

Suppose we want to find a true state/value over a normalized interval  $[0,1]$ . A few examples are disputing parties trying to share a fixed amount, single parameter of a system: emergency, security, efficiency, etc.

One way to find this value is to delegate to a committee of jurors/experts who try to acquire information about the true state and report it. The question is how to derive the final outcome. Note that choosing the average of reported values is not a good idea, as it suffers from two issues, as the average directly depends on all reported values. First, if the jurors have preferences, they may shift their report to improve the outcome. Second, if some of the jurors are corrupted, they may increase/decrease their report in favor of the corrupter.

A more robust function of reports is the median. If the jurors have (single peaked) preferences, then reporting true valuation is optimal no matter what others do. Also, corrupting a few jurors won't affect the outcome.

Now suppose that jurors do not have any preferences and all they care about is rewards. My proposal is to choose the median as a final outcome and reward the jurors depending on the distance between their reported value and the median. The reward is decreasing in the distance and in total, they make a fixed amount --budget for the procedure. Assuming the jurors can not talk to each other and collude, the idea of why such a procedure should work is the following. The only thing jurors can do is find out more about the true state of the world, to be closer to other jurors who do the same. Therefore, even if acquiring information about the true state of the world is costly, the jurors will do so because of rewards. The optimal size of the committee and exact reward function depends on these costs and is left for research. Are there any pitfalls or obvious attacks to this approach?