

Package ‘Lahman’

April 26, 2022

Type Package

Title Sean 'Lahman' Baseball Database

Version 10.0-1

Date 2022-04-07

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Description Provides the tables from the 'Sean Lahman Baseball Database' as a set of R data.frames. It uses the data on pitching, hitting and fielding performance and other tables from 1871 through 2021, as recorded in the 2022 version of the database. Documentation examples show how many baseball questions can be investigated.

Language en-US

Depends R (>= 3.5.0)

Suggests lattice, ggplot2, googleVis, data.table, vcd, reshape2,
tidyr, knitr, rmarkdown, car

Imports dplyr

Encoding UTF-8

License GPL

URL <https://CRAN.R-project.org/package=Lahman>

LazyLoad yes

LazyData yes

LazyDataCompression xz

BugReports <https://github.com/cdalzell/Lahman/issues>

Repository CRAN

NeedsCompilation no

RoxygenNote 7.1.1

VignetteBuilder knitr

Date/Publication 2022-04-26 08:20:10 UTC

R topics documented:

Lahman-package	3
AllstarFull	5
Appearances	6
AwardsManagers	8
AwardsPlayers	10
AwardsShareManagers	11
AwardsSharePlayers	12
Batting	14
battingLabels	18
BattingPost	19
battingStats	21
CollegePlaying	22
Fielding	23
FieldingOF	25
FieldingOFsplit	27
FieldingPost	28
HallOfFame	30
HomeGames	33
Label	34
LahmanData	35
Managers	37
ManagersHalf	40
Parks	41
People	42
Pitching	44
PitchingPost	47
playerInfo	50
Salaries	51
Schools	53
SeriesPost	54
Teams	56
TeamsFranchises	61
TeamsHalf	62
Index	64

Description

This database contains pitching, hitting, and fielding statistics for Major League Baseball from 1871 through 2021. It includes data from the two current leagues (American and National), the four other "major" leagues (American Association, Union Association, Players League, and Federal League), and the National Association of 1871-1875.

This database was created by Sean Lahman, who pioneered the effort to make baseball statistics freely available to the general public. What started as a one man effort in 1994 has grown tremendously, and now a team of researchers have collected their efforts to make this the largest and most accurate source for baseball statistics available anywhere.

This database, in the form of an R package offers a variety of interesting challenges and opportunities for data processing and visualization in R.

In the current version, the examples make extensive use of the `dplyr` package for data manipulation (tabulation, queries, summaries, merging, etc.), reflecting the original relational database design and `ggplot2` for graphics.

Details

Package:	Lahman
Type:	Package
Version:	10.0-0
Date:	2022-04-07
License:	GPL version 2 or newer
LazyLoad:	yes
LazyData:	yes

The main form of this database is a relational database in Microsoft Access format. The design follows these general principles: Each player is assigned a unique code (`playerID`). All of the information in different tables relating to that player is tagged with his `playerID`. The `playerIDs` are linked to names and birthdates in the [People](#) table. Similar links exist among other tables via analogous `*ID` variables.

The database is composed of the following main tables:

[People](#) Player names, dates of birth, death and other biographical info

[Batting](#) batting statistics

[Pitching](#) pitching statistics

[Fielding](#) fielding statistics

A collection of other tables is also provided:

Teams:

Teams	yearly stats and standings
TeamsHalf	split season data for teams
TeamsFranchises	franchise information

Post-season play:

BattingPost	post-season batting statistics
PitchingPost	post-season pitching statistics
FieldingPost	post-season fielding data
SeriesPost	post-season series information

Awards:

AwardsManagers	awards won by managers
AwardsPlayers	awards won by players
AwardsShareManagers	award voting for manager awards
AwardsSharePlayers	award voting for player awards

Hall of Fame: links to People via hofID

HallofFame	Hall of Fame voting data
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Other tables:

[AllstarFull](#) - All-Star games appearances; [Managers](#) - managerial statistics; [FieldingOF](#) - out-field position data; [ManagersHalf](#) - split season data for managers; [Salaries](#) - player salary data; [Appearances](#) - data on player appearances; [Schools](#) - Information on schools players attended; [CollegePlaying](#) - Information on schools players attended, by player and year;

Variable label tables are provided for some of the tables:

[battingLabels](#), [pitchingLabels](#), [fieldingLabels](#)

Author(s)

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Maintainer: Chris Dalzell <cdalzell@gmail.com>

Source

Lahman, S. (2022) Lahman's Baseball Database, 1871-2021, Main page, <https://www.seanlahman.com/baseball-archive/statistics/>

`AllstarFull`*AllstarFull table*

Description

All Star appearances by players

Usage

```
data(AllstarFull)
```

Format

A data frame with 5454 observations on the following 8 variables.

`playerID` Player ID code

`yearID` Year

`gameNum` Game number (for years in which more than one game was played)

`gameID` Game ID code

`teamID` Team; a factor

`lgID` League; a factor with levels AL NL

`GP` Game played (zero if player did not appear in game)

`startingPos` If the player started, what position he played

Source

Lahman, S. (2022) Lahman's Baseball Database, 1871-2021, 2021 version, <https://www.seanlahman.com/baseball-archive/statistics/>

Examples

```
data(AllstarFull)

# find number of appearances by players in the All Star games
player_appearances <- with(AllstarFull, rev(sort(table(playerID))))

# How many All-Star players, in total?
length(player_appearances)

# density plot of the whole distribution
plot(density(player_appearances), main="Player appearances in All Star Games")
rug(jitter(player_appearances))

# who has played in more than 10 ASGs?
player_appearances[player_appearances > 10]
hist(player_appearances[player_appearances > 10])
```

```

# Hank Aaron's All-Star record:
subset(AllstarFull, playerID == "aaronha01")

# Years that Stan Musial played in the ASG:
with(AllstarFull, yearID[playerID == "musiast01"])

# Starting positions he played (NA means did not start)
with(AllstarFull, startingPos[playerID == "musiast01"])

# All-Star rosters from the 1966 ASG
subset(AllstarFull, gameID == "NLS196607120")

# All-Stars from the Washington Nationals
subset(AllstarFull, teamID == "WAS")

# Teams with the fewest All-Stars
rare <- names(which(table(AllstarFull$teamID) < 10))

# Records associated with the 'rare' teams:
# (There are a few teamID typos: can you spot them?)
subset(AllstarFull, teamID %in% rare)

```

Appearances

Appearances table

Description

Data on player appearances

Usage

`data(Appearances)`

Format

A data frame with 110423 observations on the following 21 variables.

`yearID` Year

`teamID` Team; a factor

`lgID` League; a factor with levels AA AL FL NL PL UA

`playerID` Player ID code

`G_all` Total games played

`GS` Games started

`G_batting` Games in which player batted

`G_defense` Games in which player appeared on defense

`G_p` Games as pitcher

G_c Games as catcher
G_1b Games as firstbaseman
G_2b Games as secondbaseman
G_3b Games as thirdbaseman
G_ss Games as shortstop
G_1f Games as leftfielder
G_cf Games as centerfielder
G_rf Games as right fielder
G_of Games as outfielder
G_dh Games as designated hitter
G_ph Games as pinch hitter
G_pr Games as pinch runner

Details

The Appearances table in the original version has some incorrect variable names. In particular, the 5th column is career_year.

Source

Lahman, S. (2022) Lahman's Baseball Database, 1871-2021, 2021 version, <https://www.seanlahman.com/baseball-archive/statistics/>

Examples

```
data(Appearances)
library("dplyr")
library("tidyr")

# Henry Aaron's last two years as a DH in Milwaukee
Appearances %>%
  filter(playerID == "aaronha01" & teamID == "ML4") %>%
  select(yearID:G_batting, G_of:G_ph) # subset variables

# Herb Washington, strictly a pinch runner for Oakland in 1974-5
Appearances %>%
  filter(playerID == "washihe01")

# A true utility player - Jerry Hairston, Jr.
Appearances %>%
  filter(playerID == "hairsje02")

# Appearances for the 1984 Cleveland Indians
Appearances %>%
  filter(teamID == "CLE" & yearID == 1984)

# Pete Rose's primary position each year of his career
Appearances %>%
```

```

filter(playerID == "rosepe01") %>%
group_by(yearID, teamID) %>%
gather(pos, G, G_1b:G_rf) %>%
filter(G == max(G)) %>%
select(yearID:G_all, pos, G) %>%
mutate(pos = substring(as.character(pos), 3, 4)) %>%
arrange(yearID, teamID)

# Most pitcher appearances each year since 1950
Appearances %>%
  filter(yearID >= 1950) %>%
  group_by(yearID) %>%
  summarise(maxPitcher = playerID[which.max(G_p)],
            maxAppear = max(G_p))

# Individuals who have played all 162 games since 1961
all162 <- Appearances %>%
  filter(yearID > 1960 & G_all == 162) %>%
  arrange(yearID, playerID) %>%
  select(yearID:G_all)
# Number of all-gamers by year (returns a vector)
table(all162$yearID)

# Players with most pinch hitting appearances in a year
Appearances %>%
  arrange(desc(G_ph)) %>%
  select(playerID, yearID, teamID, lgID, G_all, G_ph) %>%
  head(., 10)

# Players with most pinch hitting appearances, career
Appearances %>%
  group_by(playerID) %>%
  select(playerID, G_all, G_ph) %>%
  summarise(G = sum(G_all), PH = sum(G_ph)) %>%
  arrange(desc(PH)) %>%
  head(., 10)

# Players with most career appearances at each position
Appearances %>%
  select(playerID, G_c:G_rf) %>%
  rename(C = G_c, `1B` = G_1b, `2B` = G_2b, SS = G_ss,
        `3B` = G_3b, LF = G_lf, CF = G_cf, RF = G_rf) %>%
  gather(pos, G, C:RF) %>%
  group_by(pos, playerID) %>%
  summarise(G = sum(G)) %>%
  arrange(desc(G)) %>%
  do(head(., 1))

```

Description

Award information for managers awards

Usage

```
data(AwardsManagers)
```

Format

A data frame with 179 observations on the following 6 variables.

playerID Manager (player) ID code
awardID Name of award won
yearID Year
lgID League; a factor with levels AL NL
tie Award was a tie (Y or N)
notes Notes about the award

Source

Lahman, S. (2022) Lahman's Baseball Database, 1871-2021, 2021 version, <https://www.seanlahman.com/baseball-archive/statistics/>

Examples

```
# Post-season managerial awards

# Number of recipients of each award by year
with(AwardsManagers, table(yearID, awardID))

# 1996 award winners
subset(AwardsManagers, yearID == 1996)

# AL winners of the BBWAA managerial award
subset(AwardsManagers, awardID == "BBWAA Manager of the year" &
       lgID == "AL")

# Tony LaRussa's manager of the year awards
subset(AwardsManagers, playerID == "larusto01")
```

