

Motivation

For each tournament, the Official World Golf Rankings aim to assign a player a Performance Points value that reflects the player's score relative to the field, adjusted for the strength of the field. Essentially, the rankings are constructed by averaging the Performance Points, weighted by recency. This has some similarities to the ELO system. First, there sense of opponents having different strengths, and a player's own performance being evaluated using these strengths. Second, ELO strongly favors recent performances, as new ratings are calculated as a function of ratings preceding the game. This suggests that ELO may be a more direct way to evaluate golfers.

ELO Model

I created a round-based ELO, as opposed to tournament or hole. A hole-based ELO rating would be an interesting exploration, but the ratings would likely be too dense to be useful – the worst golfer has a decent chance of beating the best golfer on any given hole, and they will tie a decent portion of the time. A tournament-based ELO is also reasonable but gives too small of a sample size.

ELO is typically used in head-to-head competitions. I patch this by treating every combination of golfers in a round as a match. That is, when a golfer plays a round, I model him playing a game against every other golfer who plays this round.

The ELO update works as follows:

A and B have ratings entering a match, R_a and R_b . We then calculate the expectation of A beating B, which is $E_a = \frac{1}{1 + 10^{((R_b - R_a)/480)}}$, and $E_b = 1 - E_a$. Then, we check the actual result of the match, which is 1 if A wins, 0.5 if they tie, and 0 if A loses. We then update $R_a = R_a + k(a_result - E_a)$. B is updated in the same fashion using E_b .

I also calculate performance ratings for each round using the formula $perf_rating = \frac{(total\ of\ opponents\ ratings) + 400 * (total\ score)}{total\ games}$.

From here, the main task is picking the k value, which controls the sensitivity of ratings to a single game. In other words, with higher k , a player's rating will change more drastically after a game. My code has the capability to calculate ratings of any k , but I arrived at $k=0.7$.

Because this rating was still too sensitive to outlier rounds, I experimented with maximum rating changes by round. I chose not to implement these, but my code can easily adapt to different maximum changes.

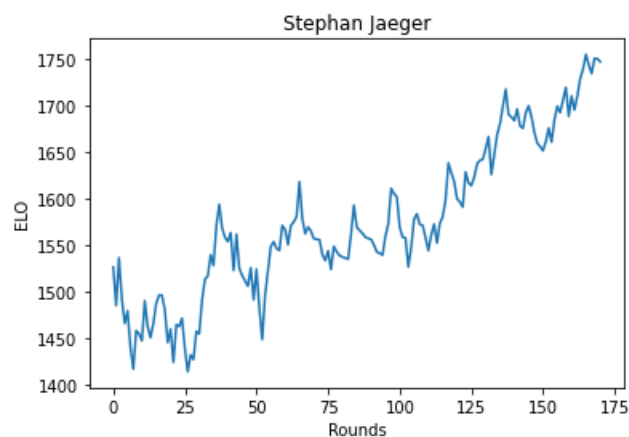
There are other aspects of the ELO system that I chose not to implement, such as provisional rating and momentum. I cover modelling decisions in more depth in the appendix.

Results and Analysis

My ratings are somewhat contiguous with the World Golf Rankings. Here is a comparison between top 15s.

Player	ELO	World Golf Ranking	Top 15 WGR
Viktor Hovland	1766	4	
Cameron Smith	1761	11	
Rory McIlroy	1760	2	
Lucas Glover	1754	30	
Stephan Jaeger	1748	86	
Collin Morikawa	1734	19	
Scottie Scheffler	1724	1	
Patrick Cantlay	1723	5	
Max Homa	1718	7	
Xander Schauffele	1715	6	
JT Poston	1712	41	
Nicolai Hojgaard	1706	83	
Russell Henley	1705	28	
Sung-Jae Im	1701	27	
Cameron Davis	1700	48	

Many golfers that my system ranks highly are also ranked highly by the OWGR. But there are some clear disagreements. We can investigate Stephan Jaeger, who is ranked 5th in ELO but 86th in the OWGR.



His ELO graph shows strong performance since around his 100th round, which occurred around the beginning of 2023. Indeed, his last few performances have been solid. In the Fedex St. Jude Championship, he shot -8 to finish T20 in a field of 70. In the Wyndham Championship, he shot -10 to finish T14 in a field of 150+.

It is hard to say which ranking is more accurate in these situations because there is no benchmark to measure against. It is hard to believe that Jaeger is the 5th best golfer in the PGA, but he is likely closer to 5th than 86th. My ELO system appears to weight recent outcomes more strongly than the OWGR.

Next Steps

I would like to use the ELO to predict betting outcomes, namely player head-to-head outcomes. My next step is to use ELO, recent performance ratings, and the OWGR to train a neural net that predicts head-to-head outcomes.

Appendix