

ncaa hoopR EDA

```
# install.packages("devtools")
devtools::install_github("lbenz730/ncaa hoopR", force = TRUE)

## 
## * checking for file '/private/var/folders/fg/58bgcw890xndbpn2g11w7w4h0000gn/T/Rtmpxp2fQM/remotesf980
## * preparing 'ncaa hoopR':
## * checking DESCRIPTION meta-information ... OK
## * checking for LF line-endings in source and make files and shell scripts
## * checking for empty or unneeded directories
## * building 'ncaa hoopR_1.7.0.11.tar.gz'

library(tidyverse)

## Warning: package 'ggplot2' was built under R version 4.1.2
## Warning: package 'tibble' was built under R version 4.1.2
## Warning: package 'tidyr' was built under R version 4.1.2
## Warning: package 'readr' was built under R version 4.1.2
## Warning: package 'purrr' was built under R version 4.1.2
## Warning: package 'dplyr' was built under R version 4.1.2
## Warning: package 'stringr' was built under R version 4.1.2

library(backports)
library(ncaa hoopR)

data(ids)
view(ids)

ark_pbp <- get_pbp("Arkansas", season = "2022-23")

ark_roster <- get_roster("Arkansas", season = "2022-23")
ark_schedule <- get_schedule("Arkansas", season = "2022-23")
```

```

#' Win Probability Chart
#'
#' Renders Win Probability Charts in ggplot
#'
#' @param game_id ESPN game_id for which to render chart
#' @param home_col Color of home team for chart
#' @param away_col Color of away team for chart
#' @param include_spread Logical, whether to include pre-game spread in Win Probability
#' calculations. Default = TRUE.
#' @param show_labels Logical whether Game Excitement Index and Minimum
#' Win Probability metrics should be displayed on the plot. Default = TRUE.
#' @export
#'
wp_chart <- function(game_id, home_col, away_col, include_spread = T, show_labels = T) {
  ### Error Testing
  if(is.na(game_id)) {
    stop("game_id is missing with no default")
  }
  if(is.na(home_col)) {
    stop("home_col is missing with no default")
  }
  if(is.na(away_col)) {
    stop("away_col is missing with no default")
  }

  ### Get Data
  data <-
    get_pbp_game(game_id, extra_parse = F) %>%
    filter(!wrong_time)
  if(is.null(data)) {
    warning("PBP Data Not Available for Win Probability Chart")
    return(NULL)
  }
  home_team <- data$home[1]
  away_team <- data$away[1]
  plot_lines <- 1200
  msec <- max(data$secs_remaining_absolute)
  sec <- msec - 2400
  ot_counter <- 0
  while(sec > 0) {
    sec <- sec - 300
    plot_lines <- c(plot_lines, 2400 + ot_counter * 300)
    ot_counter <- ot_counter + 1
  }
  date <- format(as.Date(data$date[1]), "%B %d, %Y")

  ### Naive WP if Spread Not Included
  if(!include_spread) {
    data$win_prob <- data$naive_win_prob
  }

  ### Get into Appropriate Format
  x <- rbind(

```

```

dplyr::select(data, secs_remaining_absolute, win_prob) %>%
  dplyr::mutate(team = "home"),
dplyr::select(data, secs_remaining_absolute, win_prob) %>%
  dplyr::mutate("win_prob" = 1 - win_prob,
                team = "away")
) %>%
  dplyr::mutate("secs_elapsed" = max(secs_remaining_absolute) - secs_remaining_absolute)

#### Game Excitement Index
data$wp_delta <- 0
for(i in 2:nrow(data)) {
  data$wp_delta[i] <- abs(data$win_prob[i] - data$win_prob[i-1])
}
gei <- sum(data$wp_delta, na.rm = T)
gei <- paste("Game Excitement Index:", round(gei, 2))

#### Minimum Win Probability
if(data$score_diff[nrow(data)] > 0) {
  min_prob <- min(data$win_prob)
  min_prob <- paste0("Minimum Win Probability for ", home_team, ":", ",
                     ifelse(100 * min_prob < 1, "< 1%",
                            paste0(round(100 * min_prob), "%")))
} else {
  min_prob <- min(1 - data$win_prob)
  min_prob <- paste0("Minimum Win Probability for ", away_team, ":", ",
                     ifelse(100 * min_prob < 1, "< 1%",
                            paste0(round(100 * min_prob), "%")))
}

home_score <- data$home_score[nrow(data)]
away_score <- data$away_score[nrow(data)]
st <- paste0(home_team, ":", home_score, " ", away_team, ":", away_score, "\n", date)

p <- ggplot2::ggplot(x, aes(x = secs_elapsed/60, y = win_prob, group = team, col = team)) +
  ggplot2::geom_line(size = 1) +
  ggplot2::theme_bw() +
  ggplot2::geom_vline(xintercept = plot_lines/60, lty = 2, alpha = 0.5, size = 0.8) +
  ggplot2::labs(x = "Minutes Elapsed",
                y = "Win Probability",
                col = "",
                title = paste0(ifelse(include_spread, "", "Naive "), "Win Probability Chart for ", hor
                  " vs. ", away_team),
                subtitle = st,
                caption = "Jacob Haarala (@jhaarala23) Data Accessed via ncaahoopR") +
  ggplot2::theme(plot.title = element_text(size = 16, hjust = 0.5),
                plot.subtitle = element_text(size = 12, hjust = 0.5, face = "italic"),
                axis.title = element_text(size = 14),
                plot.caption = element_text(size = 8, hjust = 0),
                legend.position = "bottom",) +
  ggplot2::scale_x_continuous(breaks = seq(0, msec/60, 5)) +
  ggplot2::scale_y_continuous(labels = function(x) {paste(100 * x, "%")}) +
  ggplot2::scale_color_manual(values = c(away_col, home_col),
                            labels = c(away_team, home_team))

```

```

if(show_labels) {
  p <- p +
    ggplot2::annotate("text", x = 5, y = 0.05, label = gei) +
    ggplot2::annotate("text", x = 5, y = 0.025, label = min_prob)
}

p
}