AwardsPlayers	<i>AwardsPlayers table</i>
---------------	----------------------------

Description

Award information for players awards

Usage

```
data(AwardsPlayers)
```

Format

A data frame with 6531 observations on the following 6 variables.

```
playerID Player ID code
awardID Name of award won
yearID Year
lgID League; a factor with levels AA AL ML NL
tie Award was a tie (Y or N)
notes Notes about the award
```

Source

Lahman, S. (2022) Lahman's Baseball Database, 1871-2021, 2021 version, <https://www.seanlahman.com/baseball-archive/statistics/>

Examples

```
data(AwardsPlayers)
# Which awards have been given and how many?
with(AwardsPlayers, table(awardID))
awardtab <- with(AwardsPlayers, table(awardID))

# Plot the awardtab table as a Cleveland dot plot
library("lattice")
dotplot(awardtab)

# Restrict to MVP awards
mvp <- subset(AwardsPlayers, awardID == "Most Valuable Player")
# Who won in 1994?
mvp[mvp$yearID == 1994L, ]

goldglove <- subset(AwardsPlayers, awardID == "Gold Glove")
# which players won most often?
GGcount <- table(goldglove$playerID)
GGcount[GGcount>10]
```

```
# Triple Crown winners
subset(AwardsPlayers, awardID == "Triple Crown")

# Simultaneous Triple Crown and MVP winners
# (compare merged file to TC)
TC <- subset(AwardsPlayers, awardID == "Triple Crown")
MVP <- subset(AwardsPlayers, awardID == "Most Valuable Player")
keepvars <- c("playerID", "yearID", "lgID.x")
merge(TC, MVP, by = c("playerID", "yearID"))[,keepvars]
```

AwardsShareManagers *AwardsShareManagers table*

Description

Award voting for managers awards

Usage

```
data(AwardsShareManagers)
```

Format

A data frame with 425 observations on the following 7 variables.

awardID name of award votes were received for

yearID Year

lgID League; a factor with levels AL NL

playerID Manager (player) ID code

pointsWon Number of points received

pointsMax Maximum number of points possible

votesFirst Number of first place votes

Source

Lahman, S. (2021) Lahman's Baseball Database, 1871-2021, 2021 version, <https://www.seanlahman.com/baseball-archive/statistics/>

Examples

```

# Voting for the BBWAA Manager of the Year award by year and league

require("dplyr")

# Sort in decreasing order of points by year and league
AwardsShareManagers %>%
  group_by(yearID, lgID) %>%
  arrange(desc(pointsWon))

# Any unanimous winners?
AwardsShareManagers %>%
  filter(pointsWon == pointsMax)

# Manager with highest proportion of possible points
AwardsShareManagers %>%
  mutate(propWon = pointsWon/pointsMax) %>%
  arrange(desc(propWon)) %>%
  head(., 1)

# Bobby Cox's MOY vote tallies
AwardsShareManagers %>%
  filter(playerID == "coxbo01")

```

AwardsSharePlayers *AwardsSharePlayers table*

Description

Award voting for managers awards

Usage

```
data(AwardsSharePlayers)
```

Format

A data frame with 6879 observations on the following 7 variables.

awardID name of award votes were received for

yearID Year

lgID League; a factor with levels AL ML NL

playerID Player ID code

pointsWon Number of points received

pointsMax Maximum number of points possible

votesFirst Number of first place votes

Source

Lahman, S. (2022) Lahman's Baseball Database, 1871-2021, 2021 version, <https://www.seanlahman.com/baseball-archive/statistics/>

Examples

```
# Vote tallies for post-season player awards

require("dplyr")

# Which awards are represented in this data frame?
unique(AwardsSharePlayers$awardID)

# Sort the votes for the Cy Young award in decreasing order.
# Until 1967, the award went to the best pitcher
# in both leagues.

cyvotes <- AwardsSharePlayers %>%
  filter(awardID == "Cy Young") %>%
  group_by(yearID, lgID) %>%
  arrange(desc(pointsWon))

# 2012 votes
subset(cyvotes, yearID == 2012)

# top three votegetters each year by league

cya_top3 <- cyvotes %>%
  group_by(yearID, lgID) %>%
  do(head(., 3))
head(cya_top3, 12)

# unanimous Cy Young winners
subset(cyvotes, pointsWon == pointsMax)

## CYA was a major league award until 1967
# Find top five pitchers with most top 3 vote tallies in CYA
# head(with(cya_top3, rev(sort(table(playerID))))), 5)

# Pre-1967
cya_top3 %>%
  filter(yearID <= 1966) %>%
  group_by(playerID) %>%
  summarise(yrs_top3 = n()) %>%
  arrange(desc(yrs_top3)) %>%
  head(., 2)

# 1967+ (both leagues)
cya_top3 %>%
  filter(yearID > 1966) %>%
  group_by(playerID) %>%
  summarise(yrs_top3 = n()) %>%
```

```

    arrange(desc(yrs_top3)) %>%
    head(., 5)

# 1967+ (by league)
cya_top3 %>%
  filter(yearID > 1966) %>%
  group_by(playerID, lgID) %>%
  summarise(yrs_top3 = n()) %>%
  arrange(desc(yrs_top3)) %>%
  head(., 5)

# Ditto for MVP awards
# Top 3 votegetters for MVP award by year and league
MVP_top3 <- AwardsSharePlayers %>%
  filter(awardID == "MVP") %>%
  group_by(yearID, lgID) %>%
  arrange(desc(pointsWon)) %>%
  do(head(., 3))
tail(MVP_top3)

## Select players with >= 7 top 3 finishes
MVP_top3 %>%
  group_by(playerID) %>%
  summarise(n_top3 = n()) %>%
  arrange(desc(n_top3)) %>%
  filter(n_top3 > 6)

```

 Batting

Batting table

Description

Batting table - batting statistics

Usage

```
data(Batting)
```

Format

A data frame with 110495 observations on the following 22 variables.

playerID Player ID code

yearID Year

stint player's stint (order of appearances within a season)

teamID Team; a factor

lgID League; a factor with levels AA AL FL NL PL UA

G Games: number of games in which a player played
AB At Bats
R Runs
H Hits: times reached base because of a batted, fair ball without error by the defense
X2B Doubles: hits on which the batter reached second base safely
X3B Triples: hits on which the batter reached third base safely
HR Homeruns
RBI Runs Batted In
SB Stolen Bases
CS Caught Stealing
BB Base on Balls
SO Strikeouts
IBB Intentional walks
HBP Hit by pitch
SH Sacrifice hits
SF Sacrifice flies
GIDP Grounded into double plays

Details

Variables X2B and X3B are named 2B and 3B in the original database

Source

Lahman, S. (2022) Lahman's Baseball Database, 1871-2021, 2021 version, <https://www.seanlahman.com/baseball-archive/statistics/>

See Also

[battingStats](#) for calculating batting average (BA) and other derived statistics
[baseball](#) for a similar dataset, but a subset of players who played 15 or more seasons.
[Baseball](#) for data on batting in the 1987 season.

Examples

```
data(Batting)
head(Batting)
require("dplyr")

## Prelude: Extract information from Salaries and People
## to be merged with the batting data.

# Subset of Salaries data
salaries <- Salaries %>%
  select(playerID, yearID, teamID, salary)
```

```

# Subset of People table (player metadata)
peopleInfo <- People %>%
  select(playerID, birthYear, birthMonth, nameLast,
         nameFirst, bats)

# Left join salaries and peopleInfo to batting data,
# create an age variable and sort by playerID, yearID and stint
# Returns an ignorable warning.
batting <- battingStats() %>%
  left_join(salaries,
           by =c("playerID", "yearID", "teamID")) %>%
  left_join(peopleInfo, by = "playerID") %>%
  mutate(age = yearID - birthYear -
         1L *(birthMonth >= 10)) %>%
  arrange(playerID, yearID, stint)

## Generate a ggplot similar to the NYT graph in the story about Ted
## Williams and the last .400 MLB season
# http://www.nytimes.com/interactive/2011/09/18/sports/baseball/WILLIAMS-GRAPHIC.html

# Restrict the pool of eligible players to the years after 1899 and
# players with a minimum of 450 plate appearances (this covers the
# strike year of 1994 when Tony Gwynn hit .394 before play was suspended
# for the season - in a normal year, the minimum number of plate appearances is 502)

eligibleHitters <- batting %>%
  filter(yearID >= 1900 & PA > 450)

# Find the hitters with the highest BA in MLB each year (there are a
# few ties). Include all players with BA > .400, whether they
# won a batting title or not, and add an indicator variable for
# .400 average in a season.

topHitters <- eligibleHitters %>%
  group_by(yearID) %>%
  filter(BA == max(BA) | BA >= .400) %>%
  mutate(ba400 = BA >= 0.400) %>%
  select(playerID, yearID, nameLast,
         nameFirst, BA, ba400)

# Sub-data frame for the .400 hitters plus the outliers after 1950
# (averages above .380) - used to produce labels in the plot below
bignames <- topHitters %>%
  filter(ba400 | (yearID > 1950 & BA > 0.380)) %>%
  arrange(desc(BA))

# Variable to provide a vertical offset to certain
# labels in the ggplot below
bignames$yoffset <- c(0, 0, 0, 0, 0.002, 0, 0, 0,
                    0.001, -0.001, 0, -0.002, 0, 0,
                    0.002, 0, 0)

```

```

# Produce the plot

require("ggplot2")
ggplot(topHitters, aes(x = yearID, y = BA)) +
  geom_point(aes(colour = ba400), size = 2.5) +
  geom_hline(yintercept = 0.400, size = 1, colour = "gray70") +
  geom_text(data = bignames, aes(y = BA + yoffset,
                                label = nameLast,
                                size = 3, hjust = 1.2)) +
  scale_colour_manual(values = c("FALSE" = "black", "TRUE" = "red")) +
  xlim(1899, 2015) +
  xlab("Year") +
  scale_y_continuous("Batting average",
                    limits = c(0.330, 0.430),
                    breaks = seq(0.34, 0.42, by = 0.02),
                    labels = c(".340", ".360", ".380", ".400", ".420")) +
  geom_smooth() +
  theme(legend.position = "none")

#####
# after Chris Green,
# http://sabr.org/research/baseball-s-first-power-surge-home-runs-late-19th-century-major-leagues

# Total home runs by year
totalHR <- Batting %>%
  group_by(yearID) %>%
  summarise(HomeRuns = sum(as.numeric(HR), na.rm=TRUE),
            Games = sum(as.numeric(G), na.rm=TRUE))

# Plot HR by year, pre-1919 (dead ball era)
totalHR %>% filter(yearID <= 1918) %>%
  ggplot(., aes(x = yearID, y = HomeRuns)) +
  geom_line() +
  geom_point() +
  labs(x = "Year", y = "Home runs hit")

# Take games into account
totalHR %>% filter(yearID <= 1918) %>%
  ggplot(., aes(x = yearID, y = HomeRuns/Games)) +
  geom_line() +
  geom_point() +
  labs(x = "Year", y = "Home runs per game played")

# Widen perspective to all years from 1871
ggplot(totalHR, aes(x = yearID, y = HomeRuns)) +
  geom_point() +
  geom_path() +
  geom_smooth() +
  labs(x = "Year", y = "Home runs hit")

# Similar plot for HR per game played by year -
# shows several eras with spikes in HR hit
ggplot(totalHR, aes(x = yearID, y = HomeRuns/Games)) +

```

```
geom_point() +
geom_path() +
geom_smooth(se = FALSE) +
labs(x = "Year", y = "Home runs per game played")
```

battingLabels

Variable Labels

Description

These data frames provide descriptive labels for the variables in the [Batting](#), [Pitching](#) and [Fielding](#) files (and related *Post files). They are useful for plots and other output using [Label](#).

