Voting System Presentation Summary

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Introduction

In politics, there are many social choices events requiring voting to make the decision. Usually, hundreds and thousands of votes will be collected from the public. Therefore, it is important to wisely find the optimum candidates from all ballots. There is no bad decision, but bad models to make the decision. Applying different voting models can have a significant influence on the final decision. Therefore, it is necessary to explore different voting models and choose the most suitable one for the decision making social events. In this presentation, we will introduce some common voting systems and an experimental method to compare different voting systems.

Voting systems

Plurality Method

The Plurality Voting is the most common system, often referred to as “first past the post”, and the declared winner is the candidate is the candidate with the most votes regardless of whether that number represents a majority. The method is more reliable if the procedure is performed with only two candidates. With an election with more than two candidates, it may result in the election of a candidate who has only received only a minority of the vote cast.

Instant Runoff Method

IRV, also know as “Ranked-Choice-Method”, was invented around 1870 and has since been adopted by a handful of democracies across the world. The system essentially allows voters to choose candidates in the order of their preference. If a candidate wins a majority of first-preference votes, they win the race. If not, the candidate with the fewest first-preference votes is eliminated and the second-choice votes of voters who preferred the eliminated candidate are allocated to those who remain in the race. This process continues until only two candidates remain. At last, the Majority Rule apply in order to get a winner where the winner needs to acquire more than 50% of the total amount of votes.

Borda Count

This is one of the most common voting systems which was invented in 1770. The main logic here is to assign different points to each candidate based on its position in every ranking (Figure 1).

Pairwise comparison

This system requires the voter to compare all candidates in a pairwise direction. If there is a win for a candidate over another one, a point will be added in the corresponding cell inside the pairwise comparison matrix. Finally, summing up all the points for each candidate and collecting the highest score as the winner (Figure 1).

Kemeny-Young

This is a modification system of pairwise comparison. The major difference is that Kemeny-Young uses the majority votes to select the winner instead of summing all votes. The counting votes part is the same with pairwise comparison, but the selecting part is different (Figure 1).

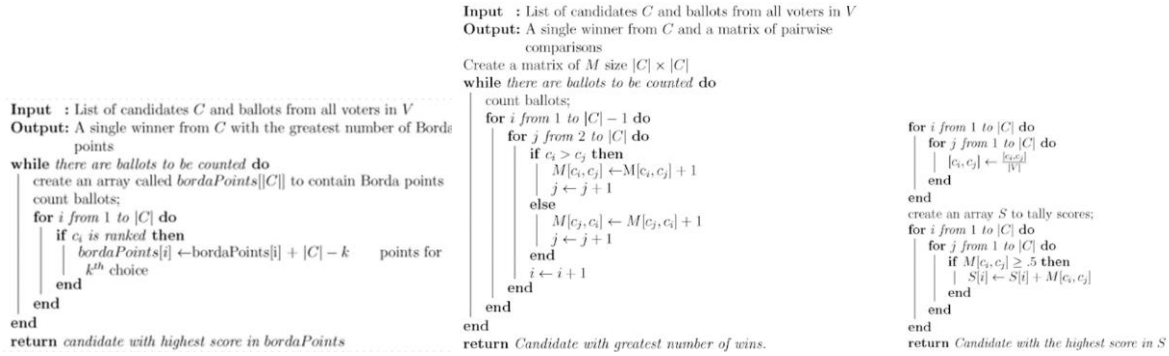

Figure 1. Borda Count (left), pairwise comparison (middle) and second half of Kemeny-Young (right)

Comparison method

The first-place mistakes and all position mistakes (using Kendall-tau distance to calculate) can be applies to evaluate the accuracy of the first position and all positions in the final ranking. Noise can be introduced in the experiment to compare different systems when the voting become more complex. Also, two sample T-test can be conducted to compare the significant difference between different voting systems.

Conclusion

There are more voting systems created by scientists. But there are still some concerns that social choice theory has not achieved its full potential. This may due to the difficulty to change an existing voting system used by the government and also the judgement of selecting the best voting systems. Data mining as a study to find out the patterns or certain important information from a large dataset can be a good fit to explore more of the social choice models.