

Swing Data Analysis

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Swing Analysis

This R Markdown document is for the purposes of examining the swing data and differences between the means of the four different types of swings (good swing, little pivot, wild pivot, back leg pick up). After examination, features for the machine learning model will be picked out and utilized in CreateML. This examination is for the datasets using Device Motion data, with intentions of creating an iOS app for the classification model.

```
# load in tidyverse packages
library(tidyverse)

## -- Attaching packages ----- tidyverse 1.3.0 --

## v ggplot2 3.3.2      v purrr  0.3.4
## v tibble  3.0.3      v dplyr  1.0.1
## v tidyr   1.1.1      v stringr 1.4.0
## v readr   1.3.1      v forcats 0.5.0

## -- Conflicts ----- tidyverse_conflicts() --
## x dplyr::filter() masks stats::filter()
## x dplyr::lag()    masks stats::lag()
```

Differences in Accelerometer Axis X Means:

```
# list of all .csvs in the directory
file_names <- list.files(pattern = '*.csv')

ax_mean_results <- c()

for (file in file_names){
  # read in file
  ax_mean_results <- read_csv(file) %>%
    # means of accelerometer / gyroscope
    summarize(mean_aX = mean(motionUserAccelerationX)) %>%
    # save file name
    mutate(file) %>%
    # remove the .csv ending part
    mutate(file = gsub('\\.csv', '', file),
           category = gsub('\\d', '', file)) %>%
    # append to previous results
    bind_rows(ax_mean_results, .)
}
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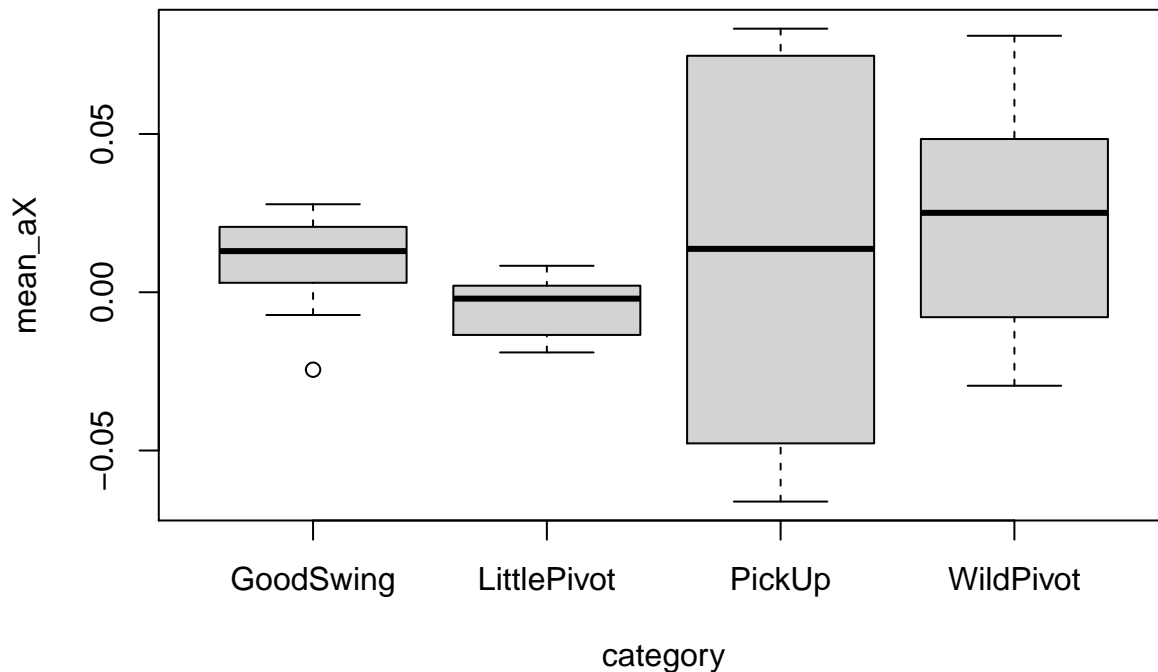
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```

Differences in Accelerometer Axis Y Means:

```
ay_mean_results <- c()

for (file in file_names){

  ay_mean_results <- read_csv(file) %>%
    summarize(mean_aY = mean(motionUserAccelerationY)) %>%
    mutate(file) %>%
    mutate(file = gsub('\\.csv', '', file),
           category = gsub('\\d', '', file)) %>%
    bind_rows(ay_mean_results, .)
}

