Package 'ffsimulator'

September 11, 2021

Title Simulate Fantasy Football Seasons

Version 1.1.0

Description Uses bootstrap resampling to run fantasy football season simulations supported by historical rankings and 'nflfastR' data, calculating optimal lineups, and returning aggregated results.

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URL https://ffsimulator.ffverse.com, https://github.com/ffverse/ffsimulator

BugReports https://github.com/ffverse/ffsimulator/issues

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Author Tan Ho [aut, cre, cph] (<https://orcid.org/0000-0001-8388-5155>)

Maintainer Tan Ho <tan@tanho.ca>

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R topics documented:

`autoplot.ff_simulation` *Automatically Plot ff_simulation Object*

Description

Creates automatic plots for wins, ranks, or points for an `ff_simulation` object as created by `ff_simulate()`.

Usage

```
autoplot.ff_simulation(object, type = c("wins", "rank", "points"), ...)

## S3 method for class 'ff_simulation'
plot(x, ..., type = c("wins", "rank", "points"), y)
```

Arguments

object	a ff_simulation object as created by ff_simulate()
type	one of "wins", "rank", "points"
...	unused, required by autoplot generic
x	A ff_simulation object.
y	Ignored, required for compatibility with the plot() generic.

Details

Usage of this function/method requires the ggplot2 package and (for wins and points plots) the ggridges package.

Value

a ggplot object

See Also

vignette("basic") for example usage

Examples

```
simulation <- .ffs_cache("foureight_sim.rds")

ggplot2::autoplot(simulation) # default is type = "wins"
ggplot2::autoplot(simulation, type = "rank")
ggplot2::autoplot(simulation, type = "points")
```

---

autoplot.ff_simulation_week

Automatically Plot ff_simulation Object

Description

Creates automatic plots for wins, ranks, or points for an ff_simulation object as created by ff_simulate().

Usage

```
autoplot.ff_simulation_week(object, type = c("luck", "points"), ...)

## S3 method for class 'ff_simulation_week'
plot(x, ..., type = c("luck", "points"), y)
```

Arguments

object	a ff_simulation object as created by ff_simulate()
type	one of "luck" or "points"
...	unused, required by autoplot generic
x	A ff_simulation_week object.
y	Ignored, required for compatibility with the plot() generic.

Details

Usage of this function/method requires the ggplot2 package and (for wins and points plots) the ggridges package.

Value

a ggplot object

See Also

vignette("basic") for example usage

Examples

```
simulation <- .ffs_cache("foureight_sim_week.rds")

ggplot2::autoplot(simulation) # default is type = "luck"
ggplot2::autoplot(simulation, type = "points")
```

---

espn_connect *Connect to a league*

Description

See ffscrapr::espn_connect() for details.

Value

a connection object to be used with ff_* functions

See Also

Other ffscrapr-imports: ff_connect(), ff_scoringhistory(), ff_starter_positions(), fleaflicker_connect(), mfl_connect(), sleeper_connect()

`ffs_adp_outcomes` *Connects ff_scoringhistory to past ADP rankings*

Description

The backbone of the ffsimulator resampling process is coming up with a population of weekly outcomes for every preseason positional rank. This function creates that dataframe by connecting historical FantasyPros.com rankings to nflfastR-based scoring data, as created by `ffscrapr::ff_scoringhistory()`.

Usage

```
ffs_adp_outcomes(
  scoring_history,
  gp_model = "simple",
  pos_filter = c("QB", "RB", "WR", "TE")
)
```

Arguments

`scoring_history`	a scoring history table as created by `ffscrapr::ff_scoringhistory()`
`gp_model`	either "simple" or "none" - simple uses the average games played per season for each position/adp combination, none assumes every game is played.
`pos_filter`	a character vector: filter the positions returned to these specific positions, default: c("QB","RB","WR","TE)

Value

a dataframe with position, rank, probability of games played, and a corresponding nested list per row of all week score outcomes.

See Also

`fp_rankings_history` for the included historical rankings

`fp_injury_table` for the historical injury table

`vignette("custom")` for usage details.