Usage

```
data(battingLabels)

data(fieldingLabels)

data(pitchingLabels)
```

Format

Each is data frame with observations on the following 2 variables.

```
variable variable name
label variable label
```

See Also

[Label](#)

Examples

```
data(battingLabels)
str(battingLabels)

require("dplyr")

# find and plot maximum number of homers per year
batHR <- Batting %>%
  filter(!is.na(HR)) %>%
  group_by(yearID) %>%
  summarise(max=max(HR))

with(batHR, {
  plot(yearID, max,
```

```
      xlab=Label("yearID"), ylab=paste("Maximum", Label("HR")),
      cex=0.8)
  lines(lowess(yearID, max), col="blue", lwd=2)
  abline(lm(max ~ yearID), col="red", lwd=2)
})
```

BattingPost

BattingPost table

Description

Post season batting statistics

Usage

```
data(BattingPost)
```

Format

A data frame with 15879 observations on the following 22 variables.

yearID Year
round Level of playoffs
playerID Player ID code
teamID Team
lgID League; a factor with levels AA AL NL
G Games
AB At Bats
R Runs
H Hits
X2B Doubles
X3B Triples
HR Homeruns
RBI Runs Batted In
SB Stolen Bases
CS Caught stealing
BB Base on Balls
SO Strikeouts
IBB Intentional walks
HBP Hit by pitch
SH Sacrifices
SF Sacrifice flies
GIDP Grounded into double plays

Details

Variables X2B and X3B are named 2B and 3B in the original database

Source

Lahman, S. (2022) Lahman's Baseball Database, 1871-2021, 2021 version, <https://www.seanlahman.com/baseball-archive/statistics/>

Examples

```
# Post-season batting data
# Requires care since intra-league playoffs have evolved since 1969
# Simplest case: World Series

require("dplyr")

# Create a sub-data frame for modern World Series play
ws <- BattingPost %>%
  filter(round == "WS" & yearID >= 1903) %>%
  mutate(BA = 0 + (AB > 0) * round(H/AB, 3),
         TB = H + X2B + 2 * X3B + 3 * HR,
         SA = 0 + (AB > 0) * round(TB/AB, 3),
         PA = AB + BB + IBB + HBP + SH + SF,
         OB = H + BB + IBB + HBP,
         OBP = 0 + (AB > 0) * round(OB/PA, 3) )

# Players with most appearances in the WS:
ws %>% group_by(playerID) %>%
  summarise(appearances = n()) %>%
  arrange(desc(appearances)) %>%
  head(., 10)

# Non-Yankees with most WS appearances
ws %>% filter(teamID != "NYA") %>%
  group_by(playerID) %>%
  summarise(appearances = n()) %>%
  arrange(desc(appearances)) %>%
  head(., 10)

# Top ten single WS batting averages ( >= 10 AB )
ws %>% filter(AB > 10) %>%
  arrange(desc(BA)) %>%
  head(., 10)

# Top ten slugging averages in a single WS
ws %>% filter(AB > 10) %>%
  arrange(desc(SA)) %>%
  head(., 10)

# Hitting stats for the 1946 St. Louis Cardinals, ordered by BA
```

```
ws %>%
  filter(teamID == "SLN" & yearID == 1946) %>%
  arrange(desc(BA))

# Babe Ruth's WS profile
ws %>%
  filter(playerID == "ruthba01") %>%
  arrange(yearID)
```

battingStats	<i>Calculate additional batting statistics</i>
--------------	--

Description

The `Batting` does not contain batting statistics derived from those present in the data.frame. This function calculates batting average (BA), plate appearances (PA), total bases (TB), slugging percentage (SlugPct), on-base percentage (OBP), on-base percentage + slugging (OPS), and batting average on balls in play (BABIP) for each record in a Batting-like data.frame.

Usage

```
battingStats(data = Lahman::Batting,
             idvars = c("playerID", "yearID", "stint", "teamID", "lgID"),
             cbind = TRUE)
```

Arguments

data	input data, typically <code>Batting</code>
idvars	ID variables to include in the output data.frame
cbind	If TRUE, the calculated statistics are appended to the input data as additional columns

Details

Standard calculations, e.g., $BA \leftarrow H/AB$ are problematic because of the presence of NAs and zeros. This function tries to deal with those problems.

Value

A data.frame with all the observations in data. If `cbind==FALSE`, only the idvars and the calculated variables are returned.

Author(s)

Michael Friendly, Dennis Murphy

See Also

[Batting](#), [BattingPost](#)

Examples

```
bstats <- battingStats()
str(bstats)
bstats <- battingStats(cbind=FALSE)
str(bstats)
```

CollegePlaying	<i>CollegePlaying table</i>
----------------	-----------------------------

Description

Information on schools players attended, by player

Usage

```
data(CollegePlaying)
```

Format

A data frame with 17350 observations on the following 3 variables.

```
playerID Player ID code
schoolID school ID code
yearID Year player attended school
```

Details

This data set reflects a change in the Lahman schema for the 2015 version. The old SchoolsPlayers table was replaced with this new table called CollegePlaying.

According to the documentation, this change reflects advances in the compilation of this data, largely led by Ted Turocy. The old table reported college attendance for major league players by listing a start date and end date. The new version has a separate record for each year that a player attended. This allows us to better account for players who attended multiple colleges or skipped a season, as well as to identify teammates.

Source

Lahman, S. (2022) Lahman's Baseball Database, 1871-2021, 2021 version, <https://www.seanlahman.com/baseball-archive/statistics/>

Examples

```

data(CollegePlaying)
head(CollegePlaying)

## Q: What are the top universities for producing MLB players?
SPcount <- table(CollegePlaying$schoolID)
SPcount[SPcount>50]

library("lattice")
dotplot(SPcount[SPcount>50])
dotplot(sort(SPcount[SPcount>50]))

## Q: How many schools are represented in this dataset?
length(table(CollegePlaying$schoolID))

# Histogram of the number of players from each school who played in MLB:
with(CollegePlaying,
      hist(table(schoolID), xlab = "Number of players",
             main = ""))

```

Fielding

Fielding table

Description

Fielding table

Usage

```
data(Fielding)
```

Format

A data frame with 147080 observations on the following 18 variables.

playerID Player ID code
yearID Year
stint player's stint (order of appearances within a season)
teamID Team; a factor
lgID League; a factor with levels AA AL FL NL PL UA
POS Position
G Games
GS Games Started
InnOuts Time played in the field expressed as outs
PO Putouts

A Assists
 E Errors
 DP Double Plays
 PB Passed Balls (by catchers)
 WP Wild Pitches (by catchers)
 SB Opponent Stolen Bases (by catchers)
 CS Opponents Caught Stealing (by catchers)
 ZR Zone Rating

Source

Lahman, S. (2022) Lahman's Baseball Database, 1871-2021, 2021 version, <https://www.seanlahman.com/baseball-archive/statistics/>

Examples

```
data(Fielding)
# Basic fielding data

require("dplyr")

# Roberto Clemente's fielding profile
# pitching and catching related data removed
# subset(Fielding, playerID == "clemero01")[, 1:13]
Fielding %>%
  filter(playerID == "clemero01") %>%
  select(1:13)

# Yadier Molina's fielding profile
# PB, WP, SP and CS apply to catchers
Fielding %>%
  subset(playerID == "molinya01") %>%
  select(-WP, -ZR)

# Pedro Martinez's fielding profile
Fielding %>% subset(playerID == "martipe02")

# Table of games played by Pete Rose at different positions
with(subset(Fielding, playerID == "rosepe01"), xtabs(G ~ POS))

# Career total G/PO/A/E/DP for Luis Aparicio
Fielding %>%
  filter(playerID == "aparilu01") %>%
  select(G, PO, A, E, DP) %>%
  summarise_each(funs(sum))

# Top ten 2B/SS in turning DPs
Fielding %>%
```

```

subset(POS %in% c("2B", "SS")) %>%
group_by(playerID) %>%
summarise(TDP = sum(DP, na.rm = TRUE)) %>%
arrange(desc(TDP)) %>%
head(., 10)

# League average fielding statistics, 1961-present
Fielding %>%
filter(yearID >= 1961 & POS != "DH") %>%
select(yearID, lgID, POS, InnOuts, PO, A, E) %>%
group_by(yearID, lgID) %>%
summarise_at(vars(InnOuts, PO, A, E), funs(sum), na.rm = TRUE) %>%
mutate(fpct = round( (PO + A)/(PO + A + E), 3),
       OPE = round(InnOuts/E, 3))

```

FieldingOF

FieldingOF table

Description

Outfield position data: information about positions played in the outfield

Usage

```
data(FieldingOF)
```

Format

A data frame with 12028 observations on the following 6 variables.

playerID Player ID code

yearID Year

stint player's stint (order of appearances within a season)

GlF Games played in left field

GcF Games played in center field

GrF Games played in right field

Source

Lahman, S. (2022) Lahman's Baseball Database, 1871-2021, 2021 version, <https://www.seanlahman.com/baseball-archive/statistics/>

