $|Q_i| \leq |Q_{i'}| - 2(n/s)$, if $Q_i \tilde{\subseteq} Q_{i'}$, [1] delete i' from R.
4. Find the minimum k such that there are k disjoint subsets $K_1, K_2, \ldots, K_k$ of $[n]$ such that for every $i \in R$, $|Q_i \triangle K_r| \leq (3n/s)$ for some $r \in \{1, 2, \ldots, k\}$.

[1] If $Q, Q' \subseteq [n]$, we write $Q \tilde{\subseteq} Q'$ to denote: $|Q \setminus Q'| \leq 2n/s$.