allegheny 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: 22 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 = " ")
}))
```

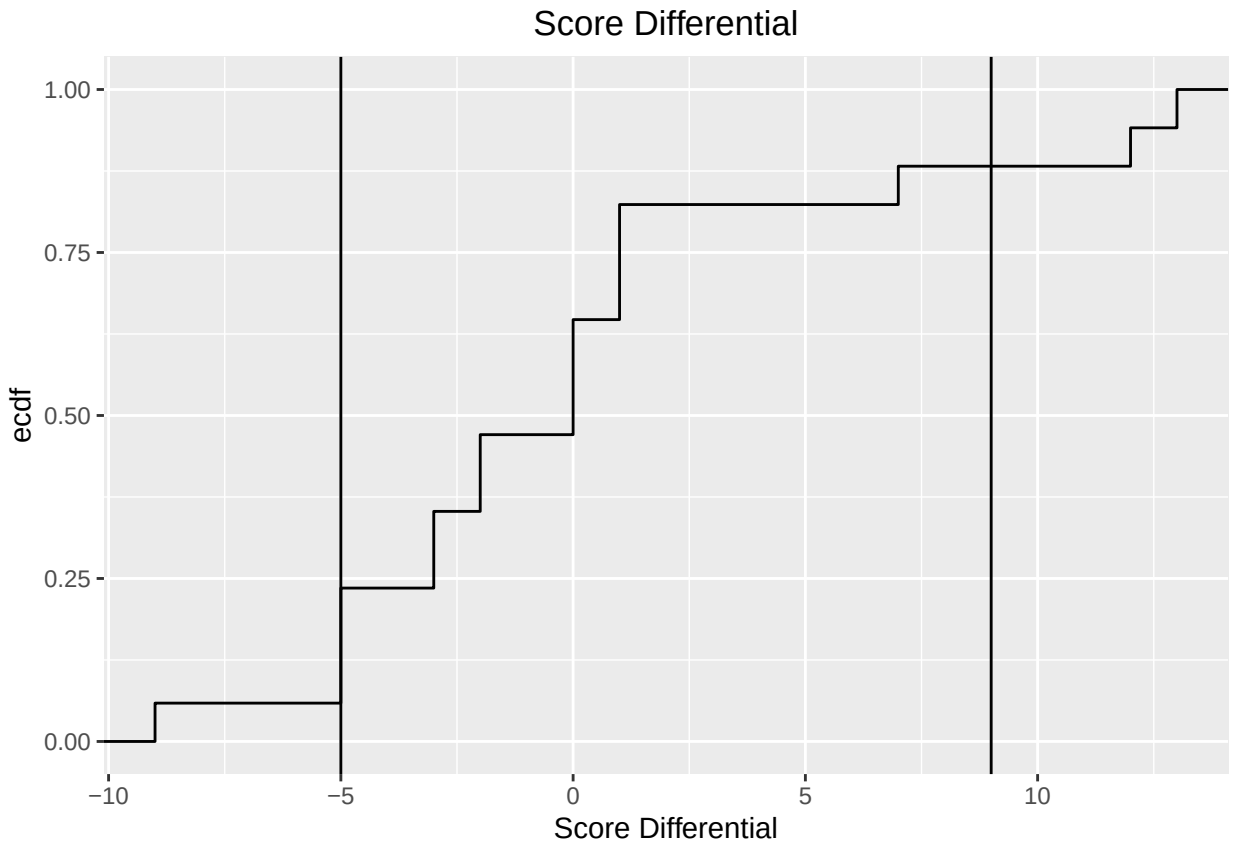
```
singular_game <- subset(singular_game, !((`SCORE DIFFERENTIAL WHEN ENTER` <= -11 | `SCORE DIFFERENTIAL
```