```

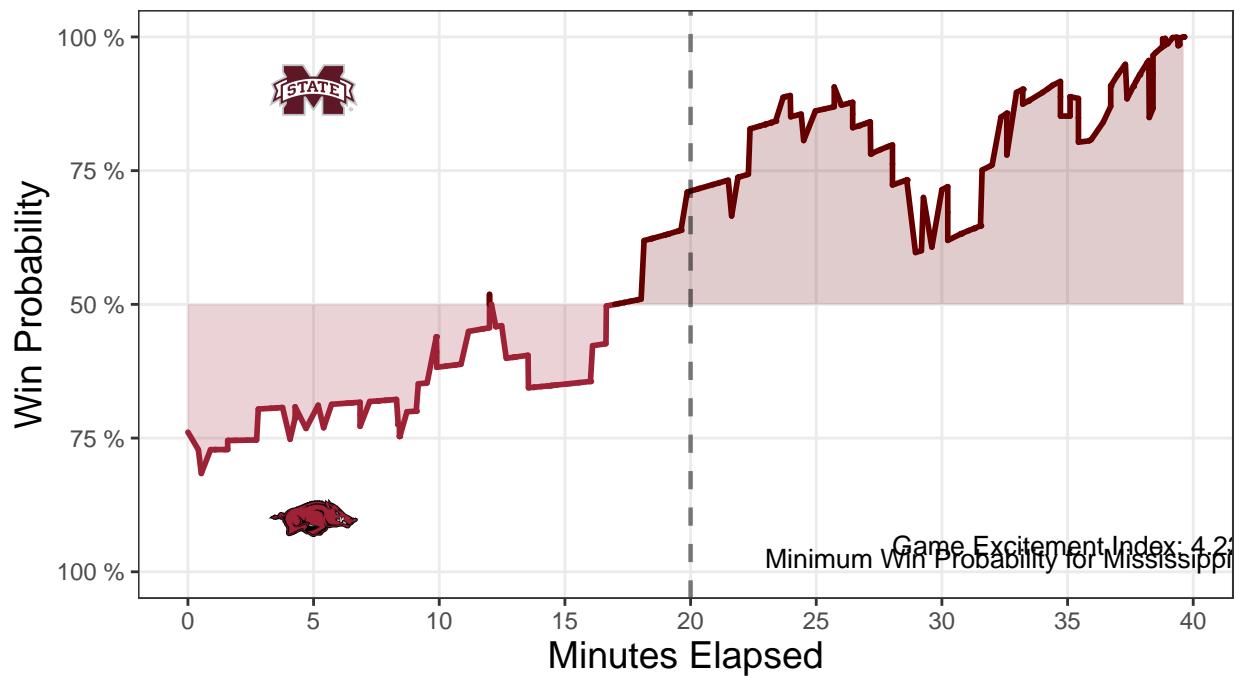
```
wp_chart_new(401484608)
```

```
## Scraping Data for Game: 1 of 1
```

Win Probability Chart for Arkansas vs. Mississippi State

Arkansas: 64 Mississippi State: 70

February 11, 2023



Luke Benz (@recspecs730) Data Accessed via ncaahoopR

```
wp_chart(game_id = 401484594, home_col = "black", away_col = "red")
```

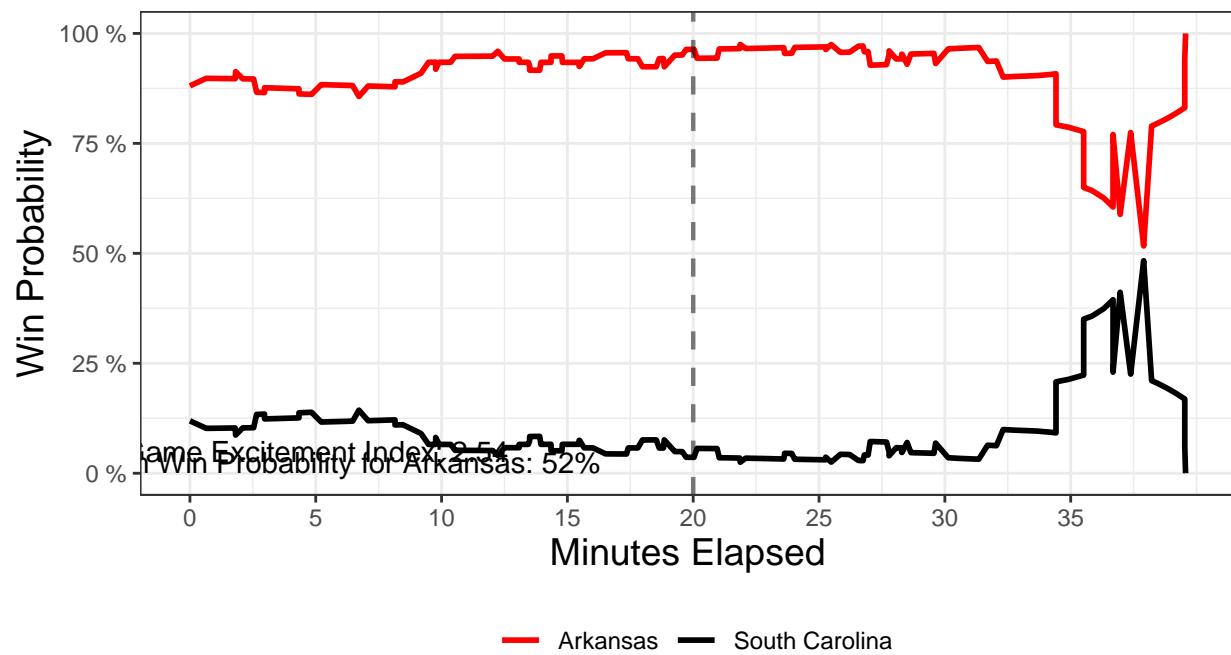
```
## Scraping Data for Game: 1 of 1
```

```
## Warning: Using 'size' aesthetic for lines was deprecated in ggplot2 3.4.0.
## i Please use 'linewidth' instead.
```