Examples

```
# cached data
scoring_history <- .ffs_cache("mfl_scoring_history.rds")

ffs_adp_outcomes(scoring_history, gp_model = "simple")
ffs_adp_outcomes(scoring_history, gp_model = "none")
```

`ffs_adp_outcomes_week` *Connects ff_scoringhistory to past ADP rankings*

Description

The backbone of the ffsimulator resampling process is coming up with a population of weekly outcomes for every inseason weekly rank. This function creates that dataframe by connecting historical FantasyPros.com rankings to nflfastR-based scoring data, as created by `ffscrapr::ff_scoringhistory()`.

Usage

```
ffs_adp_outcomes_week(scoring_history, pos_filter = c("QB", "RB", "WR", "TE"))
```

Arguments

`scoring_history`	a scoring history table as created by `ffscrapr::ff_scoringhistory()`
`pos_filter`	a character vector: filter the positions returned to these specific positions, default: c("QB","RB","WR","TE)

Value

a dataframe with position, rank, probability of games played, and a corresponding nested list per row of all week score outcomes.

See Also

`fp_rankings_history_week` for the included historical rankings

Examples

```
# cached data
scoring_history <- .ffs_cache("mfl_scoring_history.rds")
ffs_adp_outcomes_week(scoring_history, pos_filter = c("QB","RB","WR","TE"))
```

`ffs_build_schedules` *Generate fantasy schedules*

Description

This function generates random head to head schedules for a given number of seasons, teams, and weeks.

Usage

```
ffs_build_schedules(
  n_teams = NULL,
  n_seasons = 100,
  n_weeks = 14,
  franchises = NULL,
  seed = NULL
)
```

Arguments

`n_teams`	number of teams in simulation
`n_seasons`	number of seasons to simulate, default = 100
`n_weeks`	number of weeks per season, default = 14
`franchises`	optional: a dataframe of franchises as created by `ffs_franchises()` - overrides the `n_teams` argument and will attach actual franchise IDs to the schedule output.
`seed`	an integer to control reproducibility

Details

It starts with the circle method for round robin scheduling, grows or shrinks the schedule to match the required number of weeks, and then shuffles both the order that teams are assigned in and the order that weeks are generated. This doesn't "guarantee" unique schedules, but there are n_teams! x n_weeks! permutations of the schedule so it's very very likely that the schedules are unique (3x10^18 possible schedules for a 12 team league playing 13 weeks).

Value

a dataframe of schedules

See Also

`vignette("custom")` for example usage

Examples

```
ffs_build_schedules(n_teams = 12, n_seasons = 1, n_weeks = 14)
```

`ffs_copy_template` *Copy simulation template to filename*

Description

Creates a simulation template file with all of the components of ff_simulate, ready for tinkering!

Usage

```
ffs_copy_template(
  filename = "ff_simulation.R",
  template = c("season", "week"),
  overwrite = NULL
)
```

Arguments

`filename`	New file name, defaults to putting "ff_simulation.R" into your current directory
`template`	choice of template: one of "season" or "week"
`overwrite`	a logical (or NULL) - overwrite if existing file found?

Value

a success message signalling success/failure.

Examples

```
tmp <- tempfile()
ffs_copy_template(tmp)
```

`ffs_franchises` *Get Franchises*

Description

This function lightly wraps `ffscrapr::ff_franchises()` and adds league_id, which is a required column for ffsimulator.

Usage

```
ffs_franchises(conn)
```

Arguments

`conn`	a connection object as created by `ffscrapr::ff_connect()` and friends.

Value

a dataframe of franchises that includes the league_id column

See Also

vignette("Custom Simulations") for more detailed example usage

Examples

```
# cached examples
conn <- .ffs_cache("mfl_conn.rds")

ffs_franchises(conn)
```

`ffs_generate_projections` *Generate Projections*

Description

Runs the bootstrapped resampling of player week outcomes on the latest rankings and rosters for a given number of seasons and weeks per season.

