

penn state-behrend EDA

2025-07-02

```
library("readr")
library("dplyr")
library("ggplot2")
library("readr")
library("stringr")
library("glue")
```

```
g <- params$category
sn <- params$year
```

```
singular_game <- readr::read_csv(glue("Desktop/SURA project code/extended_cmu_data/extended_cmu_data_",
```

```
## New names:
```

```
## Rows: 21 Columns: 18
```

```
## -- Column specification
```

```
## -----
```

```
## (4): LINEUP (NAMES), NUMBERS, SCORE, LOCATION dbl (13): ...1, NUMBER OF GUARDS, OPPONENT POSSESSIONS
```

```
## PTS, SCORE DIFFERENTIAL WHEN ENTER, CMU 3PA,... time (1): LINEUP MINUTES
```

```
## i Use `spec()` to retrieve the full column specification for this data. i Specify the column types o
```

```
## this message.
```

```
## * `` -> `...1`
```

```
file <- glue("Desktop/SURA project code/dictionaries/", sn , "_game_order.txt")
```

```
game_order <- scan(file, what = "", sep = ",", strip.white = TRUE)
```

```
# if negatives in any columns (specifically had problem in possession column)
```

```
for (colName in colnames(c("CMU POSSESSIONS", "OPPONENT POSSESSIONS"))){
```

```
  singular_game[[colName]][singular_game[[colName]] < 0] <- 0
```

```
}
```

```
#individual_games <- readr::read_csv("Desktop/SURA project code/data frames/shortened.csv")
```

```
singular_game$`LINEUP MINUTES` <- sapply(singular_game$`LINEUP MINUTES`, function(t){
```

```
  parts <- as.integer(strsplit(as.character(t), ":")[[1]])
```

```
  parts[1]*60 + parts[2]
```

```
})
```

```
singular_game <- singular_game %>% rename('LINEUP SECONDS' = `LINEUP MINUTES`) %>% mutate(LINEUP_SORTED