Examples

```

require("dplyr")
require("tidyr")

## Data set only goes through 1955
## Can get a more complete record from the Fielding data frame
## or from the Appearances data (see below)

## Output directly from the FieldingOF data

## Barry Bonds (no records: post-1955 player)
FieldingOF %>%
  filter(playerID == "bondsba01")

## Willie Mays (first few years)
FieldingOF %>%
  filter(playerID == "mayswi01")

## Ty Cobb (complete)
FieldingOF %>%
  filter(playerID == "cobbt01")

## One way to get OF game information from the Fielding data
## Note: OF games != sum(LF, CF, RF) because players can switch
## OF positions within a game. Players can also switch from
## other positions to outfield during a game. OF represents
## the number of games a player started in the outfield.
Fielding %>%
  select(playerID, yearID, stint, POS, G) %>%
  filter(POS %in% c("LF", "CF", "RF", "OF")) %>%
  tidyr::spread(POS, G, fill = 0) %>%
  filter(playerID == "trumbma01")

## Another way is through the Appearances data (no stint).
## Provides a somewhat nicer table than the above.

## Mark Trumbo (active player)
Appearances %>%
  select(playerID, yearID, G_1f, G_cf, G_rf, G_of) %>%
  filter(playerID == "trumbma01")

## A slightly better format, perhaps
Appearances %>%
  select(playerID, yearID, G_1f, G_cf, G_rf, G_of) %>%
  rename(LF = G_1f, CF = G_cf, RF = G_rf, OF = G_of) %>%
  filter(playerID == "trumbma01")

## Willie Mays (1951-1973)
Appearances %>%
  select(playerID, yearID, G_1f, G_cf, G_rf, G_of) %>%
  filter(playerID == "mayswi01")

```

```
## Joe DiMaggio (1936-1951)
Appearances %>%
  select(playerID, yearID, G_1f, G_cf, G_rf, G_of) %>%
  filter(playerID == "dimagjo01")
```

FieldingOFsplit	<i>FieldingOFsplit table</i>
-----------------	------------------------------

Description

Outfield position data: information about positions played in the outfield

Usage

```
data(FieldingOF)
```

Format

A data frame with 34563 observations on the following 18 variables.

playerID Player ID code
yearID Year
stint player's stint (order of appearances within a season)
teamID Team; a factor
lgID League; a factor with levels AA AL FL NL PL UA
POS Position
G Games
GS Games Started
Inn0uts Time played in the field expressed as outs
PO Putouts
A Assists
E Errors
DP Double Plays
PB Passed Balls (by catchers)
WP Wild Pitches (by catchers)
SB Opponent Stolen Bases (by catchers)
CS Opponents Caught Stealing (by catchers)
ZR Zone Rating

Source

Lahman, S. (2022) Lahman's Baseball Database, 1871-2021, 2021 version, <https://www.seanlahman.com/baseball-archive/statistics/>

Examples

```

require("dplyr")
require("tidyr")

## Data set starts in 1954
## Can get a more complete record from the Fielding data frame
## or from the Appearances data (see below)

## Output directly from the FieldingOFsplit data

## Joe DiMaggio (no records: pre-1954 player)
FieldingOFsplit %>%
  filter(playerID == "dimagjo01")

## Willie Mays (all but his first few years)
FieldingOF %>%
  filter(playerID == "mayswi01")

## Mike Trout (complete)
FieldingOF %>%
  filter(playerID == "troutmi01")

```

FieldingPost

FieldingPost data

Description

Post season fielding data

Usage

```
data(FieldingPost)
```

Format

A data frame with 15063 observations on the following 17 variables.

playerID Player ID code

yearID Year

teamID Team; a factor

lgID League; a factor with levels AL NL

round Level of playoffs

POS Position

G Games

GS Games Started

InnOuts Time played in the field expressed as outs

PO Putouts
 A Assists
 E Errors
 DP Double Plays
 TP Triple Plays
 PB Passed Balls
 SB Stolen Bases allowed (by catcher)
 CS Caught Stealing (by catcher)

Source

Lahman, S. (2022) Lahman's Baseball Database, 1871-2021, 2021 version, <https://www.seanlahman.com/baseball-archive/statistics/>

Examples

```
require("dplyr")

## World Series fielding record for Yogi Berra
FieldingPost %>%
  filter(playerID == "berrayo01" & round == "WS")

## Yogi's career efficiency in throwing out base stealers
## in his WS appearances and CS as a percentage of his
## overall assists
FieldingPost %>%
  filter(playerID == "berrayo01" & round == "WS" & POS == "C") %>%
  summarise(cs_pct = round(100 * sum(CS)/sum(SB + CS), 2),
            cs_assists = round(100 * sum(CS)/sum(A), 2))

## Innings per error for several selected shortstops in the WS
FieldingPost %>%
  filter(playerID %in% c("belanma01", "jeterde01", "campabe01",
                       "conceda01", "bowala01"), round == "WS") %>%
  group_by(playerID) %>%
  summarise(G = sum(G),
            InnOuts = sum(InnOuts),
            Eper9 = round(27 * sum(E)/sum(InnOuts), 3))

## Top 10 center fielders in innings played in the WS
FieldingPost %>%
  filter(POS == "CF" & round == "WS") %>%
  group_by(playerID) %>%
  summarise(inn_total = sum(InnOuts)) %>%
  arrange(desc(inn_total)) %>%
  head(., 10)

## Most total chances by position
FieldingPost %>%
```

```

filter(round == "WS" & !(POS %in% c("DH", "OF", "P"))) %>%
group_by(POS, playerID) %>%
summarise(TC = sum(P0 + A + E)) %>%
arrange(desc(TC)) %>%
do(head(., 1)) # provides top player by position

```

HallOfFame

Hall of Fame Voting Data

Description

Hall of Fame table. This is composed of the voting results for all candidates nominated for the Baseball Hall of Fame.

Usage

```
data(HallOfFame)
```

Format

A data frame with 4191 observations on the following 9 variables.

playerID Player ID code

yearID Year of ballot

votedBy Method by which player was voted upon. See Details

ballots Total ballots cast in that year

needed Number of votes needed for selection in that year

votes Total votes received

inducted Whether player was inducted by that vote or not (Y or N)

category Category of candidate; a factor with levels Manager Pioneer/Executive Player Umpire

needed_note Explanation of qualifiers for special elections

Details

This table links to the [People](#) table via the playerID.

votedBy: Most Hall of Fame inductees have been elected by the Baseball Writers Association of America (BBWAA). Rules for election are described in https://en.wikipedia.org/wiki/National_Baseball_Hall_of_Fame_and_Museum#Selection_process.

Source

Lahman, S. (2022) Lahman's Baseball Database, 1871-2021, 2021 version, <https://www.seanlahman.com/baseball-archive/statistics/>

Examples

```
## Some examples for Hall of Fame induction data

require("dplyr")
require("ggplot2")

#####
## Some simple queries

# What are the different types of HOF voters?
table(HallOfFame$votedBy)

# What was the first year of Hall of Fame elections?
sort(unique(HallOfFame$yearID))[1]
# Who comprised the original class?
subset(HallOfFame, yearID == 1936 & inducted == "Y")

# Result of a player's last year on the BBWAA ballot
# Restrict to players voted by BBWAA:
HOFplayers <- subset(HallOfFame,
                     votedBy == "BBWAA" & category == "Player")

# Number of years as HOF candidate, last pct vote, etc.
# for a given player
playerOutcomes <- HallOfFame %>%
  filter(votedBy == "BBWAA" & category == "Player") %>%
  group_by(playerID) %>%
  mutate(nyears = length(ballots)) %>%
  arrange(yearID) %>%
  do(tail(., 1)) %>%
  mutate(lastPct = 100 * round(votes/ballots, 3)) %>%
  select(playerID, nyears, inducted, lastPct, yearID) %>%
  rename(lastYear = yearID)

#####
# How many voting years until election?
inducted <- subset(playerOutcomes, inducted == "Y")
table(inducted$nyears)

# Bar chart of years to induction for inductees
barplot(table(inducted$nyears),
        main="Number of voting years until election",
        ylab="Number of players", xlab="Years")
box()

# What is the form of this distribution?
require("vcd")
goodfit(inducted$nyears)
plot(goodfit(inducted$nyears), xlab="Number of years",
     main="Poissonness plot of number of years voting until election")
```

```

Ord_plot(table(inducted$nyears), xlab="Number of years")

# First ballot inductees sorted by vote percentage:
playerOutcomes %>%
  filter(nyears == 1L & inducted == "Y") %>%
  arrange(desc(lastPct))

# Who took at least ten years on the ballot before induction?
playerOutcomes %>%
  filter(nyears >= 10L & inducted == "Y")

#####
## Plots of voting percentages over time for the borderline
## HOF candidates, according to the BBWAA:

# Identify players on the BBWAA ballot for at least 10 years
# Returns a character vector of playerIDs
longTimers <- as.character(unlist(subset(playerOutcomes,
                                       nyears >= 10, select = "playerID"))))

# Extract their information from the HallOfFame data
HOF1t <- HallOfFame %>%
  filter(playerID %in% longTimers & votedBy == "BBWAA") %>%
  group_by(playerID) %>%
  mutate(elected = ifelse(any(inducted == "Y"),
                           "Elected", "Not elected"),
         pct = 100 * round(votes/ballots, 3))

# Plot the voting profiles:
ggplot(HOF1t, aes(x = yearID, y = pct,
                 group = playerID)) +
  ggtitle("Profiles of BBWAA voting percentage, long-time HOF candidates") +
  geom_line() +
  geom_hline(yintercept = 75, colour = 'red') +
  labs(x = "Year", y = "Percentage of votes") +
  facet_wrap(~ elected, ncol = 1)

## Eventual inductees tend to have increasing support over time.
## Fit simple linear regression models to each player's voting
## percentage profile and extract the slopes. Then compare the
## distributions of the slopes in each group.

# data frame for playerID and induction status among
# long term candidates
HOFstatus <- HOF1t %>%
  group_by(playerID) %>%
  select(playerID, elected, inducted) %>%
  do(tail(., 1))

# data frame of regression slopes, which represent average
# increase in percentage support by BBWAA members over a

```

```

# player's candidacy.
HOFslope <- HOFIt %>%
  group_by(playerID) %>%
  do(mod = lm(pct ~ yearID, data = .)) %>%
  do(data.frame(slope = coef(.$mod)[2]))

## Boxplots of regression slopes by induction group
ggplot(data.frame(HOFstatus, HOFslope),
  aes(x = elected, y = slope)) +
  geom_boxplot(width = 0.5) +
  geom_point(position = position_jitter(width = 0.2))

# Note 1: Only two players whose maximum voting percentage
# was over 60% were not eventually inducted
# into the HOF: Gil Hodges and Jack Morris.
# Red Ruffing was elected in a 1967 runoff election while
# the others have been voted in by the Veterans Committee.

# Note 2: Of the players whose slope was >= 2.5 among
# non-inductees, only Jack Morris has not (yet) been
# subsequently inducted into the HOF; however, his last year of
# eligibility was 2014 so he could be inducted by a future
# Veterans Committee.

```

HomeGames

HomeGames table

Description

Data mapping teams to the stadiums they played regular season games in as the home team.