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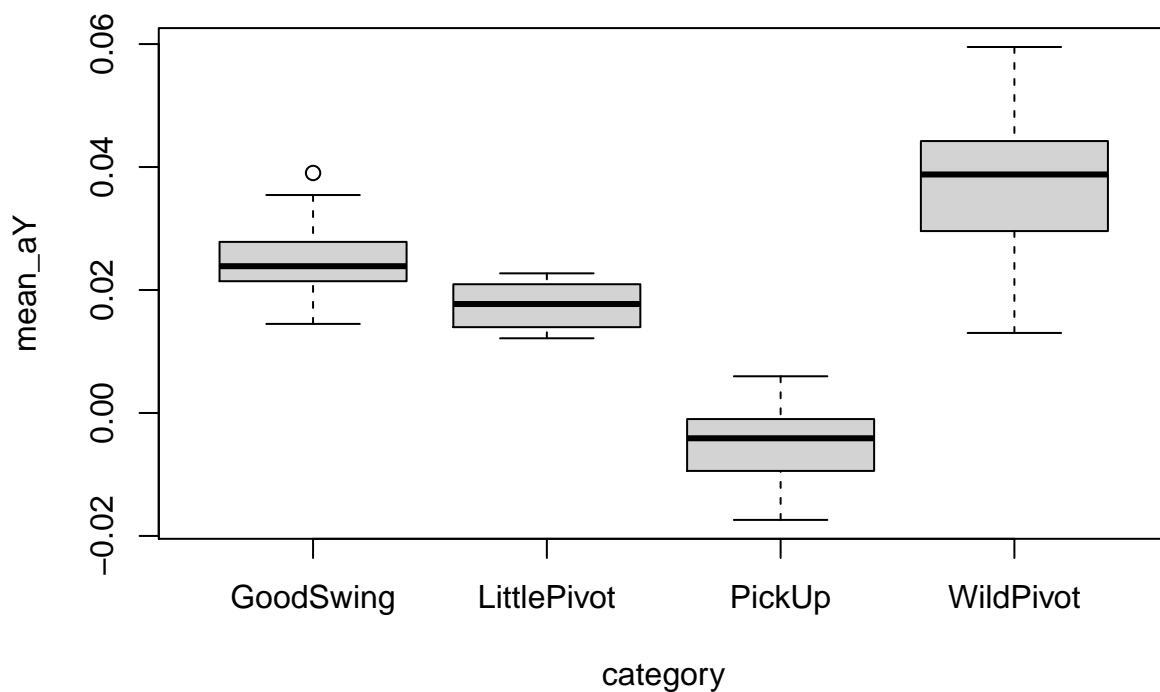
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## See spec(...) for full column specifications.
boxplot(mean_aY ~ category, data = ay_mean_results, title = "Means of Accelerometer Axis Y")

```



```
az_mean_results <- c()

for (file in file_names){

  az_mean_results <- read_csv(file) %>%
    summarize(mean_aZ = mean(motionUserAccelerationZ)) %>%
    mutate(file) %>%
    mutate(file = gsub('\\.csv', '', file),
           category = gsub('\\d', '', file)) %>%
    bind_rows(az_mean_results, .)

}
```

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##   .default = col_double()
## )

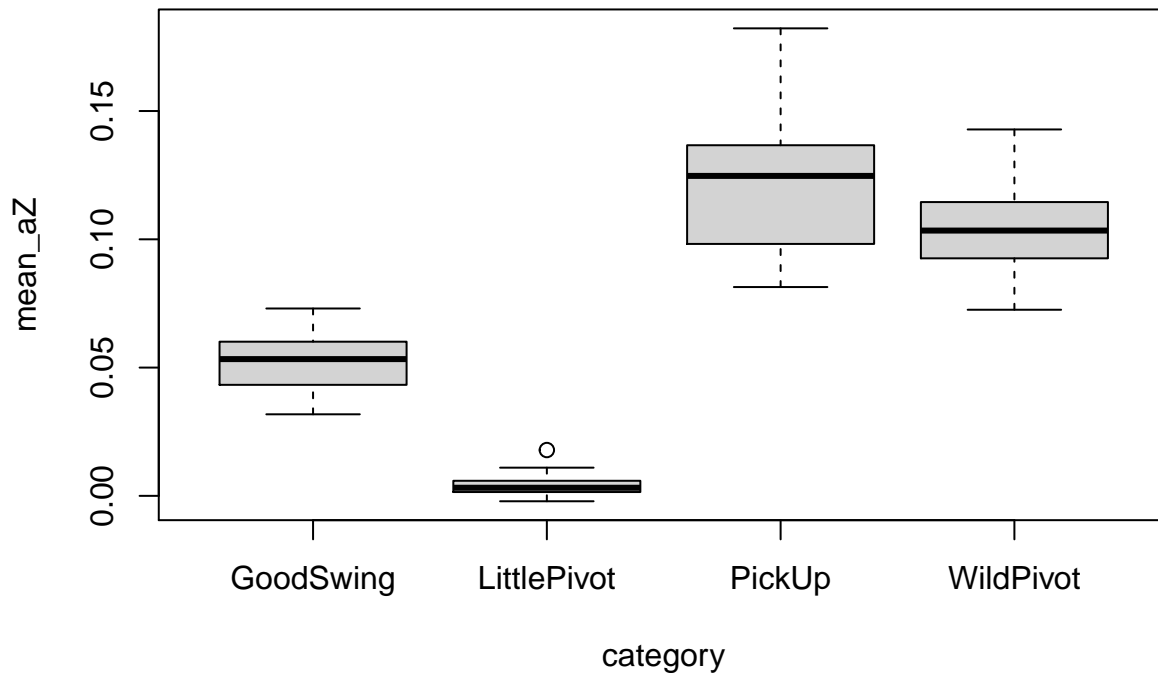
## See spec(...) for full column specifications.
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```