```

```
  if (is.na(l)) return(NA)
```

```
  paste(sort(strsplit(l, ", ")[[1]]), collapse = " ")
```

```
)))
```

```
singular_game <- subset(singular_game, !((`SCORE DIFFERENTIAL WHEN ENTER` <= -11 | `SCORE DIFFERENTIAL
```

```
game <- singular_game %>% group_by(`LINEUP_SORTED`) %>% summarise(
```

```
  `NUMBER OF GUARDS` = mean(`NUMBER OF GUARDS`),
```

```
  `OPPONENT POSSESSIONS` = sum(`OPPONENT POSSESSIONS`, na.rm = TRUE),
```

```
  `CMU POSSESSIONS` = sum(`CMU POSSESSIONS`, na.rm = TRUE),
```

```

`LINEUP SECONDS` = sum(`LINEUP SECONDS`, na.rm = TRUE),
`OPPONENT PTS` = sum(`OPPONENT PTS`, na.rm = TRUE),
`CMU PTS` = sum(`CMU PTS`, na.rm = TRUE),
`CMU 3PA` = sum(`CMU 3PA`, na.rm = TRUE),
`CMU FGA` = sum(`CMU FGA`, na.rm = TRUE),
`CMU FTA` = sum(`CMU FTA`, na.rm = TRUE),
`CMU REBOUNDS` = sum(`CMU REBOUNDS`, na.rm = TRUE),
`TOTAL REBOUNDS` = sum(`TOTAL REBOUNDS`, na.rm = TRUE),
`SCORE DIFFERENTIAL WHEN ENTER` = paste(`SCORE DIFFERENTIAL WHEN ENTER`, collapse = ", "),
`QUARTER` = paste(`QUARTER`, collapse = ", ")
) %>%mutate(`PACE` = 40 * ((`CMU POSSESSIONS` + `OPPONENT POSSESSIONS`) / (2 * `LINEUP SECONDS`/60)),
`OFFENSIVE RATING` = 100 * (`CMU PTS` / `CMU POSSESSIONS`),
`DEFENSIVE RATING` = 100 * (`OPPONENT PTS` / `OPPONENT POSSESSIONS`),
`NET RATING` = `OFFENSIVE RATING` - `DEFENSIVE RATING`,
`3PA/FGA` = `CMU 3PA` / `CMU FGA`,
`TRUE SHOOTING %` = 100 * (`CMU PTS` / (2 * (`CMU FGA` + (0.44* `CMU FTA`)))),
`TRB%` = 100 * (`CMU REBOUNDS` / `TOTAL REBOUNDS`)

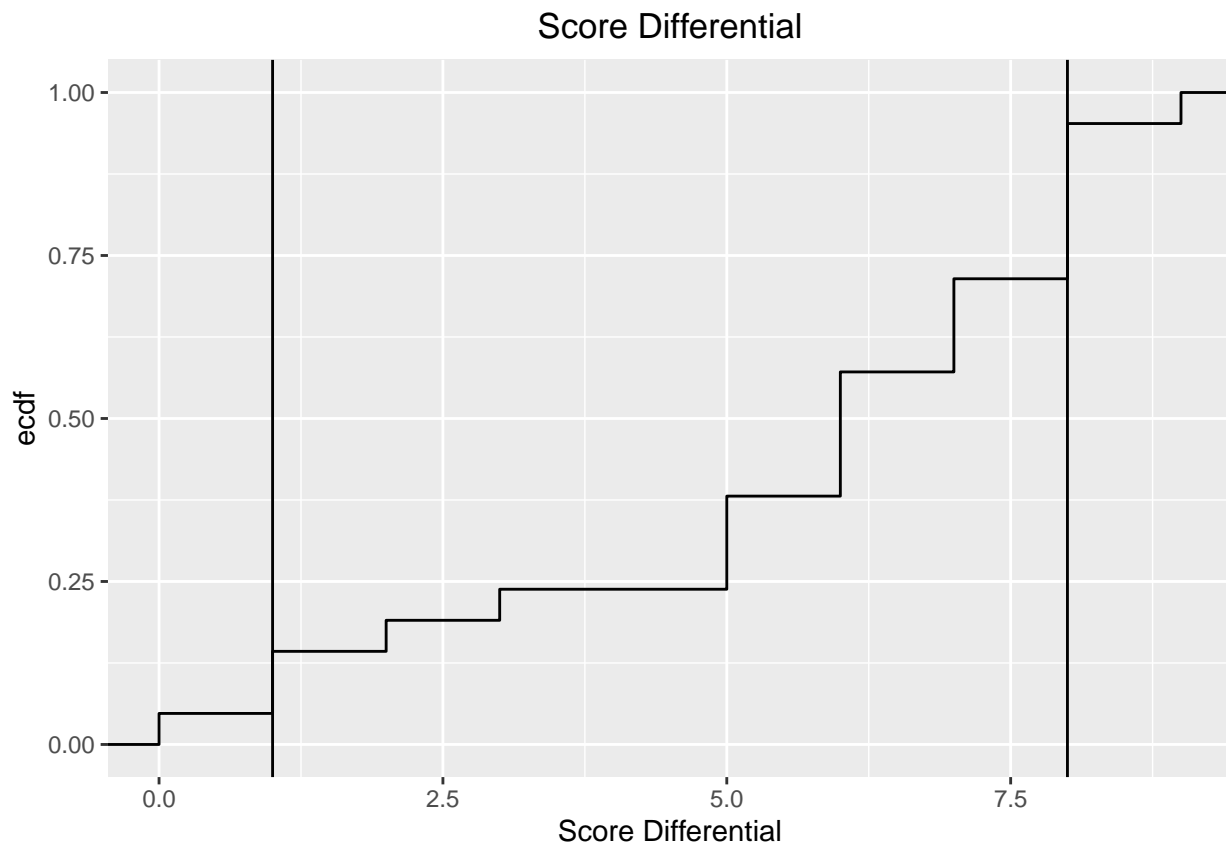
```

```
game <- subset(game, `LINEUP SECONDS` >= 60)
```

```