Usage

```
ffs_generate_projections(
  adp_outcomes,
  latest_rankings,
  n_seasons = 100,
  weeks = 1:14,
  rosters = NULL
)
```

Arguments

adp_outcomes	a dataframe of adp-based weekly outcomes, as created by ffs_adp_outcomes()
latest_rankings	a dataframe of rankings, as created by ffs_latest_rankings()
n_seasons	number of seasons, default is 100
weeks	a numeric vector of weeks to simulate, defaults to 1:14
rosters	a dataframe of rosters, as created by ffs_rosters() - optional, reduces computation to just rostered players

Value

a dataframe of weekly scores for each player in the simulation, approximately of length n_seasons x n_weeks x latest_rankings

See Also

vignette("custom") for example usage

Examples

```
# cached examples
adp_outcomes <- .ffs_cache("adp_outcomes.rds")
latest_rankings <- .ffs_cache("latest_rankings.rds")

ffs_generate_projections(adp_outcomes, latest_rankings)
```

---

ffs_generate_projections_week

Generate Projections

Description

Runs the bootstrapped resampling of player week outcomes on the latest rankings and rosters for a given number of seasons and weeks per season.

Usage

```
ffs_generate_projections_week(
  adp_outcomes,
  latest_rankings,
  n = 1000,
  rosters = NULL
)
```

Arguments

adp_outcomes	a dataframe of adp-based weekly outcomes, as created by ffs_adp_outcomes()
latest_rankings	a dataframe of rankings, as created by ffs_latest_rankings()
n	number of weeks to simulate
rosters	a dataframe of rosters, as created by ffs_rosters() - optional, reduces computation to just rostered players

Value

a dataframe of weekly scores for each player in the simulation, approximately of length n_seasons x n_weeks x latest_rankings

See Also

vignette("custom") for example usage

Examples

```
# cached examples
adp_outcomes_week <- .ffs_cache("adp_outcomes_week.rds")
latest_rankings_week <- .ffs_cache("latest_rankings_week.rds")

ffs_generate_projections_week(adp_outcomes_week, latest_rankings_week)
```

---

ffs_latest_rankings *Download latest rankings from DynastyProcess GitHub*

Description

Fetches a copy of the latest FantasyPros redraft positional rankings data from DynastyProcess.com's data repository.

Usage

```
ffs_latest_rankings(type = c("draft", "week"))
```

Arguments

type	one of "draft" or "week" - controls whether to pull preseason or inseason rankings.

Details

If you have any issues with the output of this data, please open an issue in the DynastyProcess data repository.

Value

a dataframe with a copy of the latest FP rankings from DynastyProcess's data repository

See Also

https://github.com/dynastyprocess/data

vignette("custom") for example usage

Examples

```
ffs_latest_rankings()
```

---

ffs_optimise_lineups *Optimise Lineups*

Description

Calculates optimal lineups for all franchises in the dataframe based on a table of lineup constraints.

Usage

```
ffs_optimise_lineups(
  roster_scores,
  lineup_constraints,
  lineup_efficiency_mean = 0.775,
  lineup_efficiency_sd = 0.05,
  best_ball = FALSE,
  pos_filter = c("QB", "RB", "WR", "TE")
)

ffs_optimize_lineups(
  roster_scores,
  lineup_constraints,
```

```
  lineup_efficiency_mean = 0.775,
  lineup_efficiency_sd = 0.05,
  best_ball = FALSE,
  pos_filter = c("QB", "RB", "WR", "TE")
)
```

Arguments

roster_scores	a dataframe as generated by ffs_score_rosters() - should contain columns like: projected_score, pos, and player_id
lineup_constraints	a dataframe as generated by ffscrapr::ff_starter_positions() - should contain columns pos, min, max, and offense_starters
lineup_efficiency_mean	the average lineup efficiency to use, defaults to 0.775
lineup_efficiency_sd	the standard deviation of lineup efficiency, defaults to 0.05
best_ball	a logical: FALSE will apply a lineup efficiency factor and TRUE uses optimal scores as actual scores, default = FALSE
pos_filter	a character vector specifying which positions are eligible - defaults to c("QB","RB","WR","TE)

Details

Lineup efficiency is the percentage of optimal/best-ball score that is used as the actual score - by default, the lineup efficiency for a team in non-best-ball settings is normally distributed around a mean of 77.5% and a standard deviation of 5%.