```
## See spec(...) for full column specifications.
## Parsed with column specification:
## cols(
##   .default = col_double()
## )
## See spec(...) for full column specifications.
boxplot(mean_aZ ~ category, data = az_mean_results, title = "Means of Accelerometer Axis Z")
```



Differences in Gyroscope Axis X Means:

```
gx_mean_results <- c()

for (file in file_names){

  gx_mean_results <- read_csv(file) %>%
    summarize(mean_gX = mean(motionRotationRateX)) %>%
    mutate(file) %>%
    mutate(file = gsub('\\.csv', '', file),
           category = gsub('\\d', '', file)) %>%
    bind_rows(gx_mean_results, .)
}
```

```
## Parsed with column specification:
## cols(
##   .default = col_double()
## )
## See spec(...) for full column specifications.
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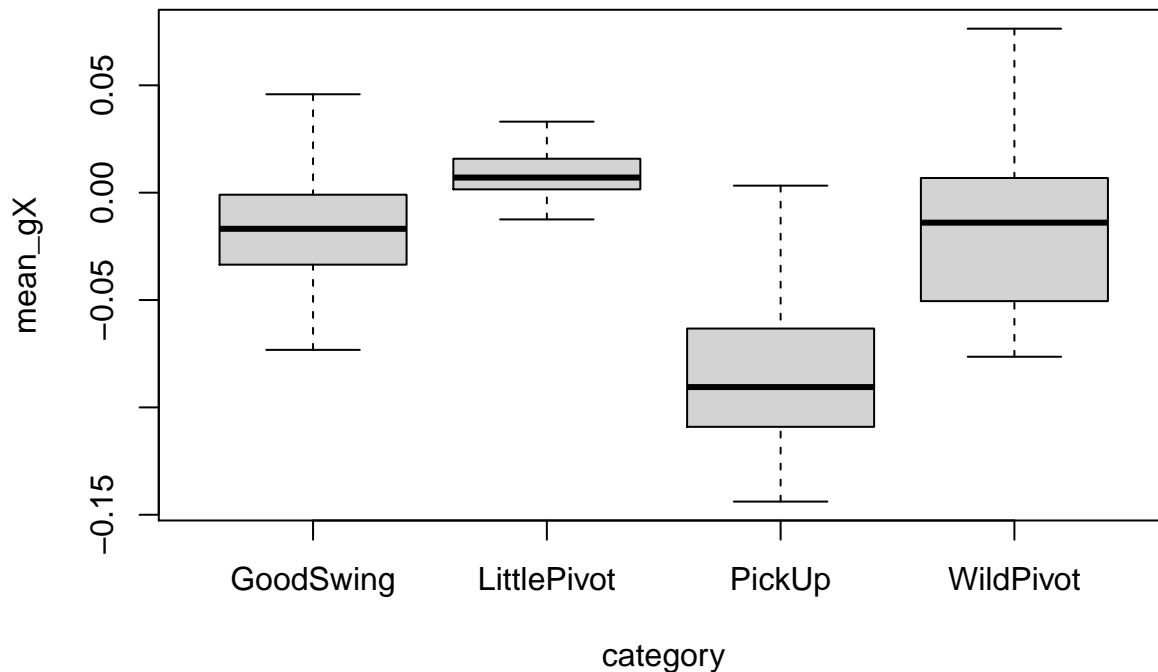
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## cols(
##   .default = col_double()
## )

## See spec(...) for full column specifications.
## Parsed with column specification:
## cols(
##   .default = col_double()
## )

```

Differences in Gyroscope Axis Y Means:

```
gy_mean_results <- c()

for (file in file_names){

  gy_mean_results <- read_csv(file) %>%
    summarize(mean_gY = mean(motionRotationRateY)) %>%
    mutate(file) %>%
    mutate(file = gsub('\\.csv', '', file),
           category = gsub('\\d', '', file)) %>%
    bind_rows(gy_mean_results, .)
}
```