# see where to score differential cut off time -> SHOULD DO THIS AFTER OR BEFORE CUT SCRAP MINUTES?
l <- quantile(singular_game$`SCORE DIFFERENTIAL WHEN ENTER`, probs=c(0.1))
u <- quantile(singular_game$`SCORE DIFFERENTIAL WHEN ENTER`, probs=c(0.9))
ggplot(singular_game, aes(x = `SCORE DIFFERENTIAL WHEN ENTER`)) + stat_ecdf() + geom_vline(xintercept =

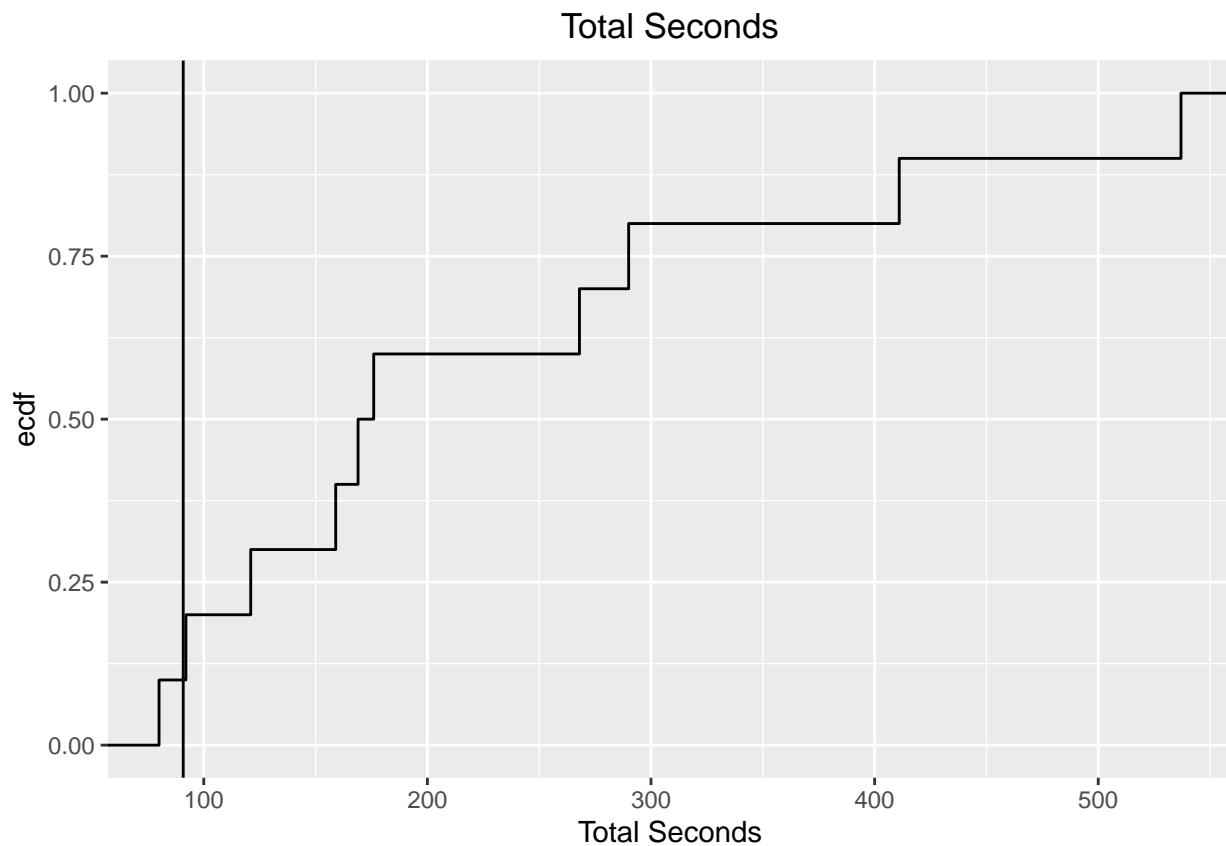
```



```