Value

a dataframe of what each team scored for each week

See Also

vignette("custom") for example usage

Examples

```
# cached examples
roster_scores <- .ffs_cache("roster_scores.rds")
lineup_constraints <- .ffs_cache("mfl_lineup_constraints.rds")

ffs_optimise_lineups(roster_scores, lineup_constraints)
```

ffs_repeat_schedules *Repeat fantasy schedules*

Description

This function repeats an actual `ffs_schedule()` by the appropriate number of seasons.

Usage

```
ffs_repeat_schedules(actual_schedule, n_seasons)
```

Arguments

`actual_schedule`	a schedule retrieved by `ffs_schedule()`
`n_seasons`	number of seasons to simulate, default = 100

Value

a dataframe of schedules for the simulation

See Also

`vignette("Custom Simulations")` for example usage

Examples

```
# ffs_repeat_schedules(actual_schedule = x, n_seasons = 10)
```

ffs_rosters *Get Rosters*

Description

This function lightly wraps `ffscrapr::ff_rosters()` and adds fantasypros_id, which is a required column for ffsimulator.

Usage

```
ffs_rosters(conn)

## S3 method for class 'mfl_conn'
ffs_rosters(conn)

## S3 method for class 'sleeper_conn'
ffs_rosters(conn)

## S3 method for class 'flea_conn'
ffs_rosters(conn)

## S3 method for class 'espn_conn'
ffs_rosters(conn)
```

Arguments

conn	a connection object as created by `ffscrapr::ff_connect()` and friends.

Value

a dataframe of rosters that includes a fantasypros_id column

See Also

vignette("custom") for more detailed example usage

Examples

```
# cached examples
conn <- .ffs_cache("mfl_conn.rds")

ffs_rosters(conn)
```

---

ffs_schedule *Get Schedule*

Description

This function lightly wraps `ffscrapr::ff_schedule()` and adds league_id, which is a required column for ffsimulator, casts IDs to character, and drops actual games played so as to only simulate unplayed games.

Usage

```
ffs_schedule(conn)
```

Arguments

conn	a connection object as created by `ffscrapr::ff_connect()` and friends.

Value

a dataframe of schedule that includes the league_id column

See Also

vignette("Custom Simulations") for more detailed example usage

Examples

```
# cached examples
conn <- .ffs_cache("mfl_conn.rds")

ffs_schedule(conn)
```

---

ffs_score_rosters *Join Rosters to Projected Scores*

Description

Attaches projected scores to rosters (via an inner-join) and creates a positional ranking column.

Usage

```
ffs_score_rosters(projected_scores, rosters)
```

Arguments

projected_scores	a dataframe of projected scores, as created by `ffs_generate_projections()`
rosters	a dataframe of rosters, as created by `ffs_rosters()`

Value

A dataframe of roster-level projected scores

See Also

vignette("custom") for example usage

Examples

```
# cached examples
projected_scores <- .ffs_cache("projected_scores.rds")
rosters <- .ffs_cache("mfl_rosters.rds")

ffs_score_rosters(projected_scores, rosters)
```

`ffs_starter_positions` *Get league starter positions*

Description

This function lightly wraps `ffscrapr::ff_starter_positions()` and cleans up some abbreviations (PK -> K)

Usage

```
ffs_starter_positions(conn)
```

Arguments

conn	a connection object as created by `ffscrapr::ff_connect()` and friends.

Value

A tidy dataframe of positional lineup rules, one row per position with minimum and maximum starters as well as total starter calculations.

Examples

```
# cached examples
conn <- .ffs_cache("mfl_conn.rds")

ffs_starter_positions(conn)
```

`ffs_summarise_week` *Summarise simulation outputs*

Description

These functions are used to summarise the simulation outputs, typically by joining the optimal scores with a matching schedule.

