

LPL summer split Elo Ratings

Self-introduction

I am a fan of data, and I believe that collecting and analyzing data could help us catch some points easily missed when we are just watching League of Legends professional games. People have been doing these for traditional sports for years. As a fan of both sports and e-sports, I have been thinking this for a while. How about introducing some useful systems into e-sports. And here comes this Elo ratings system.

This system is inspired by Fivethirtyeight's NFL Elo rating system, which is based on a relatively simple system developed by physicist Arpad Elo to rate chess players. I borrowed their algorithm and did some adjustment, and therefore developed this Elo system.

Elo introduction

1. What is good about this system?

It is simple, easily calculated and all the data are collected from open resources. It can give you very straight information on each team's performance at some point.

2. I noticed that this is the first time you use this system, but all 12 teams already have Elo rankings. How are these determined?

This is actually a hard question. As we all know that teams came and disappeared in LPL quite frequently. It is hard to calculate their Elo according to all the LPL games since Season 3 because some teams did not even exist back then. Therefore, I assigned each team Elo rankings according to their LPL 2015 summer split standings and the pool before the draw. Obviously, teams from the same pool have the same original rankings.

3. What can this system tell League of Legends audience?

First of all, it's a rankings system. Thus, we can check teams' rankings. Also, I will use this system to do prediction before each game day. However, this prediction might be a little bit different. I can't predict which team will win the victory, however, I will give you the probability for each team to win a certain game.

4. Ok, but that sounds a little bit too simple.

There are definitely something more! This system does a great job with very limited information — wins and losses, margin of victory, strength of schedule. Also, it will remain its memory for summer split or next season.

Technical questions

1. What are the parameters you are using?

Uhh..Basically just K, which is a constant in the formula. K tells me how much to update the rankings after each games. The value of K varies in different kinds of sports. For example, a NBA team plays 82 regular games in one season. Therefore, one additional games will not affect Elo significantly. This fact makes K value relatively low. However, in League of Legends, this K would be much higher. After testing, I set this value at 20. Otherwise, it will be too high to keep rankings in a reasonable range or too low to notice changes in terms of teams' performance.

2. Let's say, QG has a ranking of 1398, what does that even mean?
An average team should has a ranking of 1500, so QG should be nervous about if they can make it to playoffs, not to mention the Worlds. The reasonable range should be 1300 to 1700. But actually, as a Uzi fan, I hope QG could make it to 2000. (Just kidding :P)
3. Ok, that makes sense. But what if there is a match between two teams of rankings 1650 and 1400.
It's easy. The team has a higher rankings is favored. In other words, it has a higher probability to win the game.
4. In S5 worlds, we all realized the blue-side advantage influenced the game ridiculously, how does your system deal with it?
We would regard this as the home-field advantage. Originally, I decide it is worth an additional 65 elo in rankings. But this is a new system and I am still testing and improving it. I believe this value would be more precise when I have more data from this season.
5. How do you calculate the probability of winning.
It is as simple as a one-line formula:
$$P(A) = 1 / (10^{(-ELODIFF/400)} + 1)$$

where $P(A)$ = The probability of winning for team A;
 $ELODIFF = Elo(A) - Elo(B)$
6. So winning means an increase in Elo and losing means a decrease?
As always!
7. But it is not always true when a team with a higher Elo wins the game.
That's true. It happens here and there. For example, LGD destroyed EDG in LPL 2015 summer split with a fifth place standing. But we know that PYL's absence greatly influenced LGD's performance in the early stage. When he is back, they did much better. This is one thing good about this system; it will straightforwardly reflect teams' competitiveness over time.
8. What about the margin of victory?
As in soccer, the Elo takes the goal difference into consideration; whereas in League of legends, we would account for KDA difference. I calculated a

multiplier based on KDA difference (by taking natural log), and multiply the result by K value. Therefore, a 20-minute dominating game would move the ranking more than a 50-minute seesaw battle. I also use this multiplier as an autocorrelation in this system.

9. Autocorrelation?

Autocorrelation is the tendency of a time series to be correlated with its past and future values. For example, OMG's ranking is 1530 before one game. Natrually, their ranking would go up if they win and go down if they lose. However, it should remain 1550 on average after the game. That's important, because it means that I've accounted for all the information you've given me efficiently. If I expected the OMG's rating to rise to 1575 on average after the game, I should have rated them more highly to begin with. It's true that if I have the OMG favored against, say HYG, they should win more often than they lose. But the way I was originally designed, I can compensate by subtracting more points for a loss than I give them for a win. Everything would balance out.

*Italicized explanations are inspired and borrowed from Fivethirtyeight NFL rankings.

10. How did you compensate for it?

Math is hot.

Margin of Victory Multiplier = $\text{Ln}(\text{Abs}(\text{KD})+1) * (2.2/((\text{ELOW}-\text{ELOL})*.001+2.2))$

where KD = KDA difference;

ELOW = Pre-match Elo of winning team

ELOL= Pre-match Elo of losing team

Elo rankings (original):

Name	Group	Pool	Original
LGD	A	1	1600
EDG	B	1	1600
QG	A	2	1550
VG	B	2	1500
IG	B	2	1550
SS	A	2	1500
OMG	A	3	1450
WE	A	3	1400
RNG	B	3	1400
M3	B	3	1450
HYG	A	4	1350
EPA	B	4	1350