# see where to cut time -> SHOULD DO THIS AFTER OR BEFORE CUT SCRAP MINUTES?
p <- quantile(game$`LINEUP SECONDS`, probs=c(0.1))
ggplot(game, aes(x = `LINEUP SECONDS`)) + stat_ecdf() + geom_vline(xintercept = p) + labs(title = "Total

```



p

```
## 10%
## 90.8
```

```
#pdf(file = glue("Desktop/SURA project code/sing_game_EDA/{g}_plot.pdf"), width = 6, height = 5)
```

```
t_f <- c("3", "4")
```

```
has_three <- any(game$`NUMBER OF GUARDS` == 3, na.rm = TRUE)
has_four <- any(game$`NUMBER OF GUARDS` == 4, na.rm = TRUE)
```

```
if (has_three & has_four){
  ggplot(data = subset(game, subset = `NUMBER OF GUARDS` %in% t_f), aes(x = `NET RATING`, fill = factor(
    n3 <- sum(game$`NUMBER OF GUARDS` == 3)
    n4 <- sum(game$`NUMBER OF GUARDS` == 4)
    tapply(game$`NET RATING`[game$`NUMBER OF GUARDS` %in% t_f], game$`NUMBER OF GUARDS`[game$`NUMBER OF GUARDS`
    nr3m <- median(game$`NET RATING`[game$`NUMBER OF GUARDS` %in% c(3)], na.rm = TRUE)
    nr4m <- median(game$`NET RATING`[game$`NUMBER OF GUARDS` %in% c(4)], na.rm = TRUE)
    nr_p <- wilcox.test(`NET RATING` ~ `NUMBER OF GUARDS`, data = subset(game, `NUMBER OF GUARDS` %in% t_f))
  })
```

```
if (has_three & has_four){
  ggplot(data = subset(game, subset = `NUMBER OF GUARDS` %in% t_f), aes(x = `TRB`, fill = factor(`NUMBER OF GUARDS`
    tapply(game$`TRB`[game$`NUMBER OF GUARDS` %in% t_f], game$`NUMBER OF GUARDS`[game$`NUMBER OF GUARDS`
```

```

r3m <- median(game$`TRB`[game$`NUMBER OF GUARDS` %in% c(3)], na.rm = TRUE)
r4m <- median(game$`TRB`[game$`NUMBER OF GUARDS` %in% c(4)], na.rm = TRUE)
r_p <- wilcox.test(`TRB` ~ `NUMBER OF GUARDS`, data = subset(game, `NUMBER OF GUARDS` %in% t_f), exa
}

if (has_three & has_four){
  ggplot(data = subset(game, subset = `NUMBER OF GUARDS` %in% t_f), aes(x = `3PA/FGA`, fill = factor(`N
  tapply(game$`3PA/FGA`[game$`NUMBER OF GUARDS` %in% t_f], game$`NUMBER OF GUARDS`[game$`NUMBER OF GUAR

  three3m <- median(game$`3PA/FGA`[game$`NUMBER OF GUARDS` %in% c(3)], na.rm = TRUE)
  three4m <- median(game$`3PA/FGA`[game$`NUMBER OF GUARDS` %in% c(4)], na.rm = TRUE)
  three_p <- wilcox.test(`3PA/FGA` ~ `NUMBER OF GUARDS`, data = subset(game, `NUMBER OF GUARDS` %in% t_f)
}

if (has_three & has_four){
  ggplot(data = subset(game, subset = `NUMBER OF GUARDS` %in% t_f), aes(x = `TRUE SHOOTING %`, fill = f
  tapply(game$`TRUE SHOOTING %`[game$`NUMBER OF GUARDS` %in% t_f], game$`NUMBER OF GUARDS`[game$`NUMBER

  ts3m <- median(game$`TRUE SHOOTING %`[game$`NUMBER OF GUARDS` %in% c(3)], na.rm = TRUE)
  ts4m <- median(game$`TRUE SHOOTING %`[game$`NUMBER OF GUARDS` %in% c(4)], na.rm = TRUE)
  ts_p <- wilcox.test(`TRUE SHOOTING %` ~ `NUMBER OF GUARDS`, data = subset(game, `NUMBER OF GUARDS` %in
}

if (has_three & has_four){
  ggplot(data = subset(game, subset = `NUMBER OF GUARDS` %in% t_f), aes(x = `PACE`, fill = factor(`NUMB
  tapply(game$`PACE`[game$`NUMBER OF GUARDS` %in% t_f], game$`NUMBER OF GUARDS`[game$`NUMBER OF GUARDS`

  p3m <- median(game$`PACE`[game$`NUMBER OF GUARDS` %in% c(3)], na.rm = TRUE)
  p4m <- median(game$`PACE`[game$`NUMBER OF GUARDS` %in% c(4)], na.rm = TRUE)
