

Package Vignette

```
library(stat555sor)
```

Introduction

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Welcome to the stat555sor package vignette! This package is designed to calculate the strength of record (SOR) for college basketball teams in a given season. SOR, or Strength of Record, is a measure of team performance that takes into account the quality of opponents a team has played and the outcomes of those games. By using data from both KenPom and Warren Nolan, the package calculates a custom SOR score for each team based on their game outcomes. The SOR score is calculated using a custom formula that is tailored specifically to college basketball and is designed to provide a more accurate assessment of team strength.

This package provides a comprehensive and flexible approach to calculating SOR scores for college basketball teams. Whether you're a sports analyst looking to evaluate team performance, a bettor making informed decisions, or a researcher conducting statistical analysis, stat555sor offers a custom formula tailored to college basketball that provides a more accurate assessment of team strength. Unlike other SOR systems, this package is designed to be user-friendly and accessible to analysts of all skill levels. With clear and concise documentation, users can easily navigate the package and calculate SOR scores for a given season. Moreover, the package is highly transparent, providing users with insights into the underlying data and formula used to calculate the scores. By using stat555sor, users can gain a deeper understanding of team performance and make informed decisions.

In this vignette, we will provide an overview of the package and demonstrate how to use it to calculate SOR scores for a given season. We will also discuss the underlying data and formula used to calculate the scores, as well as provide an example of how to use the output from this package in conjunction with the commonly used data visualization package, ggplot2, to create a visualization of the data. By the end of this vignette, users will have a better understanding of what an SOR score is, how it is calculated, and how to use the stat555sor package to analyze college basketball team performance.

Using the `sum_sor()` function

In this section, we'll explore how to visualize NCAA basketball data using R. We'll be using data that includes information about every Division I basketball game played in the 2022-2023 seasons. This data is normally pulled from the two following websites, <https://kenpom.com/cbbga23.txt> and <https://www.warrennolan.com/basketball/2023/net> and then formatted into a more viewable data frame within R.

The 'sum_sor' function is the master function in this data analysis pipeline. Specifically, it calls all the necessary functions to compute the SOR score for every team. 'The sum_sor' function takes two arguments: year, which is the year for which the data is requested, and games_date, which is the cutoff date for the games played.

Upon calling the 'sum_sor' function, it first runs the 'get_combined_data' function to obtain the data frame with the necessary information about each game. Once that data frame is created and formatted correctly, two new, empty columns are created within the data frame for the SOR change for both the home and away teams.

In order to calculate the SOR score for each game, the function ‘sor_points’ is then called from within the ‘get_combined_data’ function and applied to each row twice. This function takes in the team’s own score, the opposing team’s score, the opposing team’s NET ranking, the number of teams in the college basketball season, and the game location as inputs. It returns the strength of record points gained or lost by the home or away team based on whether they won or lost the game.

At this point in the function, the data frame would look something like this:

```
test <- get_combined_data(2023, "2023-03-12")
#> No encoding supplied: defaulting to UTF-8.
head(test)
#> # A tibble: 6 x 12
#> # Rowwise:
#>   Date       Away_team      Away_score away_NET Home_team
#>   <date>    <chr>          <int>    <int> <chr>
#> 1 2022-11-07 Jackson St.         56      305 Abilene C~
#> 2 2022-11-07 South Dakota St.      80      155 Akron
#> 3 2022-11-07 Longwood             54      166 Alabama
#> 4 2022-11-07 Nicholls St.         75      263 Arizona
#> 5 2022-11-07 Tarleton St.         59      162 Arizona S~
#> 6 2022-11-07 North Dakota St.      58      215 Arkansas
#> # i 7 more variables: Home_score <int>, home_NET <int>,
#> #   score_diff <int>, site <chr>, neutral <dbl>,
#> #   home_sor <dbl>, away_sor <dbl>
```

Finally, the sum_sor function will run two for loops to sum up the SOR scores for each team. The function then creates a new data frame that contains two columns, the name of the team, and their total SOR score. This is the data frame that is returned by the function.

```
test_sor <- sum_sor(2023, "2023-03-12")
#> No encoding supplied: defaulting to UTF-8.
head(test_sor)
#>   Team      SOR ranking
#> 114 Houston 8.075916    1
#> 4 Alabama 7.806283     2
#> 133 Kansas 7.701571    3
#> 318 UCLA 7.557592     4
#> 238 Purdue 7.520942    5
#> 208 North Texas 6.767016 6
```

While this function was designed to calculate the Strength of Record for a specific team, the output can also be used to compare the performance of multiple teams over time or to identify trends in team performance. This can also be a useful tool for coaches, analysts, or fans looking to evaluate the success of their team or identify areas for improvement.