Win Probability Chart for South Carolina vs. Arkansas

South Carolina: 63 Arkansas: 65

February 04, 2023



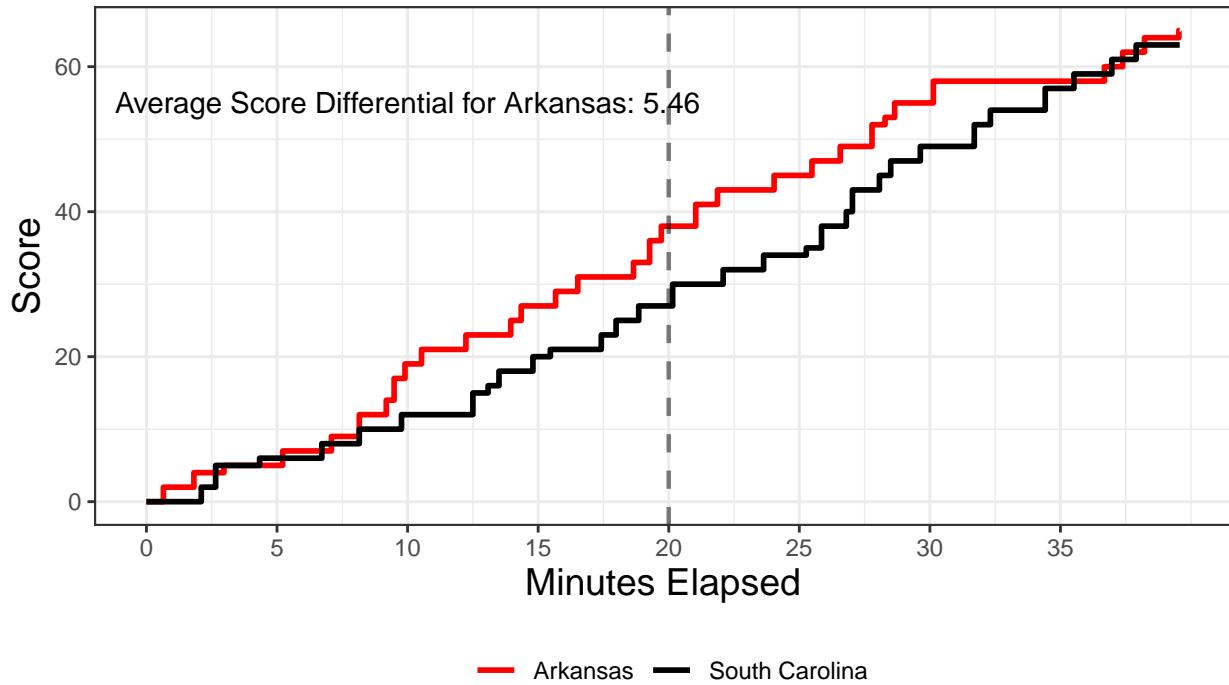
Jacob Haarala (@jhaarala23) Data Accessed via ncaahoopR

```
game_flow(game_id = 401484594, home_col = "black", away_col = "red")
```

```
## Scraping Data for Game: 1 of 1
```

Game Flow Chart for South Carolina vs. Arkansas

February 04, 2023



Luke Benz (@recspecs730) Data Accessed via ncaahoopR

```
average_win_prob(game_id = 401484594, include_spread = T)
```

```
## Scraping Data for Game: 1 of 1

## Getting Shots for Game 1 of 1

## No shot location data available for this game.

## Parsing Possessions

## [1] 0.09499065
```

ESPN game_id for which to compute time-based average win probability (from perspective of home team).

```
average_score_diff(game_id = 401484594)
```

```
## Scraping Data for Game: 1 of 1

## [1] -5.455771
```

ESPN game_id for which to compute time-based average score differential (from perspective of home team).

```
# switched to the LSU game because the data for the South Carolina game was not there yet
get_shot_locs(game_id = 401484577)
```

```
##          game_id      date
## 1      401484577 2023-01-24
## 2      401484577 2023-01-24
## 3      401484577 2023-01-24
## 4      401484577 2023-01-24
## 5      401484577 2023-01-24
## 6      401484577 2023-01-24
## 7      401484577 2023-01-24
## 8      401484577 2023-01-24
## 9      401484577 2023-01-24
## 10     401484577 2023-01-24
## 11     401484577 2023-01-24
## 12     401484577 2023-01-24
## 13     401484577 2023-01-24
## 14     401484577 2023-01-24
## 15     401484577 2023-01-24
## 16     401484577 2023-01-24
## 17     401484577 2023-01-24
## 18     401484577 2023-01-24
## 19     401484577 2023-01-24
## 20     401484577 2023-01-24
## 21     401484577 2023-01-24
## 22     401484577 2023-01-24
## 23     401484577 2023-01-24
## 24     401484577 2023-01-24
## 25     401484577 2023-01-24
## 26     401484577 2023-01-24
## 27     401484577 2023-01-24
## 28     401484577 2023-01-24
## 29     401484577 2023-01-24
## 30     401484577 2023-01-24
## 31     401484577 2023-01-24
## 32     401484577 2023-01-24
## 33     401484577 2023-01-24
## 34     401484577 2023-01-24
## 35     401484577 2023-01-24
## 36     401484577 2023-01-24
## 37     401484577 2023-01-24
## 38     401484577 2023-01-24
## 39     401484577 2023-01-24
## 40     401484577 2023-01-24
## 41     401484577 2023-01-24
## 42     401484577 2023-01-24
## 43     401484577 2023-01-24
## 44     401484577 2023-01-24
## 45     401484577 2023-01-24
## 46     401484577 2023-01-24
## 47     401484577 2023-01-24
## 48     401484577 2023-01-24
## 49     401484577 2023-01-24
```

```
## 50 401484577 2023-01-24
## 51 401484577 2023-01-24
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## 100 401484577 2023-01-24
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## 103 401484577 2023-01-24
```

```

## 104 401484577 2023-01-24
## 105 401484577 2023-01-24
## 106 401484577 2023-01-24
## 107 401484577 2023-01-24
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## 127 401484577 2023-01-24
## 128 401484577 2023-01-24
## 129 401484577 2023-01-24
## 130 401484577 2023-01-24
## 131 401484577 2023-01-24
## 132 401484577 2023-01-24
## 133 401484577 2023-01-24
##                                     shot_text x  y
## 1                               Jordan Walsh missed Jumper. 29  5
## 2                               Adam Miller missed Jumper. 13 77
## 3           Davonte Davis made Jumper. Assisted by Makhi Mitchell. 8  0
## 4                               Justice Williams missed Free Throw. 25 94
## 5                               Justice Williams made Free Throw. 25 94
## 6                               Anthony Black missed Jumper. 23 14
## 7                               Justice Williams missed Layup. 21 94
## 8                               KJ Williams made Free Throw. 25 94
## 9                               KJ Williams missed Free Throw. 25 94
## 10                              Anthony Black made Free Throw. 25  0
## 11                              Anthony Black made Free Throw. 25  0
## 12                               Jalen Reed missed Layup. 29 94
## 13                               Derek Fountain missed Layup. 24 91
## 14                               Justice Williams missed Layup. 24 92
## 15           Makhi Mitchell made Layup. Assisted by Anthony Black. 25  3
## 16                               Derek Fountain made Free Throw. 25 94
## 17                               Derek Fountain made Free Throw. 25 94
## 18           Ricky Council IV made Jumper. Assisted by Kamani Johnson. 40 10
## 19                               Trae Hannibal made Jumper. 40 85
## 20                               Anthony Black missed Jumper. 35 13
## 21                               Cam Hayes missed Three Point Jumper. 45 79
## 22                               Kendal Coleman missed Layup. 28 92
## 23   Davonte Davis made Three Point Jumper. Assisted by Ricky Council IV. 2  1

