

# Software implementations and analysis of three voting systems

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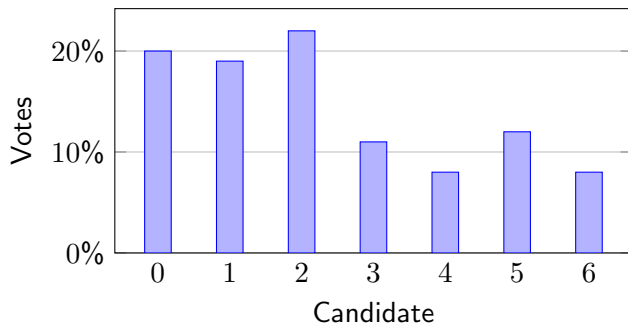
# Introduction

- What is a voting system?
- Have been interested in voting systems and wanted to test them
- Testing 3 methods
  - First-past-the-post (FPTP)
  - Single Transferable Vote (STV)
  - Schulze method
- Everything is done by programming

# First-past-the-post (FPTP)

- Simple majority system
- “Most votes win” and “One person, one vote”
- Used widely in the Anglo-Saxon world

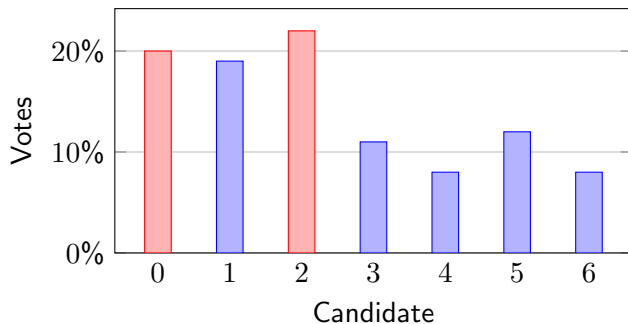
Example: Elect 2 from this sample:



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# Single Transferable Vote (STV)

- Uses ballots where voters rank candidates in order
- Uses this data to transfer votes between candidates within a ballot
- A quota/threshold is defined
- If a candidate exceeds threshold, excess votes are transferred
- If no candidate reaches threshold, the candidate with fewest votes gets eliminated and his/her votes are transferred

STV ballot	
2	Candidate A
3	Candidate B
1	Candidate C
5	Candidate D
4	Candidate E

# Schulze method

- Is a *Condorcet method*
- Compares all candidates in pairwise comparisons
- If any candidate wins every pairwise comparison, he/she is the Condorcet winner
- If there is no such candidate, path strengths are calculated and compared

	A	B	C	D	E
A		17	14	35	30
B	33		24	47	36
C	36	26		40	42
D	15	3	10		18
E	20	14	8	32	

# Generation of vote data

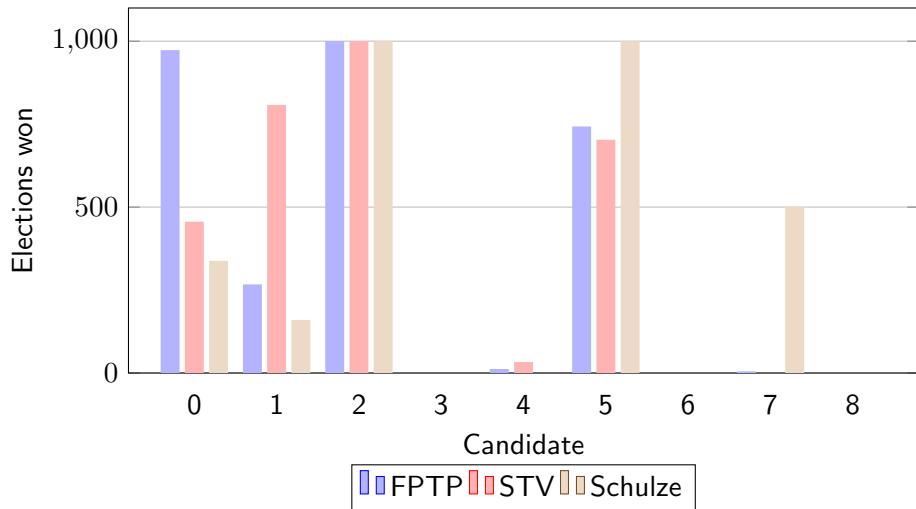
- No publicly available election data was found
- A program to create elections was developed
- Better than random data
- Includes the concept of an “ideology” that split the population.
- The program takes a simple configuration object and generates an election result
- Three election scenarios were tested, each based on a different configuration object

# Programming implementations

- Everything was implemented in Typescript and tested.
- All code is open sourced under the MIT licence and available on Github.
- Added 5547 thousand lines and deleted 3305 thousand lines
- <https://github.com/adriansalamon/gymnasiearbete>



# Example of results



# Conclusions

I made 4 conclusions:

- Schulze did not seem to be a proportional voting method in multi-seat elections
- In single-seat elections, Schulze and STV seemed to provide similar results
- FPTP did not seem to be a very proportional method in close elections
- STV seems to be the most proportional method out of the 3 tested, but is not without its flaws

## Further work

- Create more and better test data. Maybe even real election data.
- Test more election methods
- Since all code is open source, anyone can freely copy and modify it to further build on the work presented in this paper.
- The implementations provided in this paper can also be used for other projects such as online voting websites.