ELECTION OF GOVERNMENT MINISTERS

Itai Lashover[1]
itai.lash@gmail.com

Liav Weiss[1]
liavweiss@gmail.com

Amichai Kafka[1]
amichaikp@gmail.com

Shoshana Levin[1]
shani032@gmail.com

Instructor: Erel Segal Halevi

July 24, 2022

CONTENTS

ABSTRACT

The executive branch (the government) is usually not directly elected by the people, but is created by another elected body or person such as the parliament or the president. As a result, its members are not directly accountable to the people, individually or as a group.

We propose a scenario where government members are directly elected by the people, and seek to achieve proportional representation in the process.

We propose a formal model for the allocation of K offices, each associated with a disjoint set of candidates contesting for that seat.

A group of voters provides ballots for each of the offices. Since using simple majority voting for each office independently may result in minority preferences being completely ignored, here we adapt the greedy version of proportional approval voting (GreedyPAV) to our framework.

In the article Electing the Executive Branch[1] you can find an in-depth explanation of the model and a demonstration - through computer-based simulations -

[1] *Computer science students, Ariel University, Israel.*

of how voting for all offices together using this rule overcomes this weakness and upholds the axiom of proportionality.

1 INTRODUCTION

Consider a scenario in which a government in a country has to be populated; i.e., there should be elected members of the government like the minister for health, the minister for education, etc. Usually this assignment process is done via a non-participatory process . In this paper we will detail the problem and how we implemented the solution mentioned in the article[1], by building a website that makes the solution accessible to voters. We will present a survey that simulates the scenario mentioned above and analyze its results.

2 THE PROBLEM WITH THE CURRENT ELECTION SYSTEM

In most democratic countries, the selection of ministers in the government is done through coalition agreements or by the prime minister/president. As a result, the voter has no direct influence on the formation of the government and the choice of ministers, and the government ministers are elected in a way that does not always reflect the will of the voters.

3 METHOD

In this section, we will describe the way we chose to realize the solution to the problem mentioned in the previous section. We used the GreedyPAV algorithm[1] and set up a website[2] that makes the use of the algorithm accessible to voters.

3.1 GreedyPAV

The GreedyPAV voting rule devised and published by Rotvik Page, Ehud Shapiro and Nimrod Talmon in 2021 is used for multi-winner elections and is known to be proportional to that framework. The GreedyPAV algorithm maintains the 'Global Justified Representation' definition which means for each subset of voters of a certain size that agrees on at least one candidate there is a selected candidate that they agree on.

This algorithm receives as input the list of offices to be occupied, a list of candidates for each of the offices and the list of votes of each of the voters.

The algorithm gives weight to each pointer and when the pointer is provided its weight is reduced which ensures that in the next round, the weight of the pointers that have not yet been provided will be higher.

Finally, the algorithm emits the selected candidate for each of the offices.

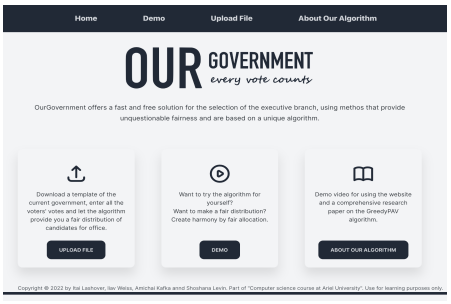
3.2 ourGovernment

Our Government is a web application that makes the use of the Greedy PAV algorithm accessible to voters. Our web application contains two main features:

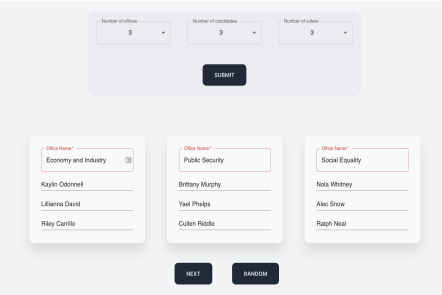
- Using the proposed election system that supports a limited number of voters (demo). The user enters the names of the offices and the names of the candidates for each of the offices, then the user enters the preferences of the voters and finally the algorithm returns a table showing the candidates selected for

each of the offices. In addition, the user is provided with an in-depth explanation of the proportionality and correctness of the allocation.