Additional Uses for Package Output

Visualization of Utah Teams’ SOR Scores Over the Last 3 Seasons

This section shows how to create a visualization of the Strength of Record (SOR) scores for all Utah college basketball teams over the past three seasons. The purpose of this visualization is to give users a better understanding of how the SOR scores of these teams have changed over time, and to identify any trends or patterns that may be present.

By running the sum_sor function once for every season, the user could then bind the data all together and add the year to each row to create a dataset that contains the SOR score for each team for the past 3

years. Note that this dataset is included within the package itself and can be called using the ‘data’ function once the package has been installed to the user’s device.

```
## Getting data for each year
year_2023 <- sum_sor(2023, "2023-03-12")
year_2022 <- sum_sor(2022, "2022-03-13")
year_2021 <- sum_sor(2021, "2021-03-14")

## Adding year to data before combining
year_2023$year <- rep(2023, nrow(year_2023))
year_2022$year <- rep(2022, nrow(year_2022))
year_2021$year <- rep(2021, nrow(year_2021))

## binding data
combined_years <- rbind(year_2023, year_2022, year_2021)
```

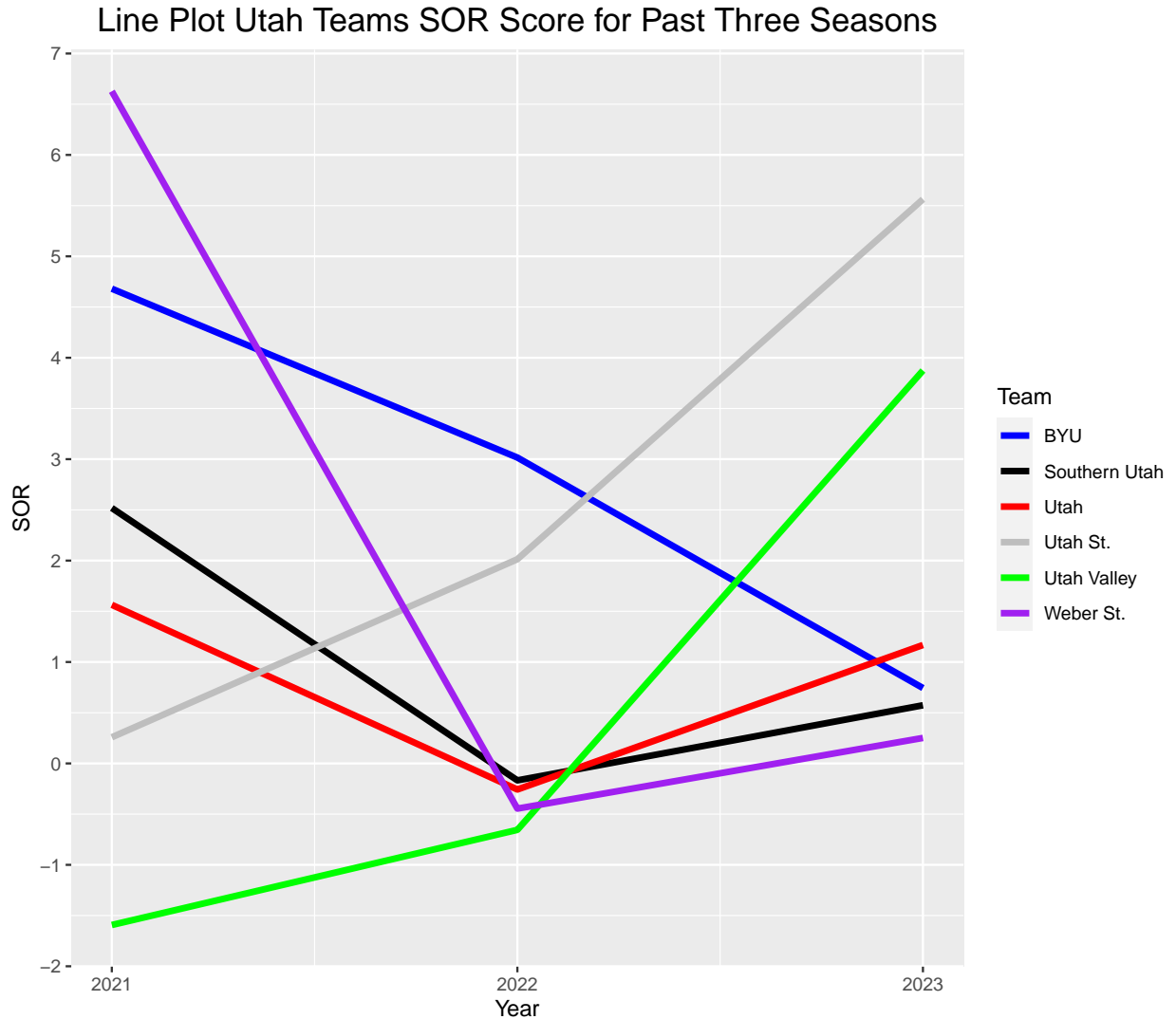
Further subsetting the data to only include any teams that contain the phrases “Utah”, “BYU” or “Weber St” will produce a dataset that only contains the Utah team’s SOR scores over the last 3 seasons.

```
library(stat555sor)
# Load dataset from within package
data("combined_years")
# filter dataset to only include rows where the state column contains "Utah"
df_utah <- combined_years[grepl("Utah|BYU|Weber St", combined_years$Team), ]
# exclude Utah Tech
df_utah <- df_utah[!grepl("Utah Tech", df_utah$Team), ]
head(df_utah)

#>      Team      SOR ranking year
#> 331   Utah St. 5.5628272      8 2023
#> 333   Utah Valley 3.8743455     32 2023
#> 330    Utah 1.1675393     99 2023
#> 35    BYU 0.7434555    120 2023
#> 275 Southern Utah 0.5732984    126 2023
#> 348   Weber St. 0.2513089    138 2023
```

