

# Package: piratings (via r-universe)

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**Type** Package

**Title** Calculate Pi Ratings for Teams Competing in Sport Matches

**Version** 0.1.4

**Author** Lars Van Cutsem

**Maintainer** Lars Van Cutsem <lars.vancutsem@hotmail.com>

**Depends** R (>= 2.10)

**Imports** methods, ggplot2

**Description** Calculate and optimize dynamic performance ratings of association football teams competing in matches, in accordance with the method used in the research paper ``Determining the level of ability of football teams by dynamic ratings based on the relative discrepancies in scores between adversaries'', by dr. Constantinou and dr. Fenton. This dynamic rating system has proven to provide superior results for predicting association football outcomes. The research paper can be found here: (<<http://www.constantinou.info/downloads/papers/pi-ratings.pdf>>).

**License** GPL-2

**Encoding** UTF-8

**LazyData** true

**RoxygenNote** 6.1.1

**Suggests** knitr, rmarkdown

**VignetteBuilder** knitr

**BugReports** <https://github.com/larsvancutsem/piratings/issues>

**Repository** <https://larsvancutsem.r-universe.dev>

**RemoteUrl** <https://github.com/larsvancutsem/piratings>

**RemoteRef** HEAD

**RemoteSha** 06aee6cb12faaf0ad484e164c8a5d206c582dc5d

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calculate\_pi\_ratings    *Calculate Pi Ratings*

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### Description

This function calculates dynamic performance ratings called "pi ratings" for sport teams in competitive matches. The pi rating system was developed by Constantinou and Fenton in their research paper 'Determining the level of ability of football teams by dynamic ratings based on the relative discrepancies in scores between adversaries'.

source: <http://www.constantinou.info/downloads/papers/pi-ratings.pdf>

### Usage

```
calculate_pi_ratings(teams, outcomes, lambda, gamma, b, c, return_e)
```

### Arguments

teams	an (n x 2) character matrix, contains unique names for the respective home and away teams in n subsequent matches
outcomes	an (n x 2) numeric matrix, contains the points that the respective home and away teams scored in n subsequent matches
lambda	a constant, the learning rate for performance from recent matches, default value: 0.035
gamma	a constant, the learning rate for performance from home to away and vice versa, default value: 0.7
b	a constant, logarithmic base, default value: 10
c	a constant, default value: 3
return_e	a boolean variable, conditions the function to return either the mean squared error when return_e = TRUE, or the pi ratings when return_e = FALSE, default value: FALSE

### Value

either an (n x 2) matrix containing the pi ratings for the teams in the n input matches or the mean squared error for the specific parameter setting, conditional on boolean parameter return\_e being FALSE or TRUE

### Examples

```
# toy example
teams <- matrix(c("team A", "team B", "team B", "team A"), nrow = 2)
outcomes <- matrix(c(1, 3, 2, 1), nrow = 2)
calculate_pi_ratings(teams, outcomes)
```

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EPL2008\_2015

*English Premier League match outcomes*

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### Description

All English Premier League match outcomes during the seasons 2008/2009 to 2014/2015

### Usage

```
EPL2008_2015
```

### Format

A data frame with 3040 rows and 5 variables:

**date** date of the match

**home\_team** name of the home team

**away\_team** name of the away team

**home\_goals** number of goals the home team scored

**away\_goals** number of goals the away team scored ...

### Source

<https://www.kaggle.com/hugomathien/soccer>

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optimize\_pi\_ratings

*Optimize Pi Ratings*

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### Description

This function performs grid optimization on a prespecified set of parameters to find the optimal learning rates for calculating the pi ratings for sport teams in competitive matches for a set of teams in their respective set of sport matches. The pi rating system was developed by Constantinou and Fenton in their research paper 'Determining the level of ability of football teams by dynamic ratings based on the relative discrepancies in scores between adversaries'

source: <http://www.constantinou.info/downloads/papers/pi-ratings.pdf>

**Usage**

```
optimize_pi_ratings(teams, outcomes, lambda_in, gamma_in, b_in, c_in)
```

**Arguments**

teams	an (n x 2) character matrix, contains unique names for the respective home and away teams in n subsequent matches
outcomes	an (n x 2) numeric matrix, contains the points that the respective home and away teams scored in n subsequent matches
lambda_in	a numerical vector, learning rate values to consider in the grid optimization, default value: seq(0, 0.1, 0.005)
gamma_in	a numerical vector, learning rate values to consider in the grid optimization, default value: seq(0, 1, 0.05)
b_in	a constant, logarithmic base, default value: 10
c_in	a constant, default value: 3

**Value**

a dataframe with the results of the grid optimization, the mean squared error for every combination of learning rates lambda and gamma specified in the parameter vectors

**Examples**

```
# toy example
teams <- matrix(c("team A", "team B", "team B", "team A"), nrow = 2)
outcomes <- matrix(c(1, 3, 2, 1), nrow = 2)
optimize_pi_ratings(teams, outcomes, seq(0.05, 0.07, 0.005), seq(0.4, 0.6, 0.05))
```

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