```

```

## 24          Ricky Council IV made Layup. 28 -1
## 25          KJ Williams made Jumper. Assisted by Adam Miller. 37 91
## 26          Cam Hayes missed Jumper. 39 81
## 27          Jordan Walsh missed Jumper. 17 17
## 28          Davonte Davis made Layup. Assisted by Ricky Council IV. 24 1
## 29          KJ Williams made Free Throw. 25 94
## 30          KJ Williams made Free Throw. 25 94
## 31          KJ Williams made Free Throw. 25 94
## 32          Anthony Black made Free Throw. 25 0
## 33          Anthony Black made Free Throw. 25 0
## 34          KJ Williams missed Jumper. 32 94
## 35          Anthony Black made Three Point Jumper. 28 25
## 36          Adam Miller missed Jumper. 41 79
## 37          Jordan Walsh made Layup. Assisted by Ricky Council IV. 29 0
## 38          KJ Williams missed Jumper. 25 85
## 39          Jordan Walsh made Layup. 28 1
## 40          Adam Miller missed Jumper. 17 94
## 41          Jalen Graham made Dunk. Assisted by Anthony Black. 23 2
## 42          Davonte Davis made Layup. 22 1
## 43          Trae Hannibal missed Jumper. 29 78
## 44          Jalen Graham made Dunk. Assisted by Ricky Council IV. 23 2
## 45          Trae Hannibal missed Jumper. 40 83
## 46          Jordan Walsh missed Dunk. 22 -1
## 47          Trae Hannibal missed Layup. 27 94
## 48          Trae Hannibal missed Layup. 24 93
## 49          Trae Hannibal made Layup. 26 93
## 50          Davonte Davis made Three Point Jumper. Assisted by Anthony Black. 2 4
## 51          Anthony Black made Three Point Jumper. Assisted by Ricky Council IV. 21 25
## 52          Justice Williams missed Three Point Jumper. 43 76
## 53          Ricky Council IV missed Three Point Jumper. 39 22
## 54          Cam Hayes missed Layup. 28 93
## 55          Ricky Council IV made Layup. 22 1
## 56          Jalen Reed missed Jumper. 23 89
## 57          Ricky Council IV missed Three Point Jumper. 48 6
## 58          KJ Williams missed Three Point Jumper. 49 95
## 59          Anthony Black missed Three Point Jumper. 33 28
## 60          KJ Williams missed Jumper. 16 95
## 61          Jalen Graham missed Jumper. 22 16
## 62          Cam Hayes missed Layup. 24 93
## 63          Derek Fountain made Free Throw. 25 94
## 64          Derek Fountain missed Free Throw. 25 94
## 65          Jalen Graham missed Jumper. 25 9
## 66          Jalen Graham missed Jumper. 29 12
## 67          Derek Fountain made Layup. 24 91
## 68          Ricky Council IV missed Jumper. 25 7
## 69          Justice Williams made Layup. Assisted by Jalen Reed. 22 93
## 70          Justice Williams missed Layup. 28 94
## 71          Adam Miller made Layup. Assisted by Justice Williams. 26 93
## 72          Ricky Council IV made Jumper. 27 14
## 73          Adam Miller made Three Point Jumper. Assisted by Derek Fountain. 32 71
## 74          Makhi Mitchell missed Layup. 28 1
## 75          Adam Miller missed Free Throw. 25 94
## 76          Adam Miller made Free Throw. 25 94
## 77          Joseph Pinion missed Three Point Jumper. 1 -2

```

| | |
|--------|---|
| ## 78 | Ricky Council IV missed Layup. 22 1 |
| ## 79 | Adam Miller made Layup. Assisted by KJ Williams. 27 91 |
| ## 80 | Adam Miller made Free Throw. 25 94 |
| ## 81 | Derek Fountain missed Layup. 23 94 |
| ## 82 | Justice Williams made Layup. 24 92 |
| ## 83 | Jalen Reed missed Jumper. 23 87 |
| ## 84 | Ricky Council IV missed Jumper. 16 16 |
| ## 85 | Joseph Pinion missed Three Point Jumper. 6 17 |
| ## 86 | Adam Miller missed Three Point Jumper. 25 65 |
| ## 87 | Ricky Council IV made Free Throw. 25 0 |
| ## 88 | Ricky Council IV made Free Throw. 25 0 |
| ## 89 | Justice Williams made Jumper. 16 92 |
| ## 90 | Anthony Black missed Jumper. 27 10 |
| ## 91 | Makhi Mitchell made Free Throw. 25 0 |
| ## 92 | Makhi Mitchell made Free Throw. 25 0 |
| ## 93 | Trae Hannibal missed Jumper. 26 88 |
| ## 94 | Davonte Davis missed Jumper. 7 8 |
| ## 95 | Trae Hannibal missed Jumper. 21 88 |
| ## 96 | Ricky Council IV missed Jumper. 31 3 |
| ## 97 | Ricky Council IV missed Free Throw. 25 0 |
| ## 98 | Adam Miller missed Three Point Jumper. 35 67 |
| ## 99 | Davonte Davis made Jumper. 19 3 |
| ## 100 | KJ Williams missed Jumper. 30 94 |
| ## 101 | KJ Williams missed Layup. 26 94 |
| ## 102 | KJ Williams made Layup. 25 93 |
| ## 103 | Jordan Walsh missed Three Point Jumper. 49 0 |
| ## 104 | Trae Hannibal made Dunk. Assisted by Justice Williams. 23 92 |
| ## 105 | Makhi Mitchell made Dunk. Assisted by Davonte Davis. 26 3 |
| ## 106 | KJ Williams missed Jumper. 16 93 |
| ## 107 | Ricky Council IV missed Jumper. 24 5 |
| ## 108 | Davonte Davis made Jumper. 9 2 |
| ## 109 | Adam Miller missed Three Point Jumper. 43 77 |
| ## 110 | KJ Williams made Free Throw. 25 94 |
| ## 111 | KJ Williams missed Free Throw. 25 94 |
| ## 112 | Anthony Black made Three Point Jumper. Assisted by Davonte Davis. 2 3 |
| ## 113 | Adam Miller missed Three Point Jumper. 45 81 |
| ## 114 | Justice Williams missed Jumper. 30 92 |
| ## 115 | Anthony Black missed Jumper. 19 5 |
| ## 116 | Jalen Graham made Dunk. Assisted by Ricky Council IV. 21 1 |
| ## 117 | Adam Miller missed Three Point Jumper. 2 84 |
| ## 118 | Jalen Graham missed Free Throw. 25 0 |
| ## 119 | Makhi Mitchell made Dunk. Assisted by Davonte Davis. 23 0 |
| ## 120 | Adam Miller missed Layup. 22 93 |
| ## 121 | Trae Hannibal made Layup. 24 92 |
| ## 122 | Makhi Mitchell made Dunk. Assisted by Ricky Council IV. 28 0 |
| ## 123 | Jalen Reed made Layup. 26 90 |
| ## 124 | Anthony Black missed Three Point Jumper. 17 26 |
| ## 125 | KJ Williams missed Jumper. 26 88 |
| ## 126 | Ricky Council IV missed Three Point Jumper. 10 20 |
| ## 127 | Makhi Mitchell missed Layup. 25 3 |
| ## 128 | Anthony Black missed Free Throw. 25 0 |
| ## 129 | Anthony Black made Free Throw. 25 0 |
| ## 130 | Jalen Graham missed Layup. 29 1 |
| ## 131 | Jalen Reed missed Jumper. 20 89 |