  p_p <- wilcox.test(`PACE` ~ `NUMBER OF GUARDS`, data = subset(game, `NUMBER OF GUARDS` %in% t_f), exa
}

if (has_three & has_four){
  ggplot(data = subset(game, subset = `NUMBER OF GUARDS` %in% t_f), aes(x = `DEFENSIVE RATING`, fill =
  tapply(game$`DEFENSIVE RATING`[game$`NUMBER OF GUARDS` %in% t_f], game$`NUMBER OF GUARDS`[game$`NUMBE

  dr3m <- median(game$`DEFENSIVE RATING`[game$`NUMBER OF GUARDS` %in% c(3)], na.rm = TRUE)
  dr4m <- median(game$`DEFENSIVE RATING`[game$`NUMBER OF GUARDS` %in% c(4)], na.rm = TRUE)
  dr_p <- wilcox.test(`DEFENSIVE RATING` ~ `NUMBER OF GUARDS`, data = subset(game, `NUMBER OF GUARDS` %)
}

if (has_three & has_four){
  ggplot(data = subset(game, subset = `NUMBER OF GUARDS` %in% t_f), aes(x = `OFFENSIVE RATING`, fill =
  tapply(game$`OFFENSIVE RATING`[game$`NUMBER OF GUARDS` %in% t_f], game$`NUMBER OF GUARDS`[game$`NUMBE

  or3m <- median(game$`OFFENSIVE RATING`[game$`NUMBER OF GUARDS` %in% c(3)], na.rm = TRUE)
  or4m <- median(game$`OFFENSIVE RATING`[game$`NUMBER OF GUARDS` %in% c(4)], na.rm = TRUE)
  or_p <- wilcox.test(`OFFENSIVE RATING` ~ `NUMBER OF GUARDS`, data = subset(game, `NUMBER OF GUARDS` %)
}

```

```

if (has_three & has_four){
  individual_games <- individual_games %>% add_row(
    `GAME` = g,
    `SCORE` = first(singular_game$`SCORE`),
    `LOCATION` = first(singular_game$`LOCATION`),
    `3G` = n3,
    `4G` = n4,
    `3G MEDIAN NET RATING` = round(nr3m,2),
    `4G MEDIAN NET RATING` = round(nr4m,2),
    `NET RATING DIFFERENCE` = round(abs(nr3m - nr4m), 2),
    `NET RATING MANN-WHITNEY P-VALUE` = round(nr_p,2),
    `3G MEDIAN TRB%` = round(r3m,2),
    `4G MEDIAN TRB%` = round(r4m,2),
    `TRB% DIFFERENCE` = round(abs(r3m - r4m),2),
    `TRB% MANN-WHITNEY P-VALUE` = round(r_p,2),
    `3G MEDIAN 3PA/FGA` = round(three3m,2),
    `4G MEDIAN 3PA/FGA` = round(three4m,2),
    `3PA/FGA DIFFERENCE` = round(abs(three3m - three4m),2),
    `3PA/FGA MANN-WHITNEY P-VALUE` = round(three_p,2),
    `3G MEDIAN TRUE SHOOTING %` = round(ts3m,2),
    `4G MEDIAN TRUE SHOOTING %` = round(ts4m,2),
    `TRUE SHOOTING % DIFFERENCE` = round(abs(ts3m - ts4m),2),
    `TRUE SHOOTING % MANN-WHITNEY P-VALUE` = round(ts_p,2),
    `3G MEDIAN PACE` = round(p3m,2),
    `4G MEDIAN PACE` = round(p4m,2),
    `PACE DIFFERENCE` = round(abs(p3m - p4m),2),
    `PACE MANN-WHITNEY P-VALUE` = round(p_p,2),
    `3G MEDIAN DEFENSIVE RATING` = round(dr3m,2),
    `4G MEDIAN DEFENSIVE RATING` = round(dr4m,2),
    `DEFENSIVE RATING DIFFERENCE` = round(abs(dr3m - dr4m),2),
    `DEFENSIVE RATING MANN-WHITNEY P-VALUE` = round(dr_p,2),
    `3G MEDIAN OFFENSIVE RATING` = round(or3m,2),
    `4G MEDIAN OFFENSIVE RATING` = round(or4m,2),
    `OFFENSIVE RATING DIFFERENCE` = round(abs(or3m - or4m),2),
    `OFFENSIVE RATING MANN-WHITNEY P-VALUE` = round(or_p,2)
  )}

```

hard coded -> FIX LATER

```

#game_order <- c("alleggheny", "penn state-behrend", "muskingum", "oberlin", "denison", "carlow", "woost
if (has_three & has_four){
  individual_games <- individual_games %>% arrange(factor(`GAME`, levels = game_order))
}

```