Usage

```
data(HomeGames)
```

Format

A data frame with 3195 observations on the following 9 variables.

```

year.key Year
league.key League; a factor with levels AA AL FL NL PL UA
team.key Team; a factor
park.key Unique identifier for each ballpark
span.first First date the park began acting as home field for the team
span.last Last date the park began acting as home field for the team
games Total games in this time span
openings Total opening in this time span
attendance Total attendance in this time span

```

Source

Lahman, S. (2022) Lahman's Baseball Database, 1871-2021, 2021 version, <https://www.seanlahman.com/baseball-archive/statistics/>

Examples

```
data(HomeGames)
library(dplyr)

# How many parks has every team played in as the home team for even a single game?
HomeGames %>%
  count(team.key) %>%
  arrange(team.key)

# What parks have the Toronto Blue Jays played in as the home team?
HomeGames %>%
  filter(team.key == "TOR") %>%
  arrange(span.last)

# What parks have the Boston Red Sox played in as the home team?
HomeGames %>%
  filter(team.key == "BOS") %>%
  arrange(span.last)

# What is the Toronto Blue Jays annual total home attendance by year?
HomeGames %>%
  filter(team.key == "TOR") %>%
  group_by(year.key) %>%
  summarize(total.attendance = sum(attendance)) %>%
  arrange(year.key)
```

Label

Extract the Label for a Variable

Description

Extracts the label for a variable from one or more of the *Labels files. This is useful for plots and other displays because the variable names are often cryptically short.

Usage

```
Label(var, labels = rbind(Lahman::battingLabels,
                          Lahman::pitchingLabels,
                          Lahman::fieldingLabels))
```

Arguments

`var` name of a variable
`labels` label table(s) to search, a 2-column dataframe containing variable names and labels.

Value

Returns the variable label, or var if no label is found

Author(s)

Michael Friendly

See Also

[battingLabels](#), [pitchingLabels](#), [fieldingLabels](#)

Examples

```
require("dplyr")
# find and plot maximum number of homers per year
batHR <- Batting %>%
  filter(!is.na(HR)) %>%
  group_by(yearID) %>%
  summarise(max = max(HR))

with(batHR, {
  plot(yearID, max,
       xlab=Label("yearID"), ylab=paste("Maximum", Label("HR")),
       cex=0.8)
  lines(lowess(yearID, max), col="blue", lwd=2)
  abline(lm(max ~ yearID), col="red", lwd=2)
})
```

LahmanData

Lahman Datasets

Description

This dataset gives a concise description of the data files in the Lahman package. It may be useful for computing on the various files.

Usage

```
data(LahmanData)
```

Format

A data frame with 24 observations on the following 5 variables.

file name of dataset

class class of dataset

nobs number of observations

nvar number of variables

title dataset title

Details

This dataset is generated using `vcdExtra::datasets(package="Lahman")` with some post-processing.

Examples

```
data(LahmanData)

# find ID variables in the datasets
IDvars <- lapply(LahmanData[,"file"], function(x) grep('.*ID$', colnames(get(x)), value=TRUE))
names(IDvars) <- LahmanData[,"file"]
str(IDvars)
# vector of unique ID variables
unique(unlist(IDvars))

# which datasets have playerID?
names(which(sapply(IDvars, function(x) "playerID" %in% x)))

#####
# Visualize relations among datasets via an MDS
#####
# jaccard distance between two sets; assure positivity
jaccard <- function(A, B) {
  max(1 - length(intersect(A,B)) / length(union(A,B)), .00001)
}

distmat <- function(vars, FUN=jaccard) {
  nv <- length(vars)
  d <- matrix(0, nv, nv, dimnames=list(names(vars), names(vars)))

  for(i in 1:nv) {
    for (j in 1:nv) {
      if (i != j) d[i,j] <- FUN(vars[[i]], vars[[j]])
    }
  }

  d[is.nan(d)] = 0

  d
}

# do an MDS on distances
distID <- distmat(IDvars)
config <- cmdscale(distID)

pos=rep(1:4, length=nrow(config))
plot(config[,1], config[,2], xlab = "", ylab = "", asp = 1, axes=FALSE,
      main="MDS of ID variable distances of Lahman tables")
abline(h=0, v=0, col="gray80")
text(config[,1], config[,2], rownames(config), cex = 0.75, pos=pos, xpd=NA)
```

Managers	<i>Managers table</i>
----------	-----------------------

Description

Managers table: information about individual team managers, teams they managed and some basic statistics for those teams in each year.

Usage

```
data(Managers)
```

Format

A data frame with 3684 observations on the following 10 variables.

playerID Manager (player) ID code

yearID Year

teamID Team; a factor

lgID League; a factor with levels AA AL FL NL PL UA

inseason Managerial order. Zero if the individual managed the team the entire year. Otherwise denotes where the manager appeared in the managerial order (1 for first manager, 2 for second, etc.)

G Games managed

W Wins

L Losses

rank Team's final position in standings that year

plyrMgr Player Manager (denoted by 'Y'); a factor with levels N Y

Source

Lahman, S. (2022) Lahman's Baseball Database, 1871-2021, 2021 version, <https://www.seanlahman.com/baseball-archive/statistics/>

Examples

```
#####
# Basic career summaries by manager
#####

library("dplyr")
mgrSumm <- Managers %>%
  group_by(playerID) %>%
  summarise(nyear = length(unique(yearID)),
            yearBegin = min(yearID),
            yearEnd = max(yearID),
```

```

nTeams = length(unique(teamID)),
nfirst = sum(rank == 1L),
W = sum(W),
L = sum(L),
WinPct = round(W/(W + L), 3))

MgrInfo <- People %>%
  filter(!is.na(playerID)) %>%
  select(playerID, nameLast, nameFirst)

# Merge names into the table
mgrTotals <- right_join(MgrInfo, mgrSumm, by = "playerID")

# add total games managed
mgrTotals <- mgrTotals %>%
  mutate(games = W + L)

#####
# Some basic queries
#####

# Top 20 managers in terms of years of service:
mgrTotals %>%
  arrange(desc(nyear)) %>%
  head(., 20)

# Top 20 winningest managers (500 games minimum)
mgrTotals %>%
  filter((W + L) >= 500) %>%
  arrange(desc(WinPct)) %>%
  head(., 20)

# Most of these are 19th century managers.
# How about the modern era?
mgrTotals %>%
  filter(yearBegin >= 1901 & (W + L) >= 500) %>%
  arrange(desc(WinPct)) %>%
  head(., 20)

# Top 10 managers in terms of percentage of titles
# (league or divisional) - should bias toward managers
# post-1970 since more first place finishes are available
mgrTotals %>%
  filter(yearBegin >= 1901 & (W + L) >= 500) %>%
  arrange(desc(round(nfirst/nyear, 3))) %>%
  head(., 10)

# How about pre-1969?
mgrTotals %>%
  filter(yearBegin >= 1901 & yearEnd <= 1969 &
  (W + L) >= 500) %>%
  arrange(desc(round(nfirst/nyear, 3))) %>%
  head(., 10)

```

```

## Tony LaRussa's managerial record by team
Managers %>%
  filter(playerID == "larusto01") %>%
  group_by(teamID) %>%
  summarise(nyear = length(unique(yearID)),
            yearBegin = min(yearID),
            yearEnd = max(yearID),
            games = sum(G),
            nfirst = sum(rank == 1L),
            W = sum(W),
            L = sum(L),
            WinPct = round(W/(W + L), 3))

#####
# Density plot of the number of games managed:
#####

library("ggplot2")

ggplot(mgrTotals, aes(x = games)) +
  geom_density(fill = "red", alpha = 0.3) +
  labs(x = "Number of games managed")

# Who managed more than 4000 games?
mgrTotals %>%
  filter(W + L >= 4000) %>%
  arrange(desc(W + L))
# Connie Mack's advantage: he owned the Philadelphia A's :)

# Table of Tony LaRussa's team finishes (rank order):
Managers %>%
  filter(playerID == "larusto01") %>%
  count(rank)

#####
# Scatterplot of winning percentage vs. number
# of games managed (min 100)
#####

ggplot(subset(mgrTotals, yearBegin >= 1900 & games >= 100),
       aes(x = games, y = WinPct)) +
  geom_point() + geom_smooth() +
  labs(x = "Number of games managed")

#####
# Division titles
#####

# Plot of number of first place finishes by managers who
# started in the divisional era (>= 1969) with

```

```

# at least 8 years of experience

mgrTotals %>%
  filter(yearBegin >= 1969 & nyear >= 8) %>%
  ggplot(., aes(x = nyear, y = nfirst)) +
    geom_point(position = position_jitter(width = 0.2)) +
    labs(x = "Number of years",
         y = "Number of divisional titles") +
    geom_smooth()

# Change response to proportion of titles relative
# to years managed
mgrTotals %>%
  filter(yearBegin >= 1969 & nyear >= 8) %>%
  ggplot(., aes(x = nyear, y = round(nfirst/nyear, 3))) +
    geom_point(position = position_jitter(width = 0.2)) +
    labs(x = "Number of years",
         y = "Proportion of divisional titles") +
    geom_smooth()

```

ManagersHalf

ManagersHalf table

Description

Split season data for managers

Usage

```
data(ManagersHalf)
```

Format

A data frame with 93 observations on the following 10 variables.

playerID Manager (player) ID code

yearID Year

teamID Team; a factor

lgID League; a factor with levels AL NL

inseason Managerial order. One if the individual managed the team the entire year. Otherwise denotes where the manager appeared in the managerial order (1 for first manager, 2 for second, etc.). A factor with levels 1 2 3 4 5

half First or second half of season

G Games managed

W Wins

L Losses

rank Team's position in standings for the half

Source

Lahman, S. (2022) Lahman's Baseball Database, 1871-2021, 2021 version, <https://www.seanlahman.com/baseball-archive/statistics/>

Examples

```
library("dplyr")
library("reshape2")

# Only have data for 1892 and 1981

# League rank by half for 1981 teams with the same
# manager in both halves who were hired in-season
ManagersHalf %>%
  filter(yearID >= 1901) %>%
  group_by(teamID, yearID) %>%
  filter(all(playerID == playerID[1])) %>% # same manager in both halves
  mutate(winPct = round(W/G, 3)) %>%
  reshape2::dcast(playerID + yearID + teamID + lgID ~ half,
                 value.var = "rank") %>%
  rename(rank1 = `1`, rank2 = `2`)
```

Parks

*Parks table***Description**

Name and location data for baseball stadiums.

Usage

```
data(Parks)
```

Format

A data frame with 255 observations on the following 6 variables.

`park.key` unique identifier for each ballpark

`park.name` the name of the ballpark

`park.alias` a semicolon delimited list of other names for the ballpark if they exist

`city` city where the ballpark is located

`state` state where the ballpark is located

`country` country where the ballpark is located

Details

This dataset apparently includes all ballparks that were ever used in baseball. There is no indication of the years they were used, nor the teams that played there.