| | | | | | | |
|--------|---------|------------------|------------------|----------------|---------|-----------|
| ## 132 | | | Ricky Council IV | missed Layup. | 28 | 2 |
| ## 133 | | | Justice Williams | missed Jumper. | 39 | 93 |
| ## | outcome | shooter | assisted | three_pt | color | team_name |
| ## 1 | missed | Jordan Walsh | <NA> | FALSE | #a41f35 | Arkansas |
| ## 2 | missed | Adam Miller | <NA> | FALSE | #461d7c | LSU |
| ## 3 | made | Davonte Davis | Makhi Mitchell | FALSE | #a41f35 | Arkansas |
| ## 4 | missed | Justice Williams | <NA> | FALSE | #461d7c | LSU |
| ## 5 | made | Justice Williams | <NA> | FALSE | #461d7c | LSU |
| ## 6 | missed | Anthony Black | <NA> | FALSE | #a41f35 | Arkansas |
| ## 7 | missed | Justice Williams | <NA> | FALSE | #461d7c | LSU |
| ## 8 | made | KJ Williams | <NA> | FALSE | #461d7c | LSU |
| ## 9 | missed | KJ Williams | <NA> | FALSE | #461d7c | LSU |
| ## 10 | made | Anthony Black | <NA> | FALSE | #a41f35 | Arkansas |
| ## 11 | made | Anthony Black | <NA> | FALSE | #a41f35 | Arkansas |
| ## 12 | missed | Jalen Reed | <NA> | FALSE | #461d7c | LSU |
| ## 13 | missed | Derek Fountain | <NA> | FALSE | #461d7c | LSU |
| ## 14 | missed | Justice Williams | <NA> | FALSE | #461d7c | LSU |
| ## 15 | made | Makhi Mitchell | Anthony Black | FALSE | #a41f35 | Arkansas |
| ## 16 | made | Derek Fountain | <NA> | FALSE | #461d7c | LSU |
| ## 17 | made | Derek Fountain | <NA> | FALSE | #461d7c | LSU |
| ## 18 | made | Ricky Council IV | Kamani Johnson | FALSE | #a41f35 | Arkansas |
| ## 19 | made | Trae Hannibal | <NA> | FALSE | #461d7c | LSU |
| ## 20 | missed | Anthony Black | <NA> | FALSE | #a41f35 | Arkansas |
| ## 21 | missed | Cam Hayes | <NA> | TRUE | #461d7c | LSU |
| ## 22 | missed | Kendal Coleman | <NA> | FALSE | #461d7c | LSU |
| ## 23 | made | Davonte Davis | Ricky Council IV | TRUE | #a41f35 | Arkansas |
| ## 24 | made | Ricky Council IV | <NA> | FALSE | #a41f35 | Arkansas |
| ## 25 | made | KJ Williams | Adam Miller | FALSE | #461d7c | LSU |
| ## 26 | missed | Cam Hayes | <NA> | FALSE | #461d7c | LSU |
| ## 27 | missed | Jordan Walsh | <NA> | FALSE | #a41f35 | Arkansas |
| ## 28 | made | Davonte Davis | Ricky Council IV | FALSE | #a41f35 | Arkansas |
| ## 29 | made | KJ Williams | <NA> | FALSE | #461d7c | LSU |
| ## 30 | made | KJ Williams | <NA> | FALSE | #461d7c | LSU |
| ## 31 | made | KJ Williams | <NA> | FALSE | #461d7c | LSU |
| ## 32 | made | Anthony Black | <NA> | FALSE | #a41f35 | Arkansas |
| ## 33 | made | Anthony Black | <NA> | FALSE | #a41f35 | Arkansas |
| ## 34 | missed | KJ Williams | <NA> | FALSE | #461d7c | LSU |
| ## 35 | made | Anthony Black | <NA> | TRUE | #a41f35 | Arkansas |
| ## 36 | missed | Adam Miller | <NA> | FALSE | #461d7c | LSU |
| ## 37 | made | Jordan Walsh | Ricky Council IV | FALSE | #a41f35 | Arkansas |
| ## 38 | missed | KJ Williams | <NA> | FALSE | #461d7c | LSU |
| ## 39 | made | Jordan Walsh | <NA> | FALSE | #a41f35 | Arkansas |
| ## 40 | missed | Adam Miller | <NA> | FALSE | #461d7c | LSU |
| ## 41 | made | Jalen Graham | Anthony Black | FALSE | #a41f35 | Arkansas |
| ## 42 | made | Davonte Davis | <NA> | FALSE | #a41f35 | Arkansas |
| ## 43 | missed | Trae Hannibal | <NA> | FALSE | #461d7c | LSU |
| ## 44 | made | Jalen Graham | Ricky Council IV | FALSE | #a41f35 | Arkansas |
| ## 45 | missed | Trae Hannibal | <NA> | FALSE | #461d7c | LSU |
| ## 46 | missed | Jordan Walsh | <NA> | FALSE | #a41f35 | Arkansas |
| ## 47 | missed | Trae Hannibal | <NA> | FALSE | #461d7c | LSU |
| ## 48 | missed | Trae Hannibal | <NA> | FALSE | #461d7c | LSU |
| ## 49 | made | Trae Hannibal | <NA> | FALSE | #461d7c | LSU |
| ## 50 | made | Davonte Davis | Anthony Black | TRUE | #a41f35 | Arkansas |
| ## 51 | made | Anthony Black | Ricky Council IV | TRUE | #a41f35 | Arkansas |