```
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),
```

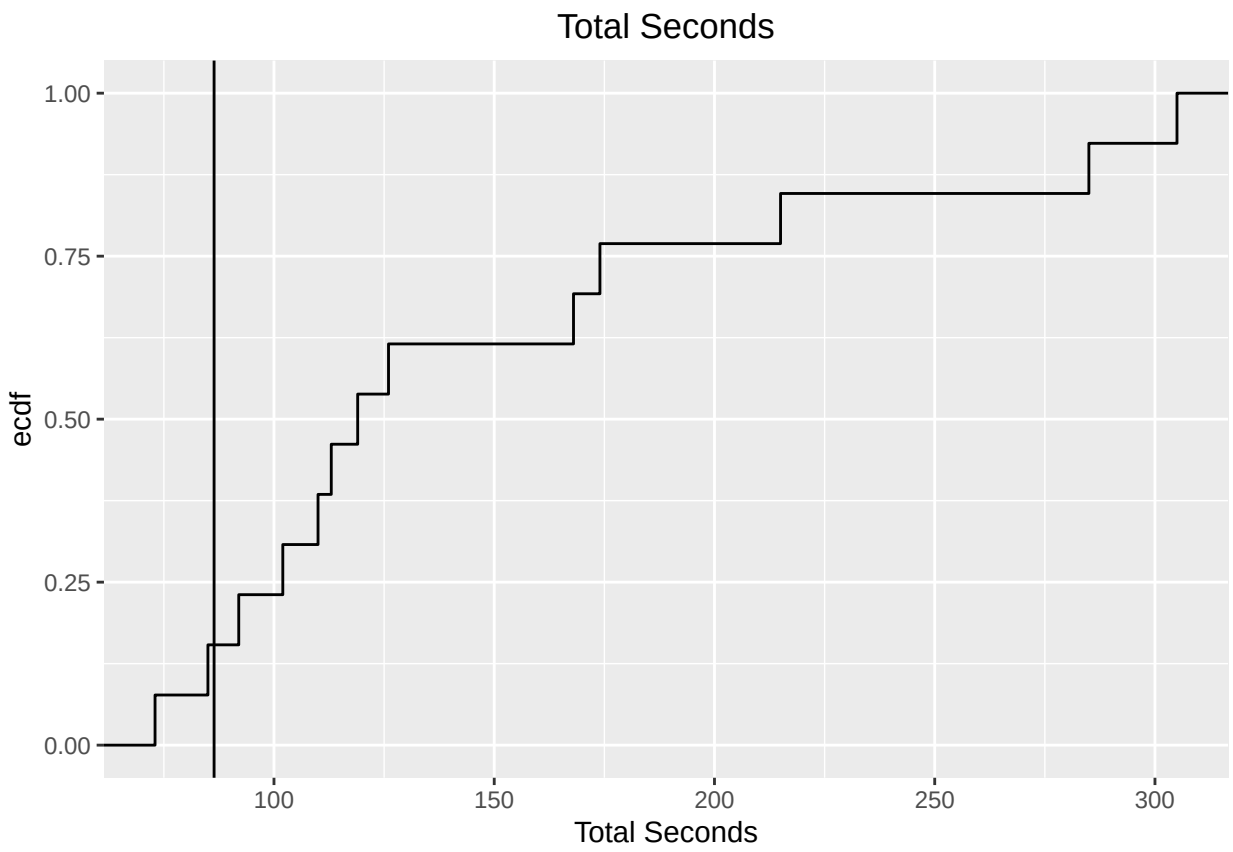
```
    `LINEUP SECONDS` = sum(`LINEUP SECONDS`, na.rm = TRUE),
    `OPPONENT PTS` = sum(`OPPONENT PTS`, na.rm = TRUE),
    `CMU PTS` = sum(`CMU PTS`, na.rm = TRUE),
    `CMU 3PA` = sum(`CMU 3PA`, na.rm = TRUE),
    `CMU FGA` = sum(`CMU FGA`, na.rm = TRUE),
    `CMU FTA` = sum(`CMU FTA`, na.rm = TRUE),
    `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 = "Tota
```




```
p
```

```
##  10%
## 86.4
```

```
#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 GU
  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_
}
```

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

  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(`NU
  tapply(game$`3PA/FGA`[game$`NUMBER OF GUARDS` %in% t_f], game$`NUMBER OF GUARDS`[game$`NUMBER OF GUARD

  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_
}
```

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

  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 = f

  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 = f

  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` %
}
```

```r
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)
  )}
```

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