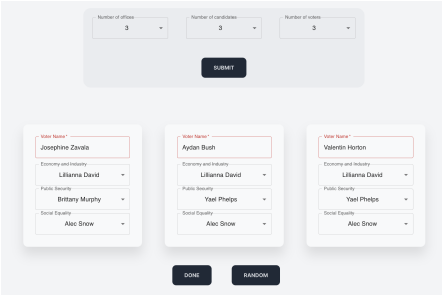
- Using the algorithm for an unlimited number of voters by uploading a file containing all the offices, candidates and citizens' votes.



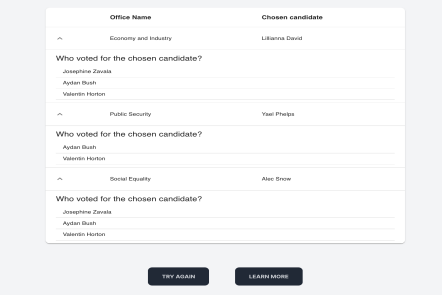
(a) OurGovernment HomePage.



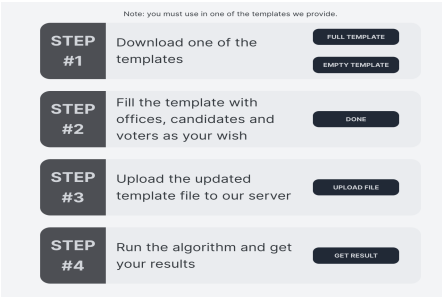
(b) Demo: Entering offices and candidates.



(c) Demo: Entering votes.



(d) Demo: Algorithm results.



(e) UploadFile: The steps to be followed to upload the file.

Figure 1: Some pictures from OurGovernment web application.

4 SURVEY

After in the last sections we discussed the importance of the algorithm and its implementation, now, we would like to make sure that the algorithm does solve the problem mentioned on the previous page. To do this, we conducted a survey for a representative sample of 300 citizens who have the right to vote in Israel. In the next sections we will present the survey we conducted, its results and their analysis.

4.1 Introducing the survey

This survey proposes a system for selecting ministers in the government, while implementing an innovative algorithm that ensures that the ministers represent the entire public. The purpose of the survey is to check how well the results of the

algorithm proportionally and fairly represent the preferences of the voters. Each participant was asked to answer the questions according to what he would do if the elections were held today, and in the manner that best reflects his opinion today. The full survey can be found here[3], under the 'Survey proposal' pdf file.

All participants may not answer all or part of the questions in the survey.

The survey consists of two parts:

4.1.1 First part: Choosing preferences for each office.

In this part, two questions will be presented to each survey participant.

- In the **first question** we present the problem, describe to the participant the current election system in the State of Israel (coalition elections) which do not directly represent all voters. We then present the alternative we propose to the current system in which members of the government are directly elected by the people, and promise to achieve proportional representation of all the voters as part of the elected government. After that, each participant was asked whether the alternative we offer is better than the method used today?
- In the **second question**, we present to each of the participants a list of 12 ministries in the government where each ministry has four candidates.

  Note: We note that the selection of candidates for each of the offices was done by us and does not necessarily reflect the wishes of the candidates. The survey was conducted in the run-up to an election period in the country, so we compiled the lists of candidates in a proportional way according to the estimated number of mandates each party received (according to the most updated election surveys as of the day the survey was sent). That is, suppose there is an estimate that one of the parties will receive 30 mandates (which is a quarter of the number of mandates in Israel) then 12 of the 48 candidates for the 12 ministries will be members of this party.

  Each participant in the survey must choose his preferred candidate for each of the offices.

After the 300 participants answered the first part of the survey, the results reach us (the personal identity of the participants is discreet), we enter the preferences of all participants into the algorithm and receive the final results.

4.1.2 Second part: presenting the results of the algorithm to the participants.

In this section, two additional questions are presented to the participants.

