

Package ‘nhlscrapr’

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Type Package

Title Compiling the NHL Real Time Scoring System Database for easy use
in R

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Description Compiling the NHL Real Time Scoring System Database for easy use in R

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R topics documented:

nhlscrapr-package	2
fold.frames	3
full.game.database	4
nhlscrapr-data	5
NP.score	6
player.summary	7
process.games	7

Index	10
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nhlscrapr-package	<i>nhlscrapr: Retrieve and process play-by-play game data from the NHL Real Time Scoring System</i>
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Description

This package contains routines for extracting play-by-play game data for regular-season and playoff NHL games, particularly for analyses that depend on which players are on the ice.

Details

This package processes data files of the type expanded summary (ES) and play-by-play (PL) for all possible games between 2002 and 2013, visual shift charts (SCH and SCV) for games between 2002 and 2007, and shot locations from 2008 until present. The purpose of this routine is to produce tables for players, games and on-ice events specifically to look at the impact of a player's contribution to how events unfold. The examples below illustrate how these tools can be used to produce these tables.

The command `process.games()` will download the appropriate game files and, for each game selected produce a table of events with all players on the ice and relevant information for each particular event, such as shot distance and type, goals and assists, and the zone in which the event took place (relative to the home team).

The command `augment.game()` takes a single game file and makes it more useful for the purpose of statistical modelling. It replaces player names with a unique player ID number, separates goal-tenders from skaters, and obtains the event interval time. This routine is called for each game in the table by `merge.to.mega.file()` as it combines all games into one single R object, saving this object to disk along with the game table and unique player roster.

A user only need run one command, `compile.all.games()`, in order to get everything from the site, though this may take hours to download and compile.

Author(s)

A.C. Thomas <act@acthomas.ca>

Examples

```
## Not run:

#What are all games that can/should be downloaded?
#valid=FALSE implies previously screened problems.
#Just a subset for testing.
game.table <- full.game.database()[301:303,]

#Get the details for these 20 games.
print(game.table)
```

```

#Takes HTML files and (possibly) GIF images and produces event and player tables for each game.
process.games (game.table)

#Give me a single game record.
sample.game <- retrieve.game (season="20022003", gcode="20301")

#Augment all games and put them all in one big database.
compile.all.games (output.file="mynhlscrapes.RData")

#####
# Extras:

#Process games in parallel!
library(doMC)
registerDoMC(4)

res <- foreach (kk=1:dim(game.table)[1]) %dopar%
{
  message (paste(kk, game.table[kk,1], game.table$gcode[kk]))
  item <- process.single.game(
    game.table[kk,1],
    game.table$gcode[kk],
    save.to.file=TRUE)
}

## End(Not run)

```

fold.frames

fold.frames

Description

Collapse a series of data frames with the same columns into one data frame.

Usage

```
fold.frames(frame.list)
```

Arguments

`frame.list` A list of data frames.

Details

Most useful with `compile.all.games()`.

Value

A single data frame with the same columns as the originals.

Author(s)

A.C. Thomas <act@acthomas.ca>

full.game.database	<i>Create a shell database for NHL games from 2002 to the present, then download them</i>
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Description

Creates a shell database for NHL games from 2002 to present, unfilled with game information. Uses this to collect and scrape NHL data, but not process them immediately.

Usage

```
full.game.database(extra.seasons=0)
download.single.game (season="20122013",
                    gcode="20001",
                    rdata.folder="nhlr-data",
                    verbose=TRUE,
                    wait=20)
download.games      (games=full.game.database(),
                    rdata.folder="nhlr-data",
                    ...)
```

Arguments

extra.seasons	Beyond 20142015, adds data for additional seasons (assuming nhlsrapr is not supported and updated before the season begins).
season	A character string for the two years specifying an NHL season.
gcode	The five-digit ID number for a particular NHL game.
rdata.folder	The location within the current directory to which to save the downloaded files. Will be created if it does not exist.
verbose	Report additional messages.
wait	Amount of time in seconds to wait between game downloads.
games	A game database, such as the one produced by full.game.database().
...	Arguments to pass to download.single.game().

Details

`full.game.database()` gives ID numbers for all regular-season and playoff games played between 2002 and 2013, with indicators for whether any particular game is known to be unavailable.

`download.single.game()` retrieves the relevant files for a single game from NHL.com.

`download.games()` retrieves the files for all games in the table.

Value

`full.game.database`: a data frame with columns including season, session (Regular or Playoffs), game number/gcode (which game in the season?). Placeholders for teams, score and date of game are included to be filled in later. “valid” indicates whether a full record of the game is available for download.

`download.single.game`: returns a single Boolean value indicating if no errors were recorded during the download. Saves the game to disk, particularly the PL, ES, SCH and SCV files, along with JSON data for x-y events.

`download.games`: returns the input game database with “valid” changed to FALSE for any failed downloads.

Author(s)

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Examples

```
#Select a part of the history.
game.table <- full.game.database()[201:220,]

#Download one game.
download.single.game(game.table$season[1], game.table$gcode[1], wait=1)

#Download all games.

## Not run:
game.table.updated <- download.games (games=game.table)

## End(Not run)
```

nhlscrapr-data

nhlscrapr: Included Data Sets

Description

Data sets included with the nhlscrapr package.