The ballparks can be associated with teams through the `park` variable in the [Teams](#) table.

Source

Lahman, S. (2022) Lahman's Baseball Database, 1871-2021, 2021 version, <https://www.seanlahman.com/baseball-archive/statistics/>

See Also

[Teams](#)

Examples

```
data(Parks)
library(dplyr)
# how many parks in each country?
table(Parks$country)

# how many parks in each US state?
Parks %>%
  filter(country=="US") %>%
  count(state, sort=TRUE)

# ballparks in NYC
Parks %>%
  filter(state=="NY") %>%
  filter(city %in% c("New York", "Brooklyn", "Queens"))

# ballparks in Canada
Parks %>%
  filter(country=="CA") %>%
  count(state, sort=TRUE)

# what are the Canadian parks?
Parks %>%
  dplyr::filter(country=="CA")
```

People

People table

Description

People table - Player names, DOB, and biographical info. This file is to be used to get details about players listed in the [Batting](#), [Pitching](#), and other files where players are identified only by playerID.

Usage

```
data(People)
```

Format

A data frame with 20370 observations on the following 26 variables.

`playerID` A unique code assigned to each player. The `playerID` links the data in this file with records on players in the other files.

`birthYear` Year player was born

`birthMonth` Month player was born

`birthDay` Day player was born

`birthCountry` Country where player was born

`birthState` State where player was born

`birthCity` City where player was born

`deathYear` Year player died

`deathMonth` Month player died

`deathDay` Day player died

`deathCountry` Country where player died

`deathState` State where player died

`deathCity` City where player died

`nameFirst` Player's first name

`nameLast` Player's last name

`nameGiven` Player's given name (typically first and middle)

`weight` Player's weight in pounds

`height` Player's height in inches

`bats` a factor: Player's batting hand (left (L), right (R), or both (B))

`throws` a factor: Player's throwing hand (left(L) or right(R))

`debut` Date that player made first major league appearance

`finalGame` Date that player made first major league appearance (blank if still active)

`retroID` ID used by retrosheet, <https://www.retrosheet.org/>

`bbrefID` ID used by Baseball Reference website, <https://www.baseball-reference.com/>

`birthDate` Player's birthdate, in as.Date format

`deathDate` Player's deathdate, in as.Date format

Details

`debut`, `finalGame` were converted from character strings with `as.Date`.

Source

Lahman, S. (2022) Lahman's Baseball Database, 1871-2021, 2021 version, <https://www.seanlahman.com/baseball-archive/statistics/>

Examples

```

data(People); data(Batting)

## add player's name to Batting data
People$name <- paste(People$nameFirst, People$nameLast, sep=" ")
batting <- merge(Batting,
                 People[,c("playerID", "name")],
                 by="playerID", all.x=TRUE)

## batting and throwing
# right-handed batters are much less ambidexterous in throwing than left-handed batters
# (should only include batters)

BT <- with(People, table(bats, throws))
require(vcd)
structable(BT)
mosaic(BT, shade=TRUE)

## Who is Shoeless Joe Jackson?
subset(People, nameLast=="Jackson" & nameFirst=="Joe")
subset(People, nameLast=="Jackson" & nameFirst=="Shoeless Joe")

joeID <-c(subset(People, nameLast=="Jackson" & nameFirst=="Shoeless Joe")["playerID"])

subset(Batting, playerID==joeID)
subset(Fielding, playerID==joeID)

```

Pitching

Pitching table

Description

Pitching table

Usage

data(Pitching)

Format

A data frame with 48399 observations on the following 30 variables.

playerID Player ID code

yearID Year

stint player's stint (order of appearances within a season)

teamID Team; a factor

lgID League; a factor with levels AA AL FL NL PL UA

W Wins

L Losses
 G Games
 GS Games Started
 CG Complete Games
 SHO Shutouts
 SV Saves
 IPouts Outs Pitched (innings pitched x 3)
 H Hits
 ER Earned Runs
 HR Homeruns
 BB Walks
 SO Strikeouts
 BAOpp Opponent's Batting Average
 ERA Earned Run Average
 IBB Intentional Walks
 WP Wild Pitches
 HBP Batters Hit By Pitch
 BK Balks
 BFP Batters faced by Pitcher
 GF Games Finished
 R Runs Allowed
 SH Sacrifices by opposing batters
 SF Sacrifice flies by opposing batters
 GIDP Grounded into double plays by opposing batter

Source

Lahman, S. (2022) Lahman's Baseball Database, 1871-2021, 2021 version, <https://www.seanlahman.com/baseball-archive/statistics/>

Examples

```

# Pitching data

require("dplyr")

#####
# cleanup, and add some other stats
#####

# Restrict to AL and NL data, 1901+
# All data re SH, SF and GIDP are missing, so remove
# Intentional walks (IBB) not recorded until 1955

```

```

pitching <- Pitching %>%
  filter(yearID >= 1901 & lgID %in% c("AL", "NL")) %>%
  select(-(28:30)) %>% # remove SH, SF, GIDP
  mutate(BAOpp = round(H/(H + IPouts), 3), # loose def'n
         WHIP = round((H + BB) * 3/IPouts, 2),
         KperBB = round(iffelse(yearID >= 1955,
                               SO/(BB - IBB), SO/BB), 2))

#####
# some simple queries
#####

# Team pitching statistics, Toronto Blue Jays, 1993
tor93 <- pitching %>%
  filter(yearID == 1993 & teamID == "TOR") %>%
  arrange(ERA)

# Career pitching statistics, Greg Maddux
subset(pitching, playerID == "maddugr01")

# Best ERAs for starting pitchers post WWII
pitching %>%
  filter(yearID >= 1946 & IPouts >= 600) %>%
  group_by(lgID) %>%
  arrange(ERA) %>%
  do(head(., 5))

# Best K/BB ratios post-1955 among starters (excludes intentional walks)
pitching %>%
  filter(yearID >= 1955 & IPouts >= 600) %>%
  mutate(KperBB = SO/(BB - IBB)) %>%
  arrange(desc(KperBB)) %>%
  head(., 10)

# Best K/BB ratios among relievers post-1950 (min. 20 saves)
pitching %>%
  filter(yearID >= 1950 & SV >= 20) %>%
  arrange(desc(KperBB)) %>%
  head(., 10)

#####
# Winningest pitchers in each league each year:
#####

# Add name & throws information:
peopleInfo <- People %>%
  select(playerID, nameLast, nameFirst, throws)

# Merge peopleInfo into the pitching data
pitching1 <- right_join(peopleInfo, pitching, by = "playerID")

```

```

# Extract the pitcher with the maximum number of wins
# each year, by league
winp <- pitching1 %>%
  group_by(yearID, lgID) %>%
  filter(W == max(W)) %>%
  select(nameLast, nameFirst, teamID, W, throws)

# A simple ANCOVA model of wins vs. year, league and hand (L/R)
anova(lm(formula = W ~ yearID + I(yearID^2) + lgID + throws, data = winp))

# Nature of managing pitching staffs has altered importance of
# wins over time
## Not run:
require("ggplot2")

# compare loess smooth with quadratic fit
ggplot(winp, aes(x = yearID, y = W)) +
  geom_point(aes(colour = throws, shape=lgID), size = 2) +
  geom_smooth(method="loess", size=1.5, color="blue") +
  geom_smooth(method = "lm", se=FALSE, color="black",
              formula = y ~ poly(x,2)) +
  ylab("League maximum Wins") + xlab("Year") +
  ggtitle("Maximum pitcher wins by year")

## To reinforce this, plot the mean IPouts by year and league,
## which gives some idea of pitcher usage. Restrict pitcher
## pool to those who pitched at least 100 innings in a year.

pitching %>% filter(IPouts >= 300) %>% # >= 100 IP

ggplot(., aes(x = yearID, y = IPouts, color = lgID)) +
  geom_smooth(method="loess") +
  labs(x = "Year", y = "IPouts")

## Another indicator: total number of complete games pitched
## (Mirrors the trend from the preceding plot.)
pitching %>%
  group_by(yearID, lgID) %>%
  summarise(totalCG = sum(CG, na.rm = TRUE)) %>%
  ggplot(., aes(x = yearID, y = totalCG, color = lgID)) +
  geom_point() +
  geom_path() +
  labs(x = "Year", y = "Number of complete games")

## End(Not run)

```

Description

Post season pitching statistics

Usage

```
data(PitchingPost)
```

Format

A data frame with 6308 observations on the following 30 variables.

playerID Player ID code
yearID Year
round Level of playoffs
teamID Team; a factor
lgID League; a factor with levels AA AL NL
W Wins
L Losses
G Games
GS Games Started
CG Complete Games
SHO Shutouts
SV Saves
IPouts Outs Pitched (innings pitched x 3)
H Hits
ER Earned Runs
HR Homeruns
BB Walks
SO Strikeouts
BAOpp Opponents' batting average
ERA Earned Run Average
IBB Intentional Walks
WP Wild Pitches
HBP Batters Hit By Pitch
BK Balks
BFP Batters faced by Pitcher
GF Games Finished
R Runs Allowed
SH Sacrifice Hits allowed
SF Sacrifice Flies allowed
GIDP Grounded into Double Plays

Source

Lahman, S. (2022) Lahman's Baseball Database, 1871-2021, 2021 version, <https://www.seanlahman.com/baseball-archive/statistics/>

Examples

```
library("dplyr")
library(ggplot2)

# Restrict data to World Series in modern era
ws <- PitchingPost %>%
  filter(yearID >= 1903 & round == "WS")
# Pitchers with ERA 0.00 in WS play (> 10 IP)
ws %>%
  filter(IPouts > 30 & ERA == 0.00) %>%
  arrange(desc(IPouts)) %>%
  select(playerID, yearID, teamID, lgID, IPouts, W, L, G,
         CG, SHO, H, R, SO, BFP)

# Pitchers with the most IP in a series
# 1903 Series went eight games - for details, see
# https://en.wikipedia.org/wiki/1903_World_Series
ws %>%
  arrange(desc(IPouts)) %>%
  select(playerID, yearID, teamID, lgID, IPouts, W, L, G,
         CG, SHO, H, SO, BFP, ERA) %>%
  head(., 10)

# Pitchers with highest strikeout rate in WS
# (minimum 20 IP)
ws %>%
  filter(IPouts >= 60) %>%
  mutate(K_rate = 27 * SO/IPouts) %>%
  arrange(desc(K_rate)) %>%
  select(playerID, yearID, teamID, lgID, IPouts,
         H, SO, K_rate) %>%
  head(., 10)

# Pitchers with the most IP in WS history
ws %>%
  group_by(playerID) %>%
  summarise_at(vars(IPouts, H, ER, CG, BB, SO, W, L),
              sum, na.rm = TRUE) %>%
  mutate(ERA = round(27 * ER/IPouts, 2),
         Kper9 = round(27 * SO/IPouts, 3),
         WHIP = round(3 * (H + BB)/IPouts, 3)) %>%
  arrange(desc(IPouts)) %>%
  select(-H, -ER) %>%
  head(., 10)

# Plot of K/9 by year
ws %>%
```

```

group_by(yearID) %>%
summarise(Kper9 = 27 * sum(SO)/sum(IPouts)) %>%
ggplot(., aes(x = yearID, y = Kper9)) +
  geom_point() +
  geom_smooth() +
  labs(x = "Year", y = "K per 9 innings")

```

playerInfo

Lookup Information for Players and Teams

Description

These functions use `grep` to lookup information about players (from the [People](#) file) and teams (from the [Teams](#) file).