- In the first question, we present to them the distribution of the elected ministers to each of the ministries according to the algorithm and point out to them that this distribution is fair and proportional. That is, each group in the population receives proportional representation according to the size of the group. Should each participant in the survey indicate how satisfied he is with the distribution received.
- In the second question, according to the results of the algorithm, each participant was asked whether the method for allocating government ministers that we propose is superior to the current system.

4.2 Survey results

The full survey results can be found here [3].

4.2.1 First part: Choosing preferences for each office.

Below are the distribution of answers to the second question in the first part:

We asked whether the alternative we offer is better than the election method used today.

- 22% of the respondents to the questionnaire answered that they prefer the current election system.
- 58% of the respondents answered that they prefer the proposed alternative.
- The remaining 20% answered that for them there is no difference between the methods.

We will emphasize and note that we asked this question before presenting the results to the respondents.

4.3 Analysis of survey results

4.3.1 Second part: presenting the results of the algorithm to the participants.

Below is the distribution of the answers to the two questions asked in the second part:

In the first question, the results of the algorithm were presented to the respondents and they were asked how satisfied they were with the results.

- About 57% of those surveyed answered that they were satisfied/indifferent with the results while the remaining 43% were not satisfied with the results.

In the second question, we asked again, whether the alternative we offer is better than the election method used today.

- 25% of the respondents to the questionnaire answered that they prefer the current election system.
- 54% of the respondents answered that they prefer the proposed alternative.
- The remaining 21% answered that for them there is no difference between the methods.

4.4 Analysis of survey results

The full survey analysis can be found here [3].

As part of the analysis of the results, we divided the respondents into a minority group and a majority group, represented by religion.

- The majority group (Jews): 81.7% of respondents.
- The minority group (the rest): 19.3% of respondents.

58% of those surveyed in the majority group were satisfied/indifferent with the results and 55% of those surveyed from the minority group were also satisfied/indifferent with the results.

As you can see, despite the division of those surveyed into two different groups whose opinions are different and the members of Knesset who represent them are different, their satisfaction with the results is similar. This indicates a fair distribution because both groups have the same partial representation in the division of ministries to their representatives in the Knesset while we would expect one of the groups that are 'ideological rivals' to be disappointed with the final division of ministries.

In addition, voters were given the opportunity to justify their satisfaction with the results of the algorithm in free text. During the analysis of the results, we went through all the answers of the respondents and noticed a phenomenon, a significant part of the respondents who indicated that they were not satisfied with the results of the algorithm added and wrote that they were not satisfied with the choice of a minister or two who represent opinions opposite to their own and therefore indicated that they were not at all satisfied with the final result.

for example:

- "I have a problem with one choice that I really didn't connect with; But apart from that, I really liked it and it's very true and accurate"

  (answered that is not at all satisfied with the results of the algorithm)

- "Don't want Anonymous in the government"

  (answered that is not at all satisfied with the results of the algorithm)

We note that the central idea of a fair and proportional distribution in our case means that there will certainly be representatives in the government who represent the entire range of different ideologies in society. Therefore, it is clear that the majority of citizens will not be satisfied with all the elected ministers, but the algorithm guarantees satisfaction with the fairness and proportionality that the algorithm guarantees.

From the analysis of our results, it appears that many of the respondents who answered that they were not satisfied with the results in general were not satisfied with one or two selected representatives, while this situation is desirable and logical in a proportional distribution.

5 CONCLUSION

In this paper we presented the implementation of an innovative method for choosing the government, by the greedyPAV algorithm that allows a fair distribution of the votes. We did a survey using the method and saw that most of the respondents were satisfied/indifferent with the results and finally we saw a majority that prefer the above method over the existing method.

REFERENCES

[1] Rutvik Page, Ehud Shapiro, and Nimrod Talmon. Electing the executive branch. *Fair distribution algorithm*, 2021.

[2] Itai Lashover, Liav Weiss, Amichai Kafka, and Shoshana Levin. Ourgovernment. https://our-government-front.herokuapp.com/, 2022.

[3] Survey proposal, results and analysis. https://github.com/ItaiLash/ourGovernment-React/tree/main/Docs/Survey, 2022.