| | | | | | |
|--------|--------|------------------|------------------|---------------|----------|
| ## 52 | missed | Justice Williams | <NA> | TRUE #461d7c | LSU |
| ## 53 | missed | Ricky Council IV | <NA> | TRUE #a41f35 | Arkansas |
| ## 54 | missed | Cam Hayes | <NA> | FALSE #461d7c | LSU |
| ## 55 | made | Ricky Council IV | <NA> | FALSE #a41f35 | Arkansas |
| ## 56 | missed | Jalen Reed | <NA> | FALSE #461d7c | LSU |
| ## 57 | missed | Ricky Council IV | <NA> | TRUE #a41f35 | Arkansas |
| ## 58 | missed | KJ Williams | <NA> | TRUE #461d7c | LSU |
| ## 59 | missed | Anthony Black | <NA> | TRUE #a41f35 | Arkansas |
| ## 60 | missed | KJ Williams | <NA> | FALSE #461d7c | LSU |
| ## 61 | missed | Jalen Graham | <NA> | FALSE #a41f35 | Arkansas |
| ## 62 | missed | Cam Hayes | <NA> | FALSE #461d7c | LSU |
| ## 63 | made | Derek Fountain | <NA> | FALSE #461d7c | LSU |
| ## 64 | missed | Derek Fountain | <NA> | FALSE #461d7c | LSU |
| ## 65 | missed | Jalen Graham | <NA> | FALSE #a41f35 | Arkansas |
| ## 66 | missed | Jalen Graham | <NA> | FALSE #a41f35 | Arkansas |
| ## 67 | made | Derek Fountain | <NA> | FALSE #461d7c | LSU |
| ## 68 | missed | Ricky Council IV | <NA> | FALSE #a41f35 | Arkansas |
| ## 69 | made | Justice Williams | Jalen Reed | FALSE #461d7c | LSU |
| ## 70 | missed | Justice Williams | <NA> | FALSE #461d7c | LSU |
| ## 71 | made | Adam Miller | Justice Williams | FALSE #461d7c | LSU |
| ## 72 | made | Ricky Council IV | <NA> | FALSE #a41f35 | Arkansas |
| ## 73 | made | Adam Miller | Derek Fountain | TRUE #461d7c | LSU |
| ## 74 | missed | Makhi Mitchell | <NA> | FALSE #a41f35 | Arkansas |
| ## 75 | missed | Adam Miller | <NA> | FALSE #461d7c | LSU |
| ## 76 | made | Adam Miller | <NA> | FALSE #461d7c | LSU |
| ## 77 | missed | Joseph Pinion | <NA> | TRUE #a41f35 | Arkansas |
| ## 78 | missed | Ricky Council IV | <NA> | FALSE #a41f35 | Arkansas |
| ## 79 | made | Adam Miller | KJ Williams | FALSE #461d7c | LSU |
| ## 80 | made | Adam Miller | <NA> | FALSE #461d7c | LSU |
| ## 81 | missed | Derek Fountain | <NA> | FALSE #461d7c | LSU |
| ## 82 | made | Justice Williams | <NA> | FALSE #461d7c | LSU |
| ## 83 | missed | Jalen Reed | <NA> | FALSE #461d7c | LSU |
| ## 84 | missed | Ricky Council IV | <NA> | FALSE #a41f35 | Arkansas |
| ## 85 | missed | Joseph Pinion | <NA> | TRUE #a41f35 | Arkansas |
| ## 86 | missed | Adam Miller | <NA> | TRUE #461d7c | LSU |
| ## 87 | made | Ricky Council IV | <NA> | FALSE #a41f35 | Arkansas |
| ## 88 | made | Ricky Council IV | <NA> | FALSE #a41f35 | Arkansas |
| ## 89 | made | Justice Williams | <NA> | FALSE #461d7c | LSU |
| ## 90 | missed | Anthony Black | <NA> | FALSE #a41f35 | Arkansas |
| ## 91 | made | Makhi Mitchell | <NA> | FALSE #a41f35 | Arkansas |
| ## 92 | made | Makhi Mitchell | <NA> | FALSE #a41f35 | Arkansas |
| ## 93 | missed | Trae Hannibal | <NA> | FALSE #461d7c | LSU |
| ## 94 | missed | Davonte Davis | <NA> | FALSE #a41f35 | Arkansas |
| ## 95 | missed | Trae Hannibal | <NA> | FALSE #461d7c | LSU |
| ## 96 | missed | Ricky Council IV | <NA> | FALSE #a41f35 | Arkansas |
| ## 97 | missed | Ricky Council IV | <NA> | FALSE #a41f35 | Arkansas |
| ## 98 | missed | Adam Miller | <NA> | TRUE #461d7c | LSU |
| ## 99 | made | Davonte Davis | <NA> | FALSE #a41f35 | Arkansas |
| ## 100 | missed | KJ Williams | <NA> | FALSE #461d7c | LSU |
| ## 101 | missed | KJ Williams | <NA> | FALSE #461d7c | LSU |
| ## 102 | made | KJ Williams | <NA> | FALSE #461d7c | LSU |
| ## 103 | missed | Jordan Walsh | <NA> | TRUE #a41f35 | Arkansas |
| ## 104 | made | Trae Hannibal | Justice Williams | FALSE #461d7c | LSU |
| ## 105 | made | Makhi Mitchell | Davonte Davis | FALSE #a41f35 | Arkansas |

```

## 106 missed KJ Williams <NA> FALSE #461d7c LSU
## 107 missed Ricky Council IV <NA> FALSE #a41f35 Arkansas
## 108 made Davonte Davis <NA> FALSE #a41f35 Arkansas
## 109 missed Adam Miller <NA> TRUE #461d7c LSU
## 110 made KJ Williams <NA> FALSE #461d7c LSU
## 111 missed KJ Williams <NA> FALSE #461d7c LSU
## 112 made Anthony Black Davonte Davis TRUE #a41f35 Arkansas
## 113 missed Adam Miller <NA> TRUE #461d7c LSU
## 114 missed Justice Williams <NA> FALSE #461d7c LSU
## 115 missed Anthony Black <NA> FALSE #a41f35 Arkansas
## 116 made Jalen Graham Ricky Council IV FALSE #a41f35 Arkansas
## 117 missed Adam Miller <NA> TRUE #461d7c LSU
## 118 missed Jalen Graham <NA> FALSE #a41f35 Arkansas
## 119 made Makhi Mitchell Davonte Davis FALSE #a41f35 Arkansas
## 120 missed Adam Miller <NA> FALSE #461d7c LSU
## 121 made Trae Hannibal <NA> FALSE #461d7c LSU
## 122 made Makhi Mitchell Ricky Council IV FALSE #a41f35 Arkansas
## 123 made Jalen Reed <NA> FALSE #461d7c LSU
## 124 missed Anthony Black <NA> TRUE #a41f35 Arkansas
## 125 missed KJ Williams <NA> FALSE #461d7c LSU
## 126 missed Ricky Council IV <NA> TRUE #a41f35 Arkansas
## 127 missed Makhi Mitchell <NA> FALSE #a41f35 Arkansas
## 128 missed Anthony Black <NA> FALSE #a41f35 Arkansas
## 129 made Anthony Black <NA> FALSE #a41f35 Arkansas
## 130 missed Jalen Graham <NA> FALSE #a41f35 Arkansas
## 131 missed Jalen Reed <NA> FALSE #461d7c LSU
## 132 missed Ricky Council IV <NA> FALSE #a41f35 Arkansas
## 133 missed Justice Williams <NA> FALSE #461d7c LSU