From here, producing a line plot to see the change over time could be done using the ggplot2 library.

```
library(ggplot2)
ggplot(data = df_utah, aes(x = year, y = SOR, group = Team, color = Team)) +
  geom_line(size = 1.5) +
  scale_x_continuous(breaks = seq(min(df_utah$year), max(df_utah$year),
                                by = 1)) +
  scale_y_continuous(breaks = seq(round(min(df_utah$SOR)),
                                round(max(df_utah$SOR))),
                    labels = function(x) format(x, scientific = FALSE)) +
  scale_color_manual(values = c("blue", "black", "red", "grey",
                                "green", "purple")) +
  labs(title = "Line Plot Utah Teams SOR Score for Past Three Seasons",
       x = "Year", y = "SOR") +
  theme(plot.title = element_text(size = 16, hjust = 0.5))
```



Conclusion

In this vignette, we have presented a package that can be used to calculate the Strength of Record (SOR) scores for college basketball teams. The main function of the package, `sum_sor`, allows users to easily obtain the SOR scores for any given season and date.

Additionally, we have demonstrated several potential uses for the SOR scores, including comparing team performance across seasons, identifying top-performing teams, and analyzing the performance of local Utah teams.

We have also included a custom function, `sor_points`, which can be used to calculate the SOR points for individual games. This function may be of particular interest to those who want to dive deeper into the SOR methodology or who want to create their own SOR-related analyses.

Overall, this package provides a useful tool for anyone interested in analyzing college basketball team performance. With its simple and intuitive interface, users can quickly and easily obtain SOR scores for any season and date. We hope that this package will be of use to researchers, analysts, and basketball enthusiasts alike.

Link to Package

<https://github.com/Gideonparry/stat5555sor>