Initial Plan

Maximising entertainment value in the vote-reveal problem

Final Year Project (CM3203) - 40 Credits

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Project Description

In many elections or competitions, a set of voters will rank a set of candidates from best to worst, or will give scores to some of the candidates, with the winner then being the candidate that gets the highest total number of points. When it comes to revealing the result after all votes have been cast, some competitions proceed by having a roll-call of all the voters in which each announces their own scores. This is often done for entertainment purposes such as in the Eurovision Song Contest.[1]

The concept of entertainment, especially with respect to competition, is heavily subjective subject and as such is hard to quantify in simple terms. There are intuitive constituent parts to an *entertaining* competition (like Eurovision) such as, if the winner is known early or late, and how many teams are in the running to win. A large constituent part of this project will be to convert these intuitive ideas into mathematical values that can then be maximised by some optimisation algorithm.

The two main questions that this project will aim to answer are:

1. How can we define the concept of "entertainment" in the context of an optimisation problem, and hence try to maximise it.

2. In which order should the votes be revealed in order to maximise that entertainment value?

To try and answer these questions I will be using the Eurovision Song Contest as my example as it has many datasets, having been running annually since 1956. Furthermore voting rules have gone through changes over the years as more countries joined and as it grew in popularity, giving the project a natural comparison tools throughout.

Most recently since the 2016 running of the contest, the jury votes and the public votes are given separately instead of being combined into one score. This change was apparently made "...to make a better television show as well as a more exciting competition"[2]. This change can form part of the final report on how the algorithm and entertainment function has performed compared to the real contest.

This change shows that the motivation behind this project, to maximise entertainment when revealing the votes, is a current problem and there have been attempts to try and solve this problem already.

Project Aims and Objectives

There are three main aims that this project will attempt to tackle, as well as some smaller objectives. These aims are described below.

1. Entertainment Value

The most important of the aims of this project is to come up with some function(s) to measure the "entertainment value" of a given roll-call.

This is a way of mapping a roll-call ordering to a single entertainment value. This would be a mathematical function that given an ordering of members in the competition, should return a value that gives an estimation of how entertaining that ordering is. As entertainment is a heavily subjective topic, this part of the project will have to have justification of why I think a function correctly describes an entertaining roll-call. This justification will likely be in the form of comparisons to real-world tournaments or competitions in which the intuitive theory behind a function has been seen to be entertaining.

To find a good function for this entertainment value I will start with an intuitive idea and then define a mathematical representation of that idea. Then I will use that as a cost function in the optimisation algorithm and analyse the results to see if it is indeed an entertaining roll-call.

It may be necessary to define multiple functions however that depends entirely on how well the first chosen function performs and if it can provide at least a near optimal solution to the problem.

A simple diagram explaining the methodology of getting an entertainment value is shown below:

Figure 1: Entertainment Function Diagram
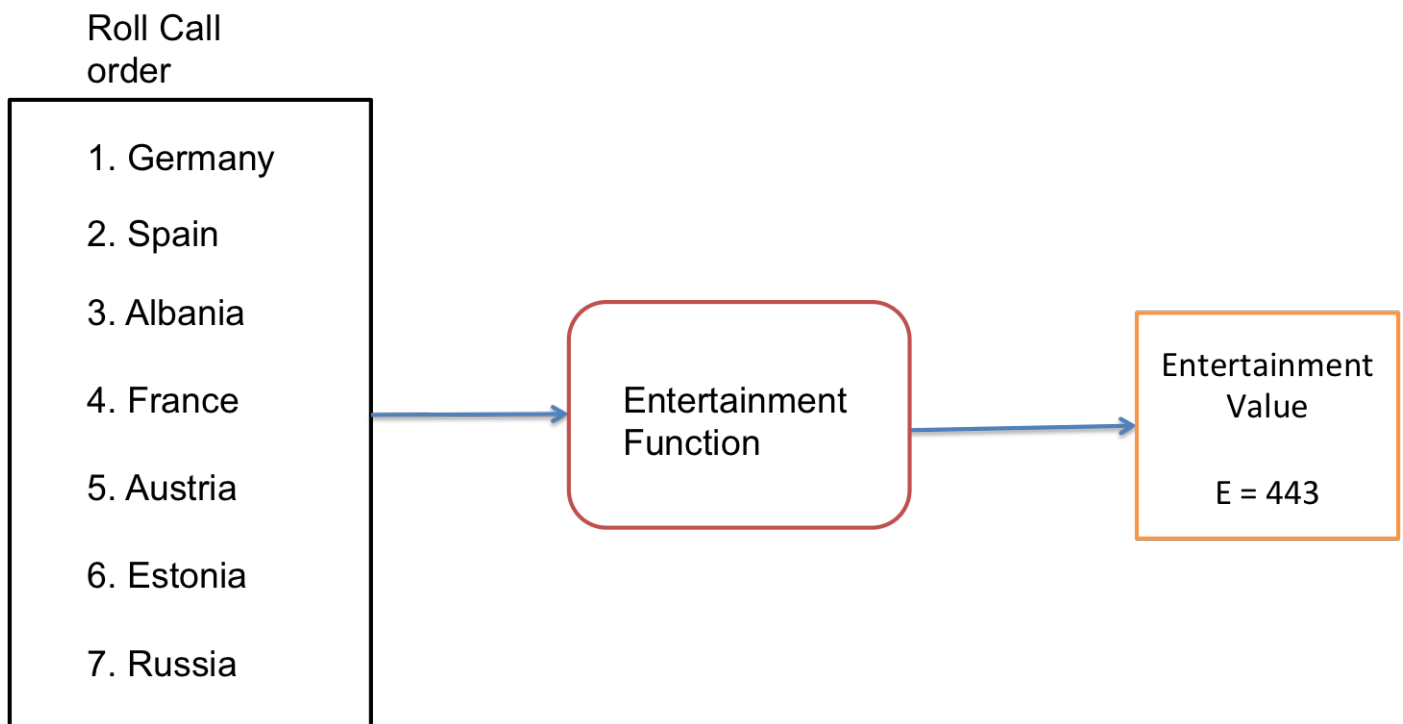
2. Optimisation Algorithm

Another of the main aims is the solve the optimisation problem of finding a roll-call that maximises an entertainment function.

Solving the optimisation problem will involve choosing a viable algorithm or algorithms that can solve the optimisation problem. Then it will involve implementing those algorithms with added problem specific code and additions to allow it to optimise the given cost function.

To start with I will try and keep the algorithm simple and create a greedy algorithm[3][4] and if the problem space is sufficiently simple then this may be good enough to find an optimal solution. For this objective it will be necessary to design and write the algorithm itself with respect to the problem we are trying to solve as well as with respect to space and time complexity.

In this problem the greedy algorithm will be choosing the solution that maximises the entertainment value produced by the entertainment function at every step.

3. Visualisation of Problem and Solution

An important part of the project will be being able to show how the algorithm computes its solution and how that solution compares to the real-world. To meet this aim I will create a simple web application that visualises the algorithm running and can compare it the actual running of the Eurovision contest.

This application will have a way of stepping through the voting reveal stages showing both my implementations ordering, current scores and teams and the actual contest side by side. The hope is that this will add another way to justify why the entertainment function and algorithm are correct in being entertaining and giving others a chance to judge for themselves.

Ethics

I have not identified any ethical issues[5] with this project as there will no personal data used and the Eurovision Song Contest data I will use is publicly and lawfully available.

Work Plan

The overall plan for the project is split into three parts, designing and implementing entertainment functions, designing and implementing an optimisation algorithm and visualising the final results. These three parts have been further subdivided in the time plan and Gantt chart to give a more granular view of what each week of the project will entail.

Although the overall plan will very likely stay the same throughout, the time scales may change during the project. In the time plan and the Gantt chart the task are marked with a letter denoting the main aim or objective of which they are a necessary part. **E** for work on the entertainment value, **A** for the optimisation algorithm and **V** for the visualisation. Some task are a part of more than one of these.