```

Returns data frame with shot location data when available.

```

#' Plot all shots from one game
#'
#' Plots game shot locations from one game.
#'
#' @param game_id ESPN game_id for which to render shot chart
#' @param heatmap Logical, Use a density-type heatmap, Default = False
#' @export
#'
#'
game_shot_chart <- function(game_id, heatmap = F){
  if(any(is.na(game_id))) {
    error("game_id missing with no default")
  }
  if(length(game_id) > 1) {
    error("game_shot_chart only takes in a single game_id")
  }

  shot_loc_df <- get_shot_locs(game_id)
  if(!is.null(shot_loc_df)) {
    teams <- sort(unique(shot_loc_df$team_name))
    game_title <- paste0(teams[1], " vs. ", teams[2])
    #color <- c(shot_loc_df$color[shot_loc_df$team_name == teams[1]][1],
    #         shot_loc_df$color[shot_loc_df$team_name == teams[2]][1])
  }
}

```

```

date <- format(as.Date(shot_loc_df$date[1]), "%B %d, %Y")

if(heatmap){
  full_title <- paste0(game_title, " \n ", date)
  title <- cowplot::ggdraw() +
    cowplot::draw_label(full_title,
                        fontface = 'bold')
  p <- team_shot_chart(game_id, teams[1], heatmap = T) +
    theme(legend.position = "bottom")
  p2 <- team_shot_chart(game_id, teams[2], heatmap=T) +
    labs(caption="") +
    theme(legend.position = "bottom")
  p3 <- cowplot::plot_grid(p,p2)
  p1 <- cowplot::plot_grid(title, p3, ncol = 1, rel_heights = c(0.1, 1))
  return(p1)
}

p1 <- suppressMessages(ggplot2::ggplot() +
  ggplot2::geom_point(data = shot_loc_df,
  aes(
    x = x,
    y = y,
    shape = team_name,
    color = outcome),
  size = 3) +
  ggplot2::geom_polygon(data = court, aes(x = x, y = y, group = group), col =
  ggplot2::geom_point(alpha = 0.2, size = 1.5) +
  #ggplot2::scale_color_manual(values = color) +
  ggplot2::xlab("") +
  ggplot2::ylab("") +
  ggplot2::coord_flip() +
  ggplot2::scale_x_reverse() +
  ggplot2::theme_void() +
  ggplot2::theme(
    axis.text.x = element_blank(),
    axis.text.y = element_blank(),
    axis.ticks.x = element_blank(),
    axis.ticks.y = element_blank(),
    axis.title = element_blank(),
    legend.position = "bottom",
    legend.direction = 'vertical',
    plot.title = element_text(size = 16, hjust = 0.5),
    plot.subtitle = element_text(size = 12, hjust = 0.5),
    plot.caption = element_text(size = 8, hjust = 0),
    plot.background = element_rect(fill = 'cornsilk')) +
  ggplot2::labs(
    title = game_title,
    subtitle = date,
    color = 'Made',
    shape = 'Team',
    caption = "Jacob Haarala (@jhaarala23) Data Accessed via ncaahoopR"))
  return(p1)
}

```

```
}
```

```
' Plot all shots for a team
#
#' Plots team shot locations from one game or multiple games.
#
#' @param game_ids Vector of ESPN game_ids
#' @param team Team Name
#' @param heatmap Use a density-type heatmap (Default = FALSE)
#' @export
team_shot_chart <- function(game_ids, team, heatmap = F) {
  if(any(is.na(game_ids))) {
    error("game_ids missing with no default")
  }
  if(any(is.na(team))) {
    error("team missing with no default")
  }
  df <- get_shot_locs(game_ids)

  if(!is.null(df)) {
    side_one <- court %>% filter(side == 1)
    team_shots <- df %>% filter(team_name %in% c(team, dict$ESPN_PBP[dict$ESPN == team]))

    ### flip shots if they are on the wrong side
    team_shots[team_shots$y > 47, "x"] <- 50 - team_shots[team_shots$y > 47, "x"]
    team_shots[team_shots$y > 47, "y"] <- 94 - team_shots[team_shots$y > 47, "y"]

    ### only pick one color
    #color <- as.character(unique(team_shots$color))[1]

    if(heatmap){
      p1 <-
        ggplot2::ggplot() +
        ggplot2::stat_density_2d(data = team_shots,
                                 aes(x = x, y = y, fill = stat(density / max(density))),
                                 geom = "raster", contour = FALSE, interpolate = TRUE, n = 200) +
        ggplot2::geom_polygon(data = side_one, aes(x = x, y = y, group = group), col = "gray") +
        ggplot2::geom_point(alpha = 0.2, size = 1.5) +
        ggplot2::coord_equal() +
        ggplot2::xlab("") +
        ggplot2::ylab("") +
        ggplot2::scale_fill_viridis_c("Shot Frequency",
                                     limits = c(0, 1),
                                     breaks = c(0, 1),
                                     labels = c("Lower", "Higher"),
                                     option = "plasma") +
        ggplot2::theme_void() +
        ggplot2::theme(
          axis.text.x = element_blank(),
          axis.text.y = element_blank(),
          axis.ticks.x = element_blank(),
          axis.ticks.y = element_blank(),
          axis.title = element_blank(),