Usage

```
playerInfo(playerID, nameFirst, nameLast, data = Lahman::People, extra = NULL, ...)
```

```
teamInfo(teamID, name, data = Lahman::Teams, extra = NULL, ...)
```

Arguments

playerID	pattern for playerID
nameFirst	pattern for first name
nameLast	pattern for last name
data	The name of the dataset to search
extra	A character vector of other fields to include in the result
...	other arguments passed to grep
teamID	pattern for teamID
name	pattern for team name

Value

Returns a data frame for unique matching rows from data

Author(s)

Michael Friendly

See Also

[grep](#), [~~~](#)

Examples

```
playerInfo("aaron")  
  
teamInfo("CH", extra="park")
```

Salaries

Salaries table

Description

Player salary data.

Usage

```
data(Salaries)
```

Format

A data frame with 26428 observations on the following 5 variables.

```
yearID Year  
teamID Team; a factor  
lgID League; a factor  
playerID Player ID code  
salary Salary
```

Details

There is no real coverage of player's salaries until 1985.

Source

Lahman, S. (2022) Lahman's Baseball Database, 1871-2021, 2021 version, <https://www.seanlahman.com/baseball-archive/statistics/>

Examples

```
# what years are included?  
summary(Salaries$yearID)  
  
# how many players included each year?  
table(Salaries$yearID)  
  
# Team salary data  
  
require("dplyr")  
require("ggplot2")
```

```

# Total team salaries by league, team and year
teamSalaries <- Salaries %>%
  group_by(lgID, teamID, yearID) %>%
  summarise(Salary = sum(as.numeric(salary))) %>%
  group_by(yearID, lgID) %>%
  arrange(desc(Salary))

#####
# Highest paid players each year:
maxSal <- Salaries %>%
  group_by(yearID) %>%
  filter(salary == max(salary))
maxPlayers <- bind_rows(lapply(maxSal$playerID, playerInfo)) %>%
  select(-playerID)
maxSal <- bind_cols(maxPlayers, maxSal)

# Plot maximum MLB salary by year (1985-present)
ggplot(maxSal, aes(x = yearID, y = salary/1e6)) +
  geom_point() +
  geom_smooth(se = FALSE) +
  labs(x = "Year", y = "Salary (millions)")

# Plot salary distributions by year for all players
ggplot(Salaries, aes(x = factor(yearID), y = salary/1e5)) +
  geom_boxplot(fill = "lightblue", outlier.size = 1) +
  labs(x = "Year", y = "Salary ($100,000)") +
  coord_flip()

# Plot median MLB salary per year
Salaries %>%
  group_by(yearID) %>%
  summarise(medsal = median(salary)) %>%
  ggplot(., aes(x = yearID, y = medsal/1e6)) +
  geom_point() +
  geom_smooth() +
  labs(x = "Year", y = "Median MLB salary (millions)")

# add salary to Batting data
batting <- Batting %>%
  filter(yearID >= 1985) %>%
  left_join(select(Salaries, playerID, yearID, teamID, salary),
            by=c("playerID", "yearID", "teamID"))
str(batting)

#####
# Average salaries by teams, over years
#####

# Some franchises are multiply named, so add a new variable
# 'franchise' to the Salaries data as a lookup table

franchise <- c(`ANA` = "LAA", `ARI` = "ARI", `ATL` = "ATL",
              `BAL` = "BAL", `BOS` = "BOS", `CAL` = "LAA",

```

```

`CHA` = "CHA", `CHN` = "CHN", `CIN` = "CIN",
`CLE` = "CLE", `COL` = "COL", `DET` = "DET",
`FLO` = "MIA", `HOU` = "HOU", `KCA` = "KCA",
`LAA` = "LAA", `LAN` = "LAN", `MIA` = "MIA",
`MIL` = "MIL", `MIN` = "MIN", `ML4` = "MIL",
`MON` = "WAS", `NYA` = "NYA", `NYM` = "NYN",
`NYN` = "NYN", `OAK` = "OAK", `PHI` = "PHI",
`PIT` = "PIT", `SDN` = "SDN", `SEA` = "SEA",
`SFG` = "SFN", `SFN` = "SFN", `SLN` = "SLN",
`TBA` = "TBA", `TEX` = "TEX", `TOR` = "TOR",
`WAS` = "WAS")

Salaries$franchise <- unname(franchise[Salaries$teamID])

# Average salaries annual salaries by team, in millions USD
avg_team_salaries <- Salaries %>%
  group_by(yearID, franchise, lgID) %>%
  summarise(salary= mean(salary)/1e6) %>%
  filter(!(franchise == "CLE" & lgID == "NL"))

# Spaghetti plot of team salary over time by team
# Yankees have largest average team salary since 2003
ggplot(avg_team_salaries,
  aes(x = yearID, y = salary, group = factor(franchise))) +
  geom_path() +
  labs(x = "Year", y = "Average team salary (millions USD)")

```

Schools

Schools table

Description

Information on schools players attended, by school

Usage

```
data(Schools)
```

Format

A data frame with 1207 observations on the following 5 variables.

schoolID school ID code

name_full school name

city city where school is located

state state where school's city is located

country country where school is located

Source

Lahman, S. (2022) Lahman's Baseball Database, 1871-2021, 2021 version, <https://www.seanlahman.com/baseball-archive/statistics/>

Examples

```
require("dplyr")

# How many different schools are listed in each state?
table(Schools$state)

# How many different schools are listed in each country?
table(Schools$country)

# Top 20 schools
schoolInfo <- Schools %>% select(-country)

schoolCount <- CollegePlaying %>%
  group_by(schoolID) %>%
  summarise(players = length(schoolID)) %>%
  left_join(schoolInfo, by = "schoolID") %>%
  arrange(desc(players))
head(schoolCount, 20)

# sum counts by state
schoolStates <- schoolCount %>%
  group_by(state) %>%
  summarise(players = sum(players),
            schools = length(state))

str(schoolStates)
summary(schoolStates)
```

SeriesPost

SeriesPost table

Description

Post season series information

Usage

```
data(SeriesPost)
```

Format

A data frame with 367 observations on the following 9 variables.

yearID Year

round Level of playoffs
 teamIDwinner Team ID of the team that won the series; a factor
 lgIDwinner League ID of the team that won the series; a factor with levels AL NL
 teamIDloser Team ID of the team that lost the series; a factor
 lgIDloser League ID of the team that lost the series; a factor with levels AL NL
 wins Wins by team that won the series
 losses Losses by team that won the series
 ties Tie games

Source

Lahman, S. (2021) Lahman's Baseball Database, 1871-2020, 2020 version, <https://www.seanlahman.com/baseball-archive/statistics/>

Examples

```

data(SeriesPost)

# How many times has each team won the World Series?

# Notes:
# - the SeriesPost table includes an identifier for the
# team (teamID), but not the franchise (e.g. the Brooklyn Dodgers
# [BRO] and Los Angeles Dodgers [LAN] are counted separately)
#
# - the World Series was first played in 1903, but the
# Lahman data tables have the final round of the earlier
# playoffs labelled "WS", so it is necessary to
# filter the SeriesPost table to exclude years prior to 1903.

# using the dplyr data manipulation package
library("dplyr")
library("tidyr")
library("ggplot2")

## WS winners, arranged in descending order of titles won
ws_winner_table <- SeriesPost %>%
  filter(yearID > "1902", round == "WS") %>%
  group_by(teamIDwinner) %>%
  summarise(wincount = n()) %>%
  arrange(desc(wincount))
ws_winner_table

## Expanded form of World Series team data in modern era

ws <- SeriesPost %>%
  filter(yearID >= 1903 & round == "WS") %>%
  select(-ties, -round) %>%
  mutate(lgIDloser = droplevels(lgIDloser),
         lgIDwinner = droplevels(lgIDwinner))

```

```

# Bar chart of length of series (# games played)
# 1903, 1919 and 1921 had eight games
ggplot(ws, aes(x = wins + losses)) +
  geom_bar(fill = "dodgerblue") +
  labs(x = "Number of games", y = "Frequency")

# Last year the Cubs appeared in the WS
ws %>%
  filter(teamIDwinner == "CHN" | teamIDloser == "CHN") %>%
  summarise(max(yearID))

# Dot chart of number of WS appearances by teamID
ws %>%
  gather(wl, team, teamIDwinner, teamIDloser) %>%
  count(team) %>%
  arrange(desc(n)) %>%
  ggplot(., aes(x = reorder(team, n), y = n)) +
    theme_bw() +
    geom_point(size = 3, color = "dodgerblue") +
    geom_segment(aes(xend = reorder(team, n), yend = 0),
                 linetype = "dotted", color = "dodgerblue",
                 size = 1) +
    labs(x = NULL, y = "Number of WS appearances") +
    scale_y_continuous(expand = c(0, 0), limits = c(0, 42)) +
    coord_flip() +
    theme(axis.text.y = element_text(size = rel(0.8)),
          axis.ticks.y = element_blank())

# Initial year of each round of championship series in modern era
SeriesPost %>%
  filter(yearID >= 1903) %>% # modern WS started in 1903
  group_by(round) %>%
  summarise(first_year = min(yearID)) %>%
  arrange(first_year)

# Ditto, but with more information about each series played
SeriesPost %>%
  filter(yearID >= 1903) %>%
  group_by(round) %>%
  arrange(yearID) %>%
  do(head(., 1)) %>%
  select(-lgIDwinner, -lgIDloser) %>%
  arrange(yearID, round)

```

Teams

Teams table

Description

Yearly statistics and standings for teams

Usage

```
data(Teams)
```

Format

A data frame with 2985 observations on the following 48 variables.

yearID Year

lgID League; a factor with levels AA AL FL NL PL UA

teamID Team; a factor

franchID Franchise (links to [TeamsFranchises](#) table)

divID Team's division; a factor with levels C E W

Rank Position in final standings

G Games played

Ghome Games played at home

W Wins

L Losses

DivWin Division Winner (Y or N)

