

Basketforces - An Accurate Rating System for Basketball Competitions

Abyss Li (@StarryAbyss on GitHub)

21 Feb 2024 (Version 1.2.0)

1 Introduction

It's a stable rating system for basketball competitions. The rating depends on the achievements of a team for a long period.

Features

- Accurate;
- Be easy to calculate;
- Non-provisional;
- The points in a match had an effect on the ratings, enhance the competitiveness of the players.

2 How It Works

(1) Variables

For each of the matches of a team, we called the variable P_1 = the points the team got in the match, and P_2 = the points the opponents got in the match. The rating before the match of the team is R'_1 , of the opponent is R'_2 .

(2) Processing of data

We called $D = \frac{P_1 - P_2}{P_1 + P_2}$.

In particular, if $P_1 = P_2 = 0$, then $D = 0$.

We divide the matches into three categories based on home and away.

Category	Δ
Home	-0.02
Neither are home	0
Away(Opponents are home)	+0.02

Table 1: Categories

The final value $Df = D + \Delta$.

(3) Formula

$$R_1 = R'_1 + I \times (Df - ExpectedDf)$$

Variables Explanation:

R_1 : The rating after the match;

I : The weight of the match;

$ExpectedDf$: Calculated as follows.

$$ExpectedDf = \frac{1}{2^{\frac{R'_2 - R'_1}{600}} + 1} - 0.5$$

Example: Team A's rating is 1200, the opponent Team B's rating is 1000.

Then,

$$\text{Team A: } ExpectedDf = \frac{1}{2^{\frac{1000 - 1200}{600}} + 1} - 0.5 = 0.0575$$

$$\text{Team B: } ExpectedDf = \frac{1}{2^{\frac{1200 - 1000}{600}} + 1} - 0.5 = -0.0575$$

The constant I is different in different levels of matches.

Level	I
Small Countries/Clubs Friendly Matches	100
Friendly Matches	150
Small Regional Countries/Clubs Comp. Group	200
Small Regional Countries/Clubs Comp. Tournaments	250
Continental Countries/Clubs Comp. Group	300
Continental Countries/Clubs Comp. Tournaments	350
Worldwide Top Countries/Clubs Comp. Group	400
Worldwide Top Countries/Clubs Comp. Tournaments	500

Table 2: Match Levels

Note that in and after the Quarter Finals, the changes wouldn't drop. It will be friendly to the teams which had a high achievement.

(4) Association Managements

Every team in the association has a rating of 1500 points when the team didn't take part in any matches.

The rating will be provisional at first. Some teams will get a higher rating if they took part in fewer matches. So when we calculate the ratings, think of the beginning rating is 0. In the first 5 matches, we add 500, 400, 300, 200, 100 to their ratings. It will be more accurate for team ranking.

(5) Period

For leagues, we'd better calculate a new rating in a new season. The final rating R is calculated as follows:

$$R = \frac{1 \times R_0 + 0.875 \times R_1 + 0.75 \times R_2 + \dots + 0.125 \times R_7}{1 + 0.875 + 0.75 + \dots + 0.125}$$

R_0, R_1, \dots, R_7 means the rating of the current season to the 7-th previous season.

3 Examples

To be written.