Usage

```
ffs_summarise_week(optimal_scores, schedules)

ffs_summarise_season(summary_week)

ffs_summarise_simulation(summary_season)

ffs_summarise_inseason(summary_week, n)

ffs_summarize_week(optimal_scores, schedules)

ffs_summarize_season(summary_week)

ffs_summarize_simulation(summary_season)
```

Arguments

`optimal_scores`	a dataframe of optimized lineups as created by `ffs_optimize_lineups()`
`schedules`	a dataframe of schedules as created by `ffs_build_schedules()` or `ffs_actual_schedules()`
`summary_week`	a dataframe as created by `ffs_summarise_week()`
`summary_season`	a dataframe as created by `ffs_summarise_season()`
`n`	number of weeks

Value

ffs_summarise_week: a dataframe summarising team results by simulation week

ffs_summarise_season: a dataframe summarising franchise results across each simulation season

ffs_summarise_simulation: a dataframe summarising franchise results across the simulation

ffs_summarise_inseason: a dataframe summarising franchise results for the inseason simulation

See Also

`vignette("custom")` for example usage

Examples

```
# cached examples
optimal_scores <- .ffs_cache("optimal_scores.rds")
schedules <- .ffs_cache("schedules.rds")

summary_week <- ffs_summarise_week(optimal_scores, schedules)
summary_week
summary_season <- ffs_summarise_season(summary_week)
summary_season
summary_simulation <- ffs_summarise_simulation(summary_season)
summary_simulation
```

---

ff_connect *Connect to a league*

Description

See `ffscrapr::ff_connect()` for details.

Value

a connection object to be used with ff_* functions

See Also

Other ffscrapr-imports: `espn_connect()`, `ff_scoringhistory()`, `ff_starter_positions()`, `fleaflicker_connect()`, `mfl_connect()`, `sleeper_connect()`

---

ff_scoringhistory *Get league scoring history*

Description

See `ffscrapr::ff_scoringhistory` for details.

Value

A tidy dataframe of weekly fantasy scoring data, one row per player per week

See Also

Other ffscrapr-imports: `espn_connect()`, `ff_connect()`, `ff_starter_positions()`, `fleaflicker_connect()`, `mfl_connect()`, `sleeper_connect()`

`ff_simulate` *Simulate Fantasy Seasons*

Description

The main function of the package - uses bootstrap resampling to run fantasy football season simulations supported by historical rankings and nflfastR data, calculating optimal lineups, and returns aggregated results.

Usage

```
ff_simulate(
  conn,
  n_seasons = 100,
  n_weeks = 14,
  best_ball = FALSE,
  seed = NULL,
  gp_model = c("simple", "none"),
  base_seasons = 2012:2020,
  actual_schedule = FALSE,
  pos_filter = c("QB", "RB", "WR", "TE", "K"),
  verbose = getOption("ffsimulator.verbose", default = TRUE)
)
```

Arguments

`conn`	an connection to a league made with `ff_connect()` and friends (required)
`n_seasons`	number of seasons to simulate, default = 100
`n_weeks`	number of weeks per season, default = 14
`best_ball`	a logical: are weekly wins based on optimal lineups?
`seed`	an integer to control reproducibility
`gp_model`	select between "simple", "none" to apply a model for whether a player played in a given game, defaults to "simple"
`base_seasons`	a numeric vector that selects seasons as base data, earliest available is 2012
`actual_schedule`	a logical: use actual ff_schedule? default is FALSE
`pos_filter`	a character vector of positions to filter/run, default is c("QB","RB","WR","TE","K")
`verbose`	a logical: print status messages? default is TRUE, configure with options(ffsimulator.verbose)

Value

an `ff_simulation` object which can be passed to `plot()` and contains the output data from the simulation.

See Also

vignette("basic") for example usage

vignette("custom") for examples on using the subfunctions for your own processes.

