

Democracy

A State consists of three cities with populations 1.2 million people, 1.4 million people and 400,000 people. The House of Representatives consists of three representatives. Given proportional representation, City 1 should have $d_1 = 3(1.2/3) = 1.2$ representatives; City 2 should have $d_2 = 1.4$ representatives; and City 3 should have $d_3 = 0.4$ representatives. Since each city must receive an integral number of representatives, this is impossible.

The State has therefore decided to allocate x_i representatives to city i , where the allocation should minimize the maximum discrepancy between the desired and actual number of representatives received by a city. How many representatives should each city receive?

Data d_j desirable reps for city j .

Stages cities $j \in \{0, 1, 2\}$

State s_j representatives left to allocate

Actions a_j number to allocate to city j

Value Function

$V_j(s_j)$ min of max discrepancy btw desired and allocated with s_j reps for cities $j, \dots, 2$

want $V_0(s)$

$0, \dots, j$

we have $V_2(s_2) = |d_2 - s_2|$ or $\min_{0 \leq a \leq s_2} |d_2 - a|$

$$V_j(s) = \min_{0 \leq a \leq s} \left\{ \max\{|d_j - a|, V_{j+1}(s-a)\} \right\}$$