

Analysis of voting algorithms

Project Specification

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Background

In a democratic system, a set of rules are needed in order to fairly distribute the power amongst the candidates. Several voting systems have been designed and tested throughout human history, such as majority rule, proportional representation and the plurality voting system. These systems are decidedly algorithmic in nature, which makes this field of study interesting for Computer Scientists and Political Scientists alike.

Problem Statement

Evaluation of different voting protocols has historically been difficult. Without sufficient amounts of empirical data, one is left with pure mathematical reasoning - which might not be able to cover all real-life ballot turnouts. Criticisms of the current voting systems are also frequently subjective in nature, and results of an unfavorable outcome.

Approach

We intend to evaluate several voting systems that are already in practice, through algorithmic implementation and extensive empirical testing. Proposed, un-implemented voting systems will also be tested in this fashion. Developing test cases based on real-life problematic situations will be one of our focal points throughout the project. Identifying problematic situations as well as desirable election outcomes, and how they come to be, will thus be one of the keys in order to improve and propose new algorithms for voting systems. This identification will primarily be achieved through study of the reference literature.

The work that this project entails will include extensive literature studies, pseudo code implementations, and implementations in an actual programming language. After the implementations have been achieved, we will run test cases systematically and record the advantages and disadvantages of the different algorithms based on the previously identified beneficial and disadvantageous situations.

Time plan

Project specification document	by February 12
Reference material study	by February 19
Defining undesirable/desirable outcomes	by February 26
Selecting which algorithms to implement	by February 26
Deciding the implementation approach	by March 2
Constructing outcome examples	by March 2
Implementations in pseudo code	by March 2
First document draft	by March 7
Implementations in the chosen programming language	by March 18
Running the examples and analysing the results	by March 25
Final document	by April 12

References

http://en.wikipedia.org/wiki/Voting_system

Asymptotic bias of some election methods, Svante Janson (<http://www2.math.uu.se/~svante/papers/sj262.pdf>)

Den naturliga spärren med jämkade uddatalsmetoden, Svante Janson (<http://www2.math.uu.se/~svante/papers/val/sjV5.pdf>)

Fair representation, meeting the ideal of one man one vote, Balinski and Young