Members: Rui Gao
ONID: gaorui

Report

Description

First, n >=3. Select the first person as the “anchor”, we meet and let the person meet other delegates in turn. In addition, make a counter = 1. If the “anchor” smile, the counter plus 1, otherwise, minus 1. Until the counter = 0 or the list empty. If the counter = 0, make the person met the anchor become our new anchor and reset the counter to 1. Until the end of the list, the party our anchor belongs to is the main party.

Running time analysis

Because the delegates have been met by our “anchor” will never occur again, this is a single direction. Hence, the running time is O(n).

Correctness

Proof by induction.

BC:
Situation 1:
We use a a b to represent the parties,
When n =3, counter = 1, the anchor is the first a,
The first a meet the second a, counter = 2,
The first a meet the b, counter = 1.
Hence, the a is the main party

Situation 2:
a b b,
The a meet the first b, counter = 0,
anchor = 2, counter has been reset to 1,
The first b meets the second b, counter = 2,
Hence, the b is the main party

Situation 3:
a b a,
The first a meet b, counter = 0, anchor has been changed to b,
The b meets the second a, counter = 0, the anchor has been changed to a,
The anchor has been changed to a

IH:
For any number of people k < n, we assume the theory works.

IS:
If k = n-1,
Then we have,
The anchor = party i, counter > = 1, if the n th delegate is also belongs to the party i, counter +1, the theory works.

Or

The anchor = party i, counter > 1, if the n th delegate is not belongs to the party i, counter -1, the theory works.

Or

The anchor = party i, counter = 1, if the n th delegate is not belongs to the party i, counter -1, the anchor become what n th delegates belongs to, and counter reset to 1.

Because the theory works for the previous k = n-1 delegates, so the n th delegate is the person we have one more. Hence, the theory works.

For the coding part, I have no time now and I was a business student, so I am not familiar with programming. I will try next time.