

Rating for a King

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Rating Chess

- The Elo rating system was originally invented for chess.
- It is also used as a rating system in association soccer, American football, basketball, Major League Baseball, and esports.
- The method also does not use linear algebra.



What's the diff?

- The difference in the ratings between two players serves as a predictor of the outcome of a match.
- After every game, the winning player takes points from the losing one. The difference between the ratings of the winner and loser determines the total number of points gained or lost after a game.

Playing normally

- Central assumption – a player's performance in each game is normally distributed.
- The mean value of the performances of any given player changes only slowly over time.
- A player's true skill = the mean of that player's performance random variable.

Details

- Assume R_A = rating for player A and R_B = rating for player B .
- Expected score of Player A is

$$E_A = \frac{1}{1 + 10^{R_B - R_A/400}}$$

- Expected score of Player B is

$$E_B = \frac{1}{1 + 10^{R_A - R_B/400}}$$

Updating expectations

- Suppose player A is expected to score E_A but scores S_A when playing player B .

- Then, player A 's rating is updated as

$$R'_A = R_A + K(S_A - E_A).$$

- Expected score of Player B is

$$E_B = \frac{1}{1 + 10^{R_A - R_B/400}}$$

K factor

- What about K ?
- If the K is too large, there will be too much sensitivity to just a few, recent events, in terms of a large number of points exchanged in each game.
- If K is too low, the sensitivity will be minimal, and the system will not respond quickly enough to changes in a player's actual level of performance.

Art vs. Science

- Note, the 400 in the earlier formulas is also a parameter to tune.
- As such, there can be parameter tuning in Elo for sports and settings to make it accurate and useful.

It's all relative

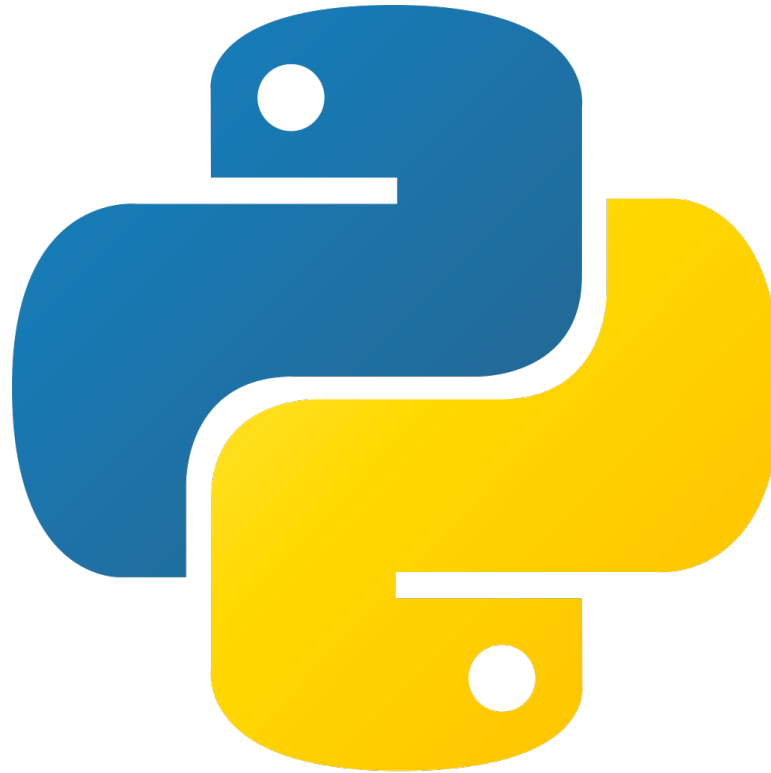
- An Elo rating is a comparative rating.
- A list of Elo ratings is valid only within the rating pool where it was established.



Code it!

Let's see this in python code.

`eloRanking.ipynb`



More details

- Want more details? How do you pick k?
How do you adapt for other sports?
- Just ask!

more details