```

```

    plot.title = element_text(size = 16, hjust = 0.5),
    plot.subtitle = element_text(size = 12, hjust = 0.5),
    plot.caption = element_text(size = 8, hjust = 0)) +
  ggplot2::labs(
    title = paste0(team, " Shots"),
    shape = "Shot Outcome",
    caption = "Jacob Haarala (@jhaarala23) Data Accessed via ncaahoopR")
  return(p1)
}

p1 <-
  suppressMessages(ggplot2::ggplot() +
    ggplot2::geom_point(data = team_shots,
      aes(
        x = x,
        y = y,
        shape = team_name),
        color = outcome,
        size = 3) +
    ggplot2::geom_polygon(data = side_one, aes(x = x, y = y, group = group), col =
    ggplot2::geom_point(alpha = 0.2, size = 1.5) +
    ggplot2::scale_color_manual(values = color) +
    ggplot2::xlab("") +
    ggplot2::ylab("") +
    ggplot2::theme_void() +
    ggplot2::theme(
      axis.text.x = element_blank(),
      axis.text.y = element_blank(),
      axis.ticks.x = element_blank(),
      axis.ticks.y = element_blank(),
      axis.title = element_blank(),
      plot.title = element_text(size = 16, hjust = 0.5),
      plot.subtitle = element_text(size = 12, hjust = 0.5),
      plot.caption = element_text(size = 8, hjust = 0),
      plot.background = element_rect(fill = 'cornsilk'))) +
    ggplot2::labs(
      title = paste(team, " Shots"),
      shape = "Shot Outcome",
      caption = "Jacob Haarala (@jhaarala23) Data Accessed via ncaahoopR"))
  return(p1)
}
}

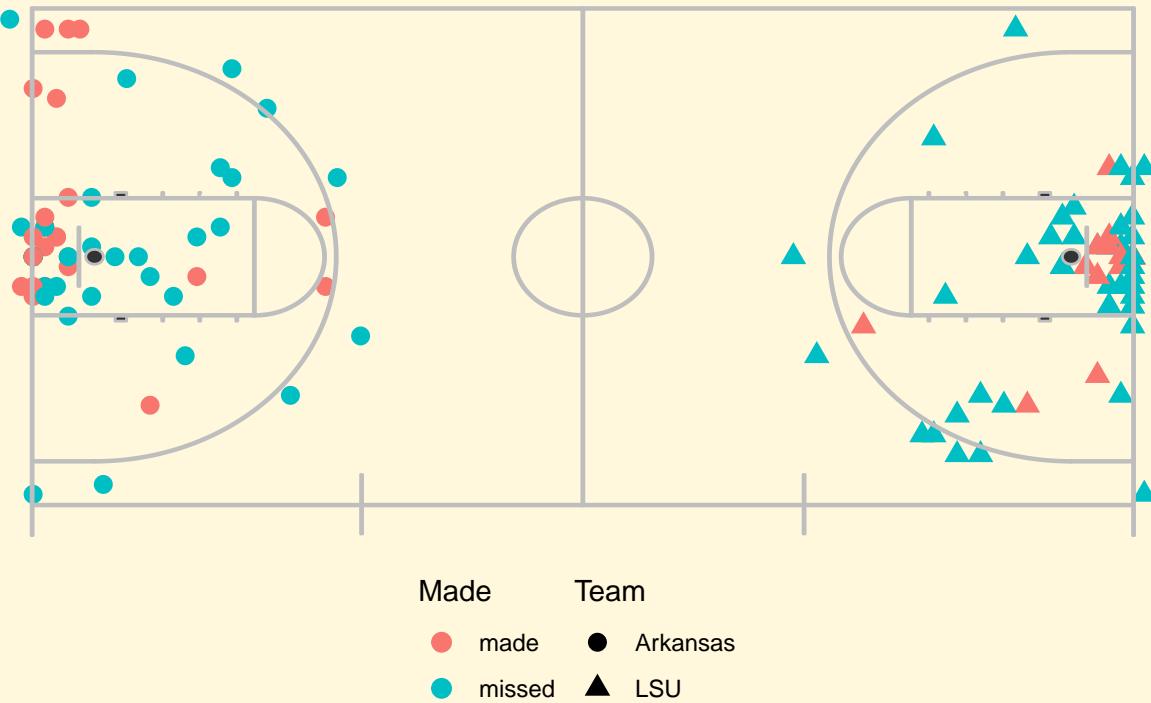
game_shot_chart(game_id = 401484577, heatmap = F)

```

```
## Getting Shots for Game 1 of 1
```

Arkansas vs. LSU

January 24, 2023



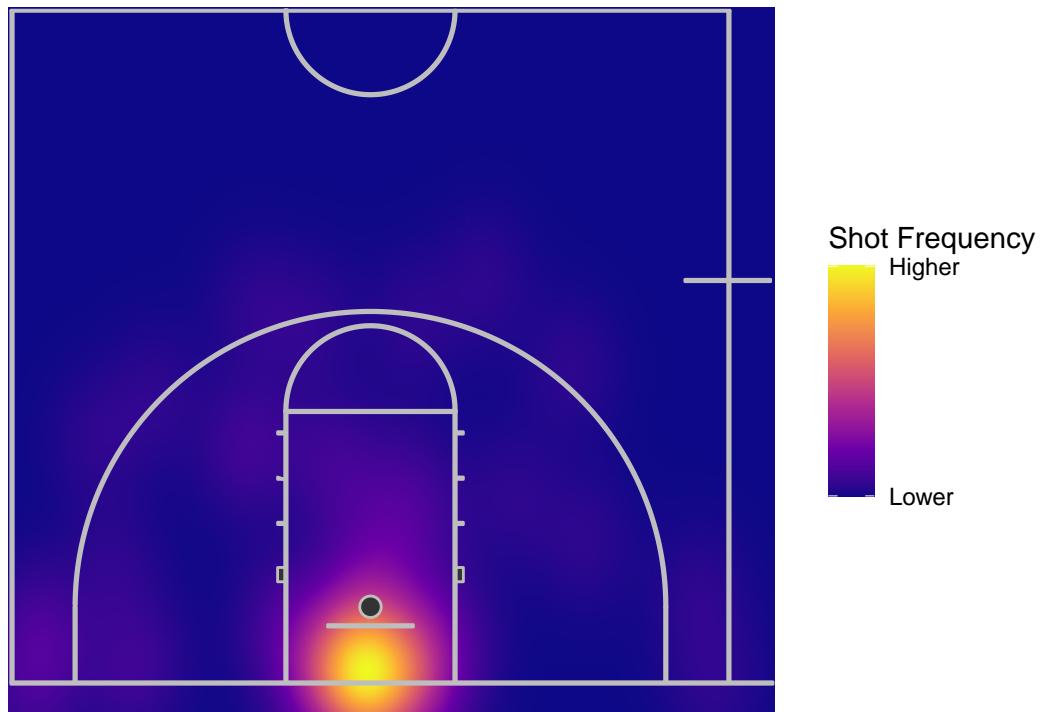
Jacob Haarala (@jhaarala23) Data Accessed via ncaahoopR

```
team_shot_chart(game_id = 401484577, team = "Arkansas", heatmap = T)

## Getting Shots for Game 1 of 1

## Warning: 'stat(density / max(density))' was deprecated in ggplot2 3.4.0.
## i Please use 'after_stat(density / max(density))' instead.
```

Arkansas Shots



Jacob Haarala (@jhaarala23) Data Accessed via ncaahoopR

If you want to do this over a span of games you can put multiple game ids in a vector for the 'game_id' parameter.