WCWin Wild Card Winner (Y or N)

LgWin League Champion(Y or N)

WSWin World Series Winner (Y or N)

R Runs scored

AB At bats

H Hits by batters

X2B Doubles

X3B Triples

HR Homeruns by batters

BB Walks by batters

SO Strikeouts by batters

SB Stolen bases

CS Caught stealing

HBP Batters hit by pitch

SF Sacrifice flies

RA Opponents runs scored

ER Earned runs allowed

ERA Earned run average

CG Complete games

SHO Shutouts

SV Saves

IPouts Outs Pitched (innings pitched x 3)
 HA Hits allowed
 HRA Homeruns allowed
 BBA Walks allowed
 SOA Strikeouts by pitchers
 E Errors
 DP Double Plays
 FP Fielding percentage
 name Team's full name
 park Name of team's home ballpark
 attendance Home attendance total
 BPF Three-year park factor for batters
 PPF Three-year park factor for pitchers
 teamIDBR Team ID used by Baseball Reference website
 teamIDlahman45 Team ID used in Lahman database version 4.5
 teamIDretro Team ID used by Retrosheet

Details

Variables X2B and X3B are named 2B and 3B in the original database

Source

Lahman, S. (2021) Lahman's Baseball Database, 1871-2020, 2020 version, <https://www.seanlahman.com/baseball-archive/statistics/>

Examples

```

data(Teams)
library("dplyr")
library("tidyr")

# Add some selected measures to the Teams data frame
# Restrict to AL and NL in modern era
teams <- Teams %>%
  filter(yearID >= 1901 & lgID %in% c("AL", "NL")) %>%
  group_by(yearID, teamID) %>%
  mutate(TB = H + X2B + 2 * X3B + 3 * HR,
         WinPct = W/G,
         rpg = R/G,
         hrpg = HR/G,
         tbpg = TB/G,
         kpg = SO/G,
         k2bb = SO/BB,
         whip = 3 * (H + BB)/IPouts)

```

```

# Function to create a ggplot by year for selected team stats
# Both arguments are character strings
yrPlot <- function(yvar, label)
{
  require("ggplot2")
  ggplot(teams, aes_string(x = "yearID", y = yvar)) +
    geom_point(size = 0.5) +
    geom_smooth(method="loess") +
    labs(x = "Year", y = paste(label, "per game"))
}

## Run scoring in the modern era by year
yrPlot("rpg", "Runs")

## Home runs per game by year
yrPlot("hrpg", "Home runs")

## Total bases per game by year
yrPlot("tbp", "Total bases")

## Strikeouts per game by year
yrPlot("kpg", "Strikeouts")

## Plot win percentage vs. run differential (R - RA)
ggplot(teams, aes(x = R - RA, y = WinPct)) +
  geom_point(size = 0.5) +
  geom_smooth(method="loess") +
  geom_hline(yintercept = 0.5, color = "orange") +
  geom_vline(xintercept = 0, color = "orange") +
  labs(x = "Run differential", y = "Win percentage")

## Plot attendance vs. win percentage by league, post-1980
teams %>% filter(yearID >= 1980) %>%
ggplot(., aes(x = WinPct, y = attendance/1000)) +
  geom_point(size = 0.5) +
  geom_smooth(method="loess", se = FALSE) +
  facet_wrap(~ lgID) +
  labs(x = "Win percentage", y = "Attendance (1000s)")

## Teams with over 4 million attendance in a season
teams %>%
  filter(attendance >= 4e6) %>%
  select(yearID, lgID, teamID, Rank, attendance) %>%
  arrange(desc(attendance))

## Average season HRs by park, post-1980
teams %>%
  filter(yearID >= 1980) %>%
  group_by(park) %>%
  summarise(meanHRpg = mean((HR + HRA)/Ghome), nyears = n()) %>%
  filter(nyears >= 10) %>%
  arrange(desc(meanHRpg)) %>%
  head(., 10)

```

```

## Home runs per game at Fenway Park and Wrigley Field,
## the two oldest MLB parks, by year. Fenway opened in 1912.
teams %>%
  filter(yearID >= 1912 & teamID %in% c("BOS", "CHN")) %>%
  mutate(hrpg = (HR + HRA)/Ghome) %>%
  ggplot(., aes(x = yearID, y = hrpg, color = teamID)) +
    geom_line(size = 1) +
    geom_point() +
    labs(x = "Year", y = "Home runs per game", color = "Team") +
    scale_color_manual(values = c("red", "blue"))

## Ditto for total strikeouts per game
teams %>%
  filter(yearID >= 1912 & teamID %in% c("BOS", "CHN")) %>%
  mutate(kpg = (SO + SOA)/Ghome) %>%
  ggplot(., aes(x = yearID, y = kpg, color = teamID)) +
    geom_line(size = 1) +
    geom_point() +
    labs(x = "Year", y = "Strikeouts per game", color = "Team") +
    scale_color_manual(values = c("red", "blue"))

## Not run:
if(require(googleVis)) {
motion1 <- gvisMotionChart(as.data.frame(teams),
  idvar="teamID", timevar="yearID", chartid="gvisTeams",
  options=list(width=700, height=600))
plot(motion1)
#print(motion1, file="gvisTeams.html")

# Merge with avg salary for years where salary is available

teamsal <- Salaries %>%
  group_by(yearID, teamID) %>%
  summarise(Salary = sum(salary, na.rm = TRUE)) %>%
  select(yearID, teamID, Salary)

teamsSal <- teams %>%
  filter(yearID >= 1985) %>%
  left_join(teamsal, by = c("yearID", "teamID")) %>%
  select(yearID, teamID, attendance, Salary, WinPct) %>%
  as.data.frame(.)

motion2 <- gvisMotionChart(teamsSal, idvar="teamID", timevar="yearID",
  xvar="attendance", yvar="salary", sizevar="WinPct",
  chartid="gvisTeamsSal", options=list(width=700, height=600))
plot(motion2)
#print(motion2, file="gvisTeamsSal.html")

}

## End(Not run)

```

TeamsFranchises	<i>TeamFranchises table</i>
-----------------	-----------------------------

Description

Information about team franchises

Usage

```
data(TeamsFranchises)
```

Format

A data frame with 120 observations on the following 4 variables.

franchID Franchise ID; a factor

franchName Franchise name

active Whether team is currently active (Y or N)

NAassoc ID of National Association team franchise played as

Source

Lahman, S. (2021) Lahman's Baseball Database, 1871-2020, 2020 version, <https://www.seanlahman.com/baseball-archive/statistics/>

Examples

```
data(TeamsFranchises)

# Which of the active Major League Baseball teams had a National Association predecessor?

# Notes:
# - the National Association was founded in 1871, and continued through the
# 1875 season. In 1876, six clubs from the National Association and two other
# independent clubs formed the National League, which exists to this day.
# - the `active` field has "NA" for the National Association franchises
# - where appropriate, the `NAassoc` field has the `franchID` of the successor National League team

# using the dplyr data manipulation package
library("dplyr")

NatAssoc_active_table <- TeamsFranchises %>%
  filter(active == "Y") %>%
  filter(!is.na(NAassoc))
NatAssoc_active_table

# Merge current team IDs with franchise IDs
currentTeams <- Teams %>%
  filter(yearID == 2014) %>%
```

```

      select(teamID, franchID, lgID, park)

# Merge TeamsFranchises with currentTeams
TeamsFranchises %>%
  filter(active == "Y") %>%
  select(-active, -NAassoc) %>%
  left_join(currentTeams, by = "franchID")

```

 TeamsHalf

TeamsHalf table

Description

Split season data for teams

Usage

```
data(TeamsHalf)
```

Format

A data frame with 52 observations on the following 10 variables.

yearID Year

lgID League; a factor with levels AL NL

teamID Team; a factor

Half First or second half of season

divID Division

DivWin Won Division (Y or N)

Rank Team's position in standings for the half

G Games played

W Wins

L Losses

Source

Lahman, S. (2021) Lahman's Baseball Database, 1871-2020, 2020 version, <https://www.seanlahman.com/baseball-archive/statistics/>

Examples

```
# 1981 season team data split into half seasons
data(TeamsHalf)
library("dplyr")

# List standings with winning percentages by
# season half, league and division
TeamsHalf %>%
  group_by(Half, lgID, divID) %>%
  mutate(WinPct = round(W/G, 3)) %>%
  arrange(Half, lgID, divID, Rank) %>%
  select(Half, lgID, divID, Rank, teamID, WinPct)
```

Index

* datasets

- AllstarFull, 5
- Appearances, 6
- AwardsManagers, 8
- AwardsPlayers, 10
- AwardsShareManagers, 11
- AwardsSharePlayers, 12
- Batting, 14
- battingLabels, 18
- BattingPost, 19
- CollegePlaying, 22
- Fielding, 23
- FieldingOF, 25
- FieldingOFsplit, 27
- FieldingPost, 28
- HallOfFame, 30
- HomeGames, 33
- LahmanData, 35
- Managers, 37
- ManagersHalf, 40
- Parks, 41
- People, 42
- Pitching, 44
- PitchingPost, 47
- Salaries, 51
- Schools, 53
- SeriesPost, 54
- Teams, 56
- TeamsFranchises, 61
- TeamsHalf, 62

* manip

- battingStats, 21
- Label, 34
- playerInfo, 50

AllstarFull, 4, 5
Appearances, 4, 6
AwardsManagers, 4, 8
AwardsPlayers, 4, 10
AwardsShareManagers, 4, 11

AwardsSharePlayers, 4, 12

Baseball, 15
baseball, 15
Batting, 3, 14, 18, 21, 22, 42
battingLabels, 4, 18, 35
BattingPost, 4, 19, 22
battingStats, 15, 21

CollegePlaying, 4, 22

Fielding, 3, 18, 23
fieldingLabels, 4, 35
fieldingLabels (battingLabels), 18
FieldingOF, 4, 25
FieldingOFsplit, 27
FieldingPost, 4, 28

grep, 50

HallOfFame, 4, 30
HomeGames, 33

Label, 18, 34
Lahman (Lahman-package), 3
Lahman-package, 3
LahmanData, 35

Managers, 4, 37
ManagersHalf, 4, 40

Parks, 41
People, 3, 30, 42, 50
Pitching, 3, 18, 42, 44
pitchingLabels, 4, 35
pitchingLabels (battingLabels), 18
PitchingPost, 4, 47
playerInfo, 50

Salaries, 4, 51
Schools, 4, 53

SeriesPost, [4](#), [54](#)

teamInfo (playerInfo), [50](#)

Teams, [4](#), [41](#), [42](#), [50](#), [56](#)

TeamsFranchises, [4](#), [57](#), [61](#)

TeamsHalf, [4](#), [62](#)