```
## Parsed with column specification:
## cols(
##   .default = col_double()
## )
## See spec(...) for full column specifications.
## Parsed with column specification:
## cols(
##   .default = col_double()
## )
## See spec(...) for full column specifications.
## Parsed with column specification:
## cols(
##   .default = col_double()
## )
## See spec(...) for full column specifications.
## Parsed with column specification:
```


[illegible]

[illegible]

[illegible]

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```

## Parsed with column specification:
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## See spec(...) for full column specifications.

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## )

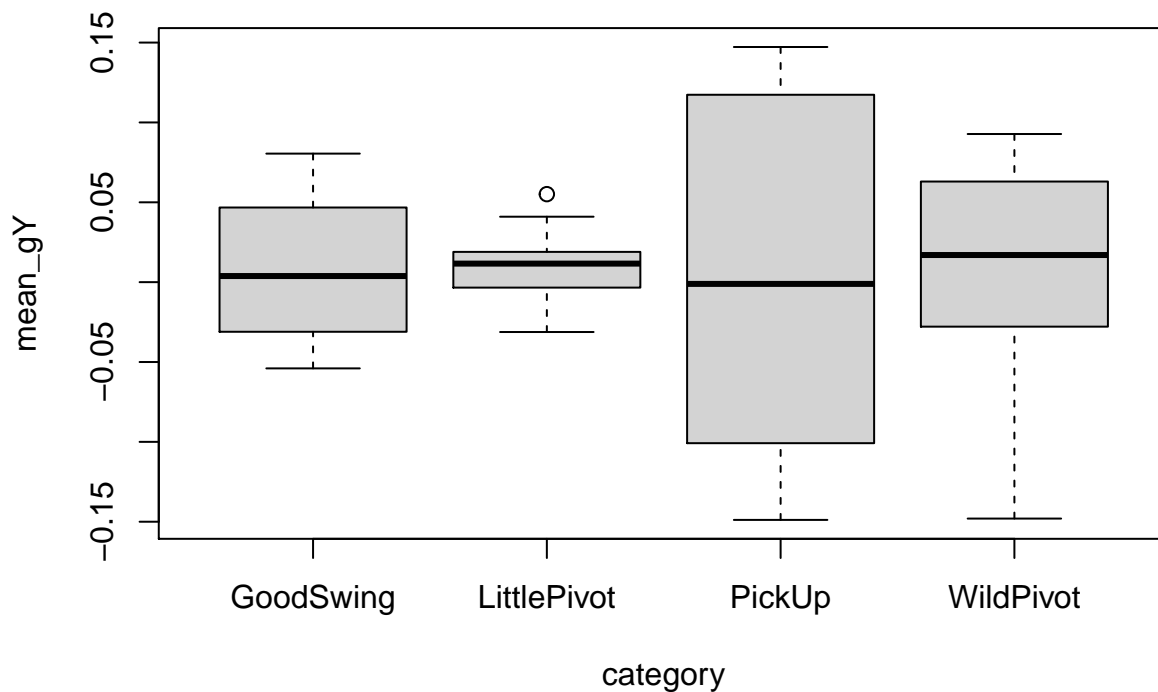
## See spec(...) for full column specifications.

## Parsed with column specification:
## cols(
##   .default = col_double()
## )

## See spec(...) for full column specifications.

boxplot(mean_gY ~ category, data = gy_mean_results, title = "Means of Gyroscope Axis Y")

```



```
gz_mean_results <- c()

for (file in file_names){

  gz_mean_results <- read_csv(file) %>%
    summarize(mean_gZ = mean(motionRotationRateZ)) %>%
    mutate(file) %>%
    mutate(file = gsub('\\.csv', '', file),
           category = gsub('\\d', '', file)) %>%
    bind_rows(gz_mean_results, .)

}
```

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```

## See spec(...) for full column specifications.
## Parsed with column specification:
## cols(
##   .default = col_double()
## )

## See spec(...) for full column specifications.
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## Parsed with column specification:
## cols(
##   .default = col_double()
## )

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```

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## See spec(...) for full column specifications.
## Parsed with column specification:
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##   .default = col_double()
## )

```

```
## See spec(...) for full column specifications.
## Parsed with column specification:
## cols(
##   .default = col_double()
## )
## See spec(...) for full column specifications.
boxplot(mean_gZ ~ category, data = gz_mean_results, title = "Means of Gyroscope Axis Z")
```



Summary: From the data visualization presented above, the features I will strive to use in my machine learning model are the accelerometer's Y and Z axis, and the gyroscope's X axis. These axes have the biggest differences between swing types, making classification much easier. If needed, the CreateML model can easily utilize the other discarded features; however I will only add these in if the model could improve significantly. (apologies for the pages of column parsing specifications in the knitted pdf)