Ranking System

Spring 2020 INFO6205 Project

Kickoff date: March 20th 2020
Due date: April 17th 2020 at midnight.

Your task is to develop a ranking system which is able to evaluate the following expression where x_i, x_j are elements from a set of competing elements $\boldsymbol{X}$:

$$P(x_i, x_j)$$

where $P(x_i, x_j)$ is the probability that x_i would beat x_j if they met in a head to head matchup at neutral territory.

A by-product of this expression would be the ability to build a table of elements ordered such that if an element x_i appears above another element x_j, then you may infer that $P(x_i, x_j) > 0$. Note that there may be a set of undecidable cycles (like rock, paper, scissors) in which case you will have to mark those elements as equal in your table.

It is desirable also that the value of P is not just a single number, but a probability density function (pdf), in other words there should perhaps be some sort of bounds on the P, maybe a uniform pdf between two values. As you get more data, the bounds will become narrower (i.e. your precision will improve).

The input to your system will be a set of prior encounters with a result. These results can be win-loss or they can be scores, as in for example the English Premier League (EPL). If appropriate, you may also consider home team advantage if you feel that it matters.

Your choice of element is entirely up to you. There may be bonus points for originality. However, My recommendation would be to concentrate on the EPL, especially in light of COVID-19 which has abruptly terminated (or at least postponed) the season. Although Liverpool must end the season at the top of the table (it is mathematically impossible for any other team to pass them), the next five positions are important for the summer, as are the last three positions, which teams will be relegated.

It is desirable that the order of data input not affect the result.

Please note that this is a very open-ended project. As a byproduct, you will learn about statistics and probability (more, if you already know some). There may be many “right” answers, even if they appear different.

Finally, there is a particular project which I’m interested in and that is a ranking system for bridge players. I have data for this and, if you’re interested in taking that on, please slack me. It will be harder than the EPL (or similar) problem but it will also carry some bonus points. For most of you, the EPL (or similar) problem will be your best bet.

And, even more finally, if you really want to do the traffic simulation (a harder problem), I would love that. Again, it will carry bonus points, but will involve much more work, I think. I wouldn’t recommend it if you are on your own.