Examples

```
conn <- mfl_connect(2021, 22627)
ff_simulate(conn, n_seasons = 25)
```

---

ff_simulate_week *Simulate Fantasy Week*

Description

This function simulates a single upcoming week using the same methodology as in the season-long simulation, ff_simulate().

Usage

```
ff_simulate_week(
  conn,
  n = 1000,
  best_ball = FALSE,
  seed = NULL,
  base_seasons = 2012:2020,
  actual_schedule = TRUE,
  pos_filter = c("QB", "RB", "WR", "TE", "K"),
  verbose = getOption("ffsimulator.verbose", default = TRUE)
)
```

Arguments

conn	an connection to a league made with ff_connect() and friends (required)
n	number of times to simulate the upcoming week, default is 1000
best_ball	a logical: are weekly wins based on optimal lineups?
seed	an integer to control reproducibility
base_seasons	a numeric vector that selects seasons as base data, earliest available is 2012
actual_schedule	a logical: use actual ff_schedule? default is TRUE
pos_filter	a character vector of positions to filter/run, default is c("QB","RB","WR","TE","K")
verbose	a logical: print status messages? default is TRUE, configure with options(ffsimulator.verbose)

Value

an ff_simulation object which can be passed to plot() and contains the output data from the simulation.

See Also

vignette("basic") for example usage

vignette("custom") for examples on using the subfunctions for your own processes.

Examples

```
conn <- mfl_connect(2021, 22627)
ff_simulate_week(conn, n = 1000, actual_schedule = TRUE)
```

---

ff_starter_positions *Get league starter positions*

Description

See ffscrapr::ff_starter_positions for details.

Value

A tidy dataframe of positional lineup rules, one row per position with minimum and maximum starters as well as total starter calculations.

See Also

Other ffscrapr-imports: espn_connect(), ff_connect(), ff_scoringhistory(), fleaflicker_connect(), mfl_connect(), sleeper_connect()

---

fleaflicker_connect *Connect to a league*

Description

See ffscrapr::fleaflicker_connect() for details.

Value

a connection object to be used with ff_* functions

See Also

Other ffscrapr-imports: espn_connect(), ff_connect(), ff_scoringhistory(), ff_starter_positions(), mfl_connect(), sleeper_connect()

---

fp_injury_table *FP injury table*

Description

This dataframe contains a column (prob_gp) for each positional ranking that describes the probability of a player with that preseason ADP playing in a given game. It is modelled from historical rankings data and the number of games played per season for a given positional rank.

Usage

```
fp_injury_table
```

Format

An object of class tbl_df (inherits from tbl, data.frame) with 692 rows and 3 columns.

---

fp_rankings_history *Historical draft position ranks*

Description

This dataframe has historical positional draft rankings for 2012-2020 QB/RB/WR/TE/PK and 2015-2020 DL/LB/DB, as gathered by the ffpros package.

Usage

```
fp_rankings_history
```

Format

An object of class tbl_df (inherits from tbl, data.frame) with 7503 rows and 10 columns.

`fp_rankings_history_week` *Historical position ranks*

Description

This dataframe has historical positional in-season rankings for 2012-2020 QB/RB/WR/TE/PK and 2015-2020 DL/LB/DB, as gathered by the ffpros package.

Usage

```
fp_rankings_history_week
```

Format

An object of class `tbl_df` (inherits from `tbl`, `data.frame`) with 76224 rows and 11 columns.

`mfl_connect` *Connect to a league*

Description

See `ffscrapr::mfl_connect()` for details.

Value

a connection object to be used with ff_* functions

See Also

Other ffscrapr-imports: `espn_connect()`, `ff_connect()`, `ff_scoringhistory()`, `ff_starter_positions()`, `fleaflicker_connect()`, `sleeper_connect()`

`sleeper_connect` *Connect to a league*

Description

See `ffscrapr::sleeper_connect()` for details.

Value

a connection object to be used with ff_* functions

See Also

Other ffscrapr-imports: `espn_connect()`, `ff_connect()`, `ff_scoringhistory()`, `ff_starter_positions()`, `fleaflicker_connect()`, `mfl_connect()`

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