Package 'NFLSimulatoR'

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Type Package

Title Simulating Plays and Drives in the NFL

Version 0.3.0

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Description The intent here is to enable the simulation of plays/drives and evaluate game-play strategies in the National Football League (NFL). Built-in strategies include going for it on fourth down and varying the proportion of passing/rushing plays during a drive. The user should be familiar with nflscrapR data before trying to write his/her own strategies. This work is inspired by a blog post by Mike Lopez, currently the Director of Data and Analytics at the NFL, Lopez (2019) <https://statsbylopez.netlify.app/post/resampling-nfl-drives/>.

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Encoding UTF-8

Imports data.table, progress

LazyData true

Depends R (>= 3.5.0)

RoxygenNote 7.1.1

URL https://github.com/rtelmore/NFLSimulatoR/

BugReports https://github.com/rtelmore/NFLSimulatoR/issues/

Suggests knitr, rmarkdown

VignetteBuilder knitr

NeedsCompilation no

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R topics documented:

`download_nflfastR_data` *Download raw nflfastR data in rds format*

Description

This function will return a tibble after downloading the original file from the nflfastR-data website. Note that the tibble will contain all regular and postseason data.

Usage

```
download_nflfastR_data(year)
```

Arguments

`year`	A year from 2009 to 2020

Value

A data.frame containing play-by-play information from NFL games

Examples

```
df <- download_nflfastR_data(2019)
```

download_nflscrapR_data *Download raw nflscrapR data in csv format*

Description

This function will return a data.frame after downloading the original file from the nflscrapR-data website.

Usage

```
download_nflscrapR_data(type = "regular", year)
```

Arguments

type	A character string specifying "regular", "pre", or "post", for regular, pre, or post season, respectively.
year	A year from 2009 to 2019

Value

A data.frame containing play-by-play information from NFL games

Examples

```
## Not run:
df <- download_nflscrapR_data("regular", 2019)

## End(Not run)
```

down_distance_updater *Update the down and distance of a drive*

Description

The down and distance updater will run a play and update various game-based statistics accordingly.

Usage

```
down_distance_updater(
  what_down,
  yards_to_go,
  yards_from_own_goal,
  play_by_play_data,
  ...
)
```

Arguments

what_down	The current down (1st, 2nd, 3rd, or 4th down)
yards_to_go	Number of yards to go until a first down or TD
yards_from_own_goal	The number of yards from the possession team's own goal
play_by_play_data	A data file from nflscrapR prepped using the prep_pbp_data.R function
...	Additional arguments for different strategies

Value

A data.frame object

Examples

```
## Not run:
down_distance_updater(what_down = 1,
                      yards_to_go = 10,
                      yards_from_own_goal = 25,
                      play_by_play_data = pbp_data,
                      strategy = "normal")

## End(Not run)
```

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expected_pts_fourth *Decision for 4th downs based on expected points*

Description

This function will return the expected points for several 4th down decision. The options are "go for it", "field goal", or "punt". This should be primarily used within the 'NFLSimulatoR::sample_play()' function.

Usage

```
expected_pts_fourth(yards_from_goal, yards_to_go, play_data)
```

Arguments

yards_from_goal	The number of yards until a team scores a touchdown
yards_to_go	Number of yards to go until a first down or TD
play_data	A data file from nflscrapR prepped using the prep_pbp_data.R function

Value

A data.frame of the expected points of three fourth down options

Examples

```
## Not run:
expected_pts_fourth(what_down = 1,
                      yards_to_go = 10,
                      yards_from_own_goal = 25,
                      play_by_play_data = reg_pbp_2018)

## End(Not run)
```

`prep_pbp_data` *Add necessary columns to nflscrapR data*

Description

Add necessary columns to nflscrapR data

Usage

```
prep_pbp_data(data)
```

Arguments

`data`	An nflscrapR or nflfastR data set. Note that stringsAsFactors = FALSE is assumed.

Value

a data.table object

Examples

```
## Not run:
dt <- prep_pbp_data(nflscrapr_pbp_data)

## End(Not run)
```

sample_drives *Sample a Series of Drives, a strategy to test verses the normal strategy*

Description

Sample a Series of Drives, a strategy to test verses the normal strategy

Usage

```
sample_drives(
  n_sims,
  from_yard_line = 25,
  play_by_play_data,
  strategy = "normal",
  single_drive = FALSE,
  progress = TRUE,
  ...
)
```

Arguments

n_sims	The number of simulations
from_yard_line	The starting field position (defaults to 25)
play_by_play_data	A data file from nflscrapR prepped using the prep_pbp_data.R function
strategy	"normal", "passes_rushes", or "fourth_downs"
single_drive	TRUE indicates only a single drive, otherwise, drives sampled until a score occurs
progress	logical for inclusion of a progress bar
...	Additional arguments for different strategies

Value

A data.frame of drives

Examples

```
## Not run:
sample_drives(2, 25, dt)

## End(Not run)
```

`sample_fourth_down_strategy` *Sample NFL play-by-play data with a specified 4th down strategy*

Description

This function will return a sample play from the nflscrapR play-by-play data for a given down, distance, yards from the team's goal, using a given strategy on fourth down. The strategies are: empirical, always going for it on fourth down, never going for it on fourth down, go for it if one is less than a certain distance from a first down/touchdown, and go for it if it maximizes one's expected points. This should be primarily used within the 'NFLSimulatoR::sample_play()' function.

