Voting Systems

After watching this video about the limitations of democratic voting systems I spent some thoughts on the matter.

I feel like I came up with a pretty good systems in my head. The main idea is a ranked voting system that allows you to give additional weights to your choices. The counting happens recursively, unlike STAR voting which uses an arbitrary two step process. It can be summarized as a continuously ranked voting system.

NOTE	The limitations that are talked about in the video cannot be overcome mathematically, but some things are very unlikely to happen in the real world. Thus we can relax some of the properties that are used in Arrow's impossibility theorem.

Let's make some stuff clear.

NOTE	*The problem we are talking about* There are `N` options, that you can vote for. Only one option will be selected after counting all votes.

Assumptions

Unanimity

 Consensus is the ultimate goal.

Anonymity

 Equal voting power for each voter.

Unrestricted Domain

 Any voting will deterministically result in a decision.

Transitivity

 `A > B` and `B > C` imply `A > C`. Every voter is able to decide on a ranking satisfying a total order.

Things that can go wrong

Independence of irrelevant alternatives

 One of the main flaws of FPTP voting is that additional options can influence the result even though that option doesn't even win. This is not desired considering transitivity.

System abuse to increase voting power

 Many ranked voting systems can be abused in a way by only voting for the single most preferred option. A well designed ranked voting system incentivizes to actually give the desired score to each option.

My idea of continuously ranked voting

Each voter will decide on an ordering of the options he wants to vote for. The voter will then distribute 100 points in a way that represents the ordering he has in mind. Giving the same number of points to multiple options is allowed.

Example 1. A ballot could look like this

1. 10 points

2. 10 points

3. 0 points

4. 30 points

5. 50 points

TIP

Choosing the amount of exactly 100 points is very arbitrary. It's just important to normalize the sum of points on every ballot to the same.

The idea is to give the voter the ability to express something along these lines

> I like option D three times more than option B.

Counting continuously ranked ballots

We will eliminate options one by one. The worst option gets eliminated.

Let's look at an example voting.

Table 1. Rows are ballots. Columns are voting options

Options	A	B	C	D	E
Ballot 1	10	10	0	30	50
Ballot 2	0	0	100	0	0
Ballot 3	30	30	30	0	10
Ballot 4	50	50	0	0	0
Ballot 5	10	20	10	0	60
Sum	100	110	140	30	120

In this example option D will be eliminated first. Ballot 1 was the only one that voted for that option. To keep the voting power of Ballot 1 the same as before the 30 points that were given to option D will now be distributed accordingly.

Table 2. Option D was just eliminated

Options	A	B	C	E
Ballot 1	14.286	14.286	0	71.428
Ballot 2	0	0	100	0
Ballot 3	30	30	30	10
Ballot 4	50	50	0	0
Ballot 5	10	20	10	60
Sum	104.286	114.286	140	141.428

Now we eliminate option A and distribute the points the same way as before. You might have noticed the recursion happening now.

Table 3. Option A was just eliminated

Options	B	C	E
Ballot 1	16.667	0	83.333
Ballot 2	0	100	0
Ballot 3	42.857	42.857	14.286
Ballot 4	100	0	0
Ballot 5	22.222	11.111	66.667
Sum	181.746	153.968	164.286

We keep going. We have arrived in the final round.

Table 4. Option C was just eliminated

Options	B	E
Ballot 1	16.667	83.333
Ballot 2	0	0
Ballot 3	75	25
Ballot 4	100	0
Ballot 5	25	75
Sum	216.667	183.333

In the final round option B wins over option E.

Pros and Cons of this voting method

The main idea of this counting method is to make sure that irrelevant alternatives really don't change the outcome. It's easy to see that in each recursion step no voting power is lost. Thus it is evident, that choosing irrelevant options is not harmful.

One problem is that ties can happen at any step. Even when the tie happens between irrelevant alternatives, you cannot just flip a coin and keep going. These ties can actually still affect the outcome of the overall vote. Luckily ties are quite unlikely. One could argue that this voting system doesn't work on the "Unrestricted Domain" though.

Depending on the implementation, floating point rounding errors might affect the result.

Unfortunately it is not evident how your personal opinion translates to accurately giving points to options.

What I really like about this voting method though, is that it greatly incentivizes the use of your actual preference in your vote.

If you can spot a flaw with this system please let me know!

Also while writing this I stumbled upon rated voting. So I guess one could argue that this is just one way to do rated voting. Maybe it even exists already? Maybe "range voting" is very close?