Deliverables

The deliverables for this project will be:

1. Final Report
2. Source code of the optimisation algorithm used

  3. Datasets used to test algorithm

  4. Visualisation of problem and solution

Milestones

The main milestones for this project are:

- the successful running of an algorithm against a dataset

- a way of visualising the algorithms running and how the algorithm I have used compares to real-world examples

These milestones come in at Week 10 for having a running algorithm and Week 14 for having a visualisation.

To reach these milestones and the final deliverables described above, I plan to spend every week day working on the project between the hours of 09:00 and 17:00. Of course this does not include the time during which I have lectures or labs and furthermore one of the days every week must be kept free as I continue my part-time job from my placement year.

The time plan below is a rough way of showing the things that I will be working on during each given week. It is supported by a Gantt chart which is attached in the appendix. The Gantt chart will be updated every week by filling out the "actual start" and "actual duration" parts of each task. This will then provide evidence of the project work during the final report.

Week 1 begins on the 23rd January before giving in this Initial Plan. In this plan and in the attached Gantt chart I have continued my numbering of the weeks over the Easter break. This means that Week 15 in the plans corresponds to teaching week 12 and hence the deadline for the Final Report is the end of Week 15 in both plans.

Time Plan

Week 1 (23/01/17)

- **V/E/A** - Write Initial Plan - *Deadline: 30/01/17*

Week 2 (30/01/17)

- **E/A** - Research

Week 3 (06/02/17)

- **E** - Define entertainment functions

Week 4 (13/02/17)

- **First review meeting**

- **A** - Write skeleton algorithm

Week 5 (20/02/17)

- **A** - Gather and prepare data for use

Week 6 (27/02/17)

- **A** - Write problem specific algorithm

Week 7 (06/03/17)

- **A** - Write problem specific algorithm

Week 8 (13/03/17)

- **A** - Write problem specific algorithm

- **Second review meeting**

Week 9 (20/03/17)

- **A** - Write problem specific algorithm

- **V** - Create visualisation of results

Week 10 (27/03/17)

- **V** - Create visualisation of results

- **V/E/A** - Run experiments on datasets

Week 11 (03/04/17)

- **V** - Create visualisation of results

- **V/E/A** - Analyse data from experiments

Week 12 (10/04/17)

- **V** - Create visualisation of results

- **V/E/A** - Write final report

Week 13 (17/04/17)

- **V** - Create visualisation of results

- **V/E/A** - Write final report

Week 14 (24/04/17)

- **V** - Create visualisation of results

- **V/E/A** - Write final report

Week 15 (01/05/17)

- **V/E/A** - Finish and hand-in final report - *Deadline: 05/05/17*

References

[1] Wikipedia, "Voting at the eurovision song contest — wikipedia, the free encyclopedia," 2016. [Online; accessed 28-January-2017].

[2] P. Jordan, "Biggest change to eurovision song contest voting since 1975," 18 February 2016. [Online; accessed 25-January-2017].

[3] Wikipedia, "Greedy algorithm — wikipedia, the free encyclopedia," 2017. [Online; accessed 28-January-2017].

[4] encyclopediaofmathematics, "Greedy algorithm," 2016. [Online; accessed 28-January-2017].

[5] I. Spasić, "Ethical approval of research: Procedures and guidance," 2016. [Online; accessed 28-January-2017].

Appendix

Project Planner

Select a period to highlight at right. A legend describing the charting follows.

Period Highlight 1   ⬚ Plan Duration   ⬚ Actual Start   ■ % Complete

ACTIVITY	PLAN START	PLAN DURATION	ACTUAL START	ACTUAL DURATION	PERCENT COMPLETE	PERIODS
V/E/A - Write initial plan	1	1	1	1	100%	
E/A - Research	2	1			0%	
E - Define entertainment functions	3	2			0%	
First review meeting	4	1			0%	
A - Write skeleton algorithm	4	1			0%	
A - Gather and prepare data for use	5	1			0%	
A - Write problem specific algorithm	6	3			0%	
Second review meeting	8	1			0%	
V - Create visualisation of results	9	5			0%	
V/E/A - Run experiments on datasets	10	2			0%	
V/E/A - Analyse data from experiments	11	1			0%	
V/E/A - Write final report	12	3			0%	
Hand-in final report	15	1			0%	