Usage

```
sample_fourth_down_strategy(
  what_down,
  yards_to_go,
  yards_from_own_goal,
  window_yards_from_own_goal = 1,
  play_by_play_data,
  fourth_down_strategy = "empirical",
  yards_less_than = 5
)
```

Arguments

`what_down`	The current down (1st, 2nd, 3rd, or 4th down)
`yards_to_go`	Number of yards to go until a first down or TD
`yards_from_own_goal`	The number of yards from the possession team's own goal
`window_yards_from_own_goal`	Precision parameter for "yards_from_own_goal" (a value of 1 means the sampling will occur within plus or minus 1 of the "yards_from_own_goal" value)
`play_by_play_data`	A data file from nflscrapR prepped using the prep_pbp_data.R function
`fourth_down_strategy`	The specific fourth down strategy 'empirical', 'always_go_for_it', 'never_go_for_it','yds_less_than','exp
`yards_less_than`	Parameter for 'yds_less_than' strategy. If using 'yds_less_than' strategy and one is less than 'yards_less_than' yards from first down/touchdown, then go for it on fourth down

Value

A tibble containing lots of info

Examples

```
## Not run:
sample_fourth_down_strategy(what_down = 3,
                      yards_to_go = 2,
                      yards_from_own_goal = 45,
                      window_yards_from_own_goal = 2,
                      play_by_play_data = reg_pbp_2018,
                      fourth_down_strategy = "empirical")

## End(Not run)
```

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sample_passes_rushes_strategy

Sample NFL play-by-play data with a specified blend of rushing and passing

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Description

This function will return a sample play from the nflscrapR play-by-play data for a given down, distance, yards from the team's goal, using a given pass/rush play strategy. The user may choose a value for the proportion of passing plays to be sampled. Thus one can test strategies in which the team always passes, always runs, or some distribution of the two. This strategy is only intended for downs 1 - 3, and uses an empirical strategy for fourth downs. This should be primarily used within the 'NFLSimulatoR::sample_play()' function.

Usage

```
sample_passes_rushes_strategy(
  what_down,
  yards_to_go,
  yards_from_own_goal,
  window_yards_from_own_goal = 1,
  play_by_play_data,
  prop_passes = 0.5
)
```

Arguments

what_down	The current down (1st, 2nd, 3rd, or 4th down)
yards_to_go	Number of yards to go until a first down or TD
yards_from_own_goal	The number of yards from the possession team's own goal
window_yards_from_own_goal	Precision parameter for "yards_from_own_goal" (a value of 1 means the sampling will occur within plus or minus 1 of the "yards_from_own_goal" value)
play_by_play_data	A data file from nflscrapR prepped using the prep_pbp_data.R function
prop_passes	Proportion of plays that should be pass plays, between 0 and 1, inclusive

Value

A tibble containing lots of info

Examples

```
## Not run:
sample_passes_rushes_strategy(what_down = 3,
                              yards_to_go = 2,
                              yards_from_own_goal = 45,
                              window_yards_from_own_goal = 2,
                              play_by_play_data = reg_pbp_2018,
                              prop_passes = 0.5)

## End(Not run)
```

`sample_play` *Sample one NFL play according to some strategy*

Description

This function will return a sample play from the nflscrapR play-by-play data for a given down, distance, yards from the team's goal, using the usual NFL-coaching strategy.

Usage

```
sample_play(
  what_down,
  yards_to_go,
  yards_from_own_goal,
  window_yards_from_own_goal = 1,
  play_by_play_data,
  strategy = "normal",
  ...
)
```

Arguments

`what_down`	The current down (1st, 2nd, 3rd, or 4th down)
`yards_to_go`	Number of yards to go until a first down or TD
`yards_from_own_goal`	The number of yards from the possession team's own goal
`window_yards_from_own_goal`	Precision parameter for "yards_from_own_goal" (a value of 1 means the sampling will occur within plus or minus 1 of the "yards_from_own_goal" value)
`play_by_play_data`	A data file from nflscrapR prepped using the prep_pbp_data.R function

strategy	A string describing the strategy to be used, default is "normal", others include: "fourth_downs" and "passes_rushes" which implement some strategy regarding 4th downs and proportion of plays that are passing plays, respectively.
...	Additional arguments for different strategies

Value

A tibble containing lots of info

Examples

```
## Not run:
sample_play_test(what_down = 3,
                 yards_to_go = 2,
                 yards_from_own_goal = 45,
                 play_by_play_data = pbp_data,
                 strategy = "normal")

## End(Not run)
```

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