CMPS 102 — Quarter Spring 2017 – Homework 2

VLADOI MARIAN

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I have read and agree to the collaboration policy.Vladoi Marian
Colaborators None

Solution to Problem 5: Optional

The temperatures ranges from 1 to n degrees. I choose the temperature s . He is wiling to let the temperature at some t temperature or any lower temperature.

   a. Change my mind exactly once.
The strategy I use.

   1. Choose s to be n .
2. Set integer i = 0;
3. While (s == too warm)
{
4. chose s to be = $n - 2^i$. (choose $n - 2^0, n - 2^1, n - 2^2, ...$)
5. increase i by one.
(At the end of the while loop I know that t has to be in the interval $n - 2^i$ to $n - 2^{i-1}$)
(I can find this interval in logn choices)
   }
6. Now that I know the interval. I change my mind.
7. I start againg from 2^{i-1} to choose, one by one value , until I would go lower than t and he would agree with s.
(the last round of negociations is constant, and I claim that I finish the process after log(n) negociations)

   b. Change my mind k times , where $k > 1$.
The strategy I use.

   1. Choose s to be n .
2. Set integer i = 0;
3. While $(k > 1)\{$
4. While (s == too warm) {
5. chose s to be = $n - k^i$. (choose $n - k^0, n - k^1, n - k^2, ...$)
6. increase i by one.
(At the end of the while loop I know that t has to be in the interval $n - k^i$ to $n - k^{i-1}$)

}

7. Now that I know the interval, t has to be in the interval $n - k^i$ to $n - k^{i-1}$, I will change my mind.

8. Repeat the outer while loop with k - 1 and looking in the interval $n - k^i$ to $n - k^{i-1}$. This means that now n = $n - k^{i-1}$

}

7.When k = 1 I exit the loops, and I found the range where t is. In constant time I cheeck one by one solution in this range.

(Each round of negociation $f_k(n)$ takes $log_k(n)$ negociations, for $k > 1$.)

(The total negociations = $\sum_{i=1}^{k} log_i(n) + constant\ time\ when\ i = 1.$