Usage

quadsarray
 pushes
 pulls
 zone.adjust.prefab
 date201415

Format

quadsarray: a series of quadrilaterals that define distinct areas of the offensive zone. pushes, pulls: the possible transitions from one area subzone to another, constrained to be distance lengthening (push) or shortening (pull). zone.adjust.prefab: When fixing the rink biases, this is used to assign the transition probabilities. This can be calculated by the user if desired. date201415: A predownloaded version of the timing of games for the 2014-2015 season.

None of these is ever required for the user.

Author(s)

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NP.score

Calculate NP-tau score

Description

Calculates the Net Probability score from a game table.

Usage

NP.score(grand.data, seconds=20)

Arguments

grand.data A single data frame of all events to be considered.
 seconds The amount of time in seconds after the event with which we measure net goals.

Value

A table containing the goal counts for each team following the particular events and zones, as well as the calculated net probability.

Author(s)

A.C. Thomas <act@acthomas.ca>

References

Michael Schuckers and James Curro (2013) Total Hockey Rating (THoR): A comprehensive statistical rating of National Hockey League forwards and defensemen based upon all on-ice events. Sloan Sports Conference.

player.summary	<i>Player summaries</i>
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Description

Summarizes the event count for each player in the data frame.

Usage

```
player.summary (grand.data, roster.unique)
```

Arguments

`grand.data` A single data frame of all events to be considered.
`roster.unique` A list of all player IDs to consider.

Value

An array with event counts for each player in the data frame.

Author(s)

A.C. Thomas <act@acthomas.ca>

process.games	<i>Given downloaded NHL games, produce event tables with players on ice.</i>
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Description

Produces game tables from the NHL source files.

Usage

```

process.single.game (season="20122013",
                    gcode="20001",
                    rdata.folder="nhlr-data",
                    override.download=FALSE,
                    save.to.file=TRUE,
                    ...)
process.games      (games=full.game.database(),
                    rdata.folder="nhlr-data",
                    override.download=FALSE)
retrieve.game     (season="20122013",
                    gcode="20001",
                    rdata.folder="nhlr-data",
                    force=TRUE,
                    ...)
compile.all.games (rdata.folder="nhlr-data",
                    output.folder="source-data",
                    new.game.table=NULL,
                    seasons=NULL,
                    verbose=FALSE,
                    override.days.back=NULL,
                    date.check=FALSE,
                    ...)

```

Arguments

<code>season</code>	A character string for the two years specifying an NHL season.
<code>gcode</code>	The five-digit ID number for a particular NHL game.
<code>rdata.folder</code>	The location within the current directory to which to save the downloaded files. Will be created if it does not exist.
<code>output.folder</code>	The location within the current directory where compiled files will be saved. Will be created if it does not exist.
<code>games, new.game.table</code>	A game database, such as the one produced by <code>full.game.database()</code> .
<code>override.download</code>	Re-download the game files whether or not they are currently locally available.
<code>save.to.file</code>	Save the game object to file.
<code>force</code>	If TRUE, reprocesses the single game file.
<code>seasons</code>	If selected, defaults to a game table with only these seasons, of the form "20142015".
<code>date.check</code>	Try and download files without known dates.
<code>override.days.back</code>	Force download for those days previous to this one.
<code>verbose</code>	Print extra output information.
<code>...</code>	Arguments to pass to <code>download.single.game()</code> .

Details

This group of functions takes the downloaded HTML, image and JSON files and produces an event table for each game, particularly focusing on the players on the ice during each event.

Value

`process.single.game()` produces an object called `game.info` that contains several pieces of information, primarily the `data.frame` `playbyplay`, with each column representing an event. Columns are as follows: `event`: The event number as recorded in the game. `period`, `seconds`: The period of the game and the elapsed time in seconds. `a1,...,a6`: The numbers and names of the away team players on the ice. `h1,...,h6`: The numbers and names of the home team players on the ice. `ev.team`: The team that registered the event in question. `ev.player.1`, `ev.player.2`, `ev.player.3`: The players involved in the event. `distance`: The distance in feet from the relevant goal for a shot on goal, missed shot or goal. `type`: Further information on the event, either shot type or penalty type. `homezone`: The zone in which the event took place, from the perspective of the home team. `xcoord`, `ycoord`: If available, the (x,y) location of a shot on goal or hit.

`process.games()` runs this routine and saves all game files to disk.

`retrieve.game()` retrieves the processed file from disk if it exists, and if not, it runs `process.single.game()` first.

`compile.all.games()` does everything that's needed to construct the entire record. This will be fastest if all games have already been downloaded and processed, possibly in parallel.

Author(s)

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Index

*Topic **datasets**

nhlscrapr-data, [5](#)

*Topic **package**

nhlscrapr-package, [2](#)

compile.all.games (process.games), [7](#)

date201415 (nhlscrapr-data), [5](#)

download.games (full.game.database), [4](#)

download.single.game
(full.game.database), [4](#)

fold.frames, [3](#)

full.game.database, [4](#)

nhlscrapr (nhlscrapr-package), [2](#)

nhlscrapr-data, [5](#)

nhlscrapr-package, [2](#)

NP.score, [6](#)

player.summary, [7](#)

process.games, [7](#)

process.single.game (process.games), [7](#)

pulls (nhlscrapr-data), [5](#)

pushes (nhlscrapr-data), [5](#)

pushpull (nhlscrapr-data), [5](#)

quadsarray (nhlscrapr-data), [5](#)

retrieve.game (process.games), [7](#)

zone.adjust.prefab (nhlscrapr-data), [5](#)