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Dictatorship Vs Democracy

2 messages

Shrinivas Kannan <shrinivas.kannan@gmail.com> Fri, May 26, 2006 at 2:22 PM
To: gstars@googlegroups.com

I was thinking last night on the relative merits of dicatorship vis-a-vis democracy in terms of probabilistic methods and the results were interesting:

1) Democracy:

Let us assume there are 2n people in a country and they need to elect a ruler in an election. A candidate getting majority (n + 1 votes) will be winner.
Question: What is the probability that people have made a good choice? (i.e elected a good ruler)
Answer: Probability of each voter making a good decision is p and bad decision is 1 - p (0 <= p <= 1).
So the for an elected candidate to be a good choice, atleast n + 1 people should have made a good decision.
So,
probability of a good choice = p^(n+1)*(1-p)^(n-1) + p^(n+2)*(1-p)^(n-2) + ...+ p^(2n) <= due to "atleast n+1" clause
= p^(n+1)*(1-p)^(n-1) [1 + p/(1-p) + p^2/(1-p)^2 + ...+p^(n-1)/(1-p)^(n-1)]
= p^(n+1)*(1-p)^(n-1) [1 + r + r^2 + r^3 +...+ r^(n-1)]   where r = p/(1-p)

Assuming p = 1/2 (most likely in a bipartisan democracy), r becomes 1, so,
= (1/2)^(2n) [n]

= n / 2^(2n)
=> As n tends to infinity (i.e population grows as in India), the probability of good choice tends to zero.
Even for minimum value of n =1 (i.e population of two) , we get 25% chance of electing a good candidate which is less than the probability of a good dictator (below). (I have ignored n = 1/2 which will give you value of population 1, but that would mean there is only one voter which is a monopoly)

2) Dictatorship: the probability is fixed at 50% (He/She can be either good or bad irrespective of the population)

So is democracy mathematically inferior to dictatorship?

regards
Shrinivas Kannan

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It is not worth an intelligent man's time to be in the majority. By definition, there are already enough people to do that.

-G. H. Hardy

Shrinivas Kannan <shrinivas.kannan@gmail.com> Mon, May 29, 2006 at 10:06 AM
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Just a small correction in this calculation:

I did a mistake by not selecting the population (i.e if n+k people make good choice, I have to select n+k people out of 2n people using combinations, which I did not do).

Skipping the calculations, the revised probability of good choice is :
P(good) = {(2n)! / 4^n } * { 1/[(n+1)!(n-1)!] + 1/[(n+2)!(n-2)!] + ... + 1/[(n+n)!(n-n)!] }

For n =1, P(good) = {2!/4}*{1/2} = 1/4 = 25%

For n=2, P(good) = 4!/16 *{ 1/[3!*1!] + 1/[4!0!] }
= 4! *5 / 16 * 4! = 5/16 = ~31%

I could not sum the above series to get a closed form..It will be interesting to see what percentage this converges to (if it does).

regards
Shrinivas Kannan
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