

# Fielding Optim BigelowBricklayers

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## Load Packages

```
library(dplyr)
library(ggplot2)
library(tibble)
library(tidyverse)
```

## File Import

This imports the data into a dataframe and calls `head()` in order to get a front-sided view of the data.

```
fielding_data_df <- readr::read_csv("/Users/proje/Desktop/CollegeStuff/Math - Baseball/Baseball Fielding

## Parsed with column specification:
## cols(
##   .default = col_double(),
##   BatSide = col_character(),
##   PitcherHand = col_character(),
##   PitchTypeCode = col_character(),
##   Trajectory = col_character()
## )

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

fielding_data_df %>% head()

## # A tibble: 6 x 31
##   Game_PK pitcherid batterid BatSide PitcherHand inning PitchTypeCode
##       <dbl>     <dbl>     <dbl> <chr>    <chr>      <dbl> <chr>
## 1  566294     621242    614177 R         R           9  SL
## 2  530509     548389    546991 R         R           4  KC
## 3  566391     474463    592387 R         L           4  FF
## 4  530365     572140    435064 R         L           3  FT
## 5  529436     533167    543760 R         R           1  FF
## 6  566786     571946    608596 R         R           7  CU
## # ... with 24 more variables: ExitVelocity <dbl>, VertAngle <dbl>,
## #   HorizAngle <dbl>, Distance <dbl>, FlightTime <dbl>, Trajectory <chr>,
## #   HitValue <dbl>, RunValue <dbl>, X3 <dbl>, Y3 <dbl>, X4 <dbl>, Y4 <dbl>,
## #   X5 <dbl>, Y5 <dbl>, X6 <dbl>, Y6 <dbl>, X7 <dbl>, Y7 <dbl>, X8 <dbl>,
## #   Y8 <dbl>, X9 <dbl>, Y9 <dbl>, ballpos_x <dbl>, ballpos_y <dbl>
```

## Glimpsing the Data

This calls `glimpse()` in order to get all variables and their datatypes.

```
fielding_data_df %>% glimpse()
```

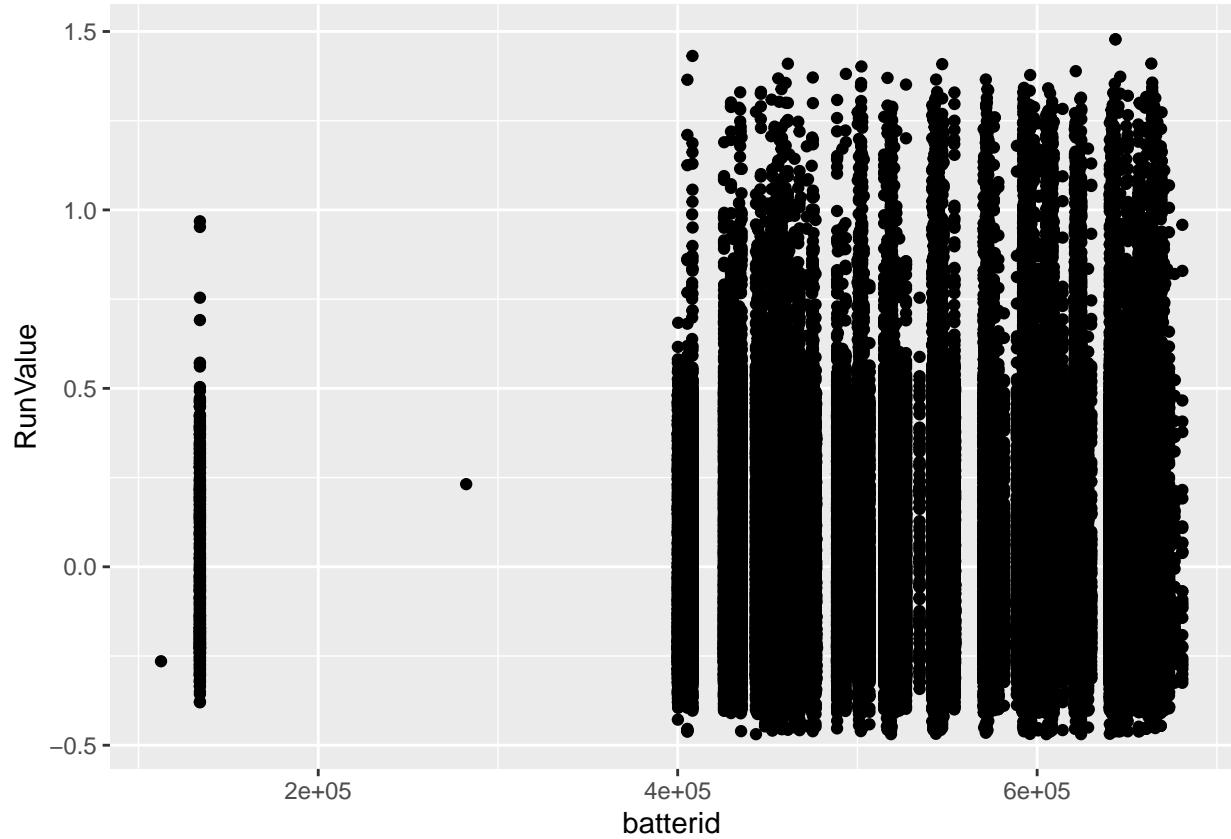
```
## Rows: 258,088
## Columns: 31
## $ Game_PK      <dbl> 566294, 530509, 566391, 530365, 529436, 566786, 56595...
## $ pitcherid    <dbl> 621242, 548389, 474463, 572140, 533167, 571946, 60545...
## $ batterid     <dbl> 614177, 546991, 592387, 435064, 543760, 608596, 60615...
## $ BatSide      <chr> "R", "R", "R", "R", "R", "R", "R", "L", "L", "L"...
## $ PitcherHand   <chr> "R", "R", "L", "L", "R", "R", "R", "R", "R", "R"...
## $ inning        <dbl> 9, 4, 4, 3, 1, 7, 2, 8, 9, 5, 8, 9, 9, 2, 3, 4, 9, 1, ...
## $ PitchTypeCode <chr> "SL", "KC", "FF", "FT", "FF", "CU", "SL", "CH", "SL", ...
## $ ExitVelocity  <dbl> 102.22041, 57.86483, 103.44940, 88.49261, 100.06711, ...
## $ VertAngle      <dbl> 11.0336704, 49.6903725, 9.7220182, 23.2390881, 21.229...
## $ HorizAngle    <dbl> 99.73433, 59.35676, 89.14812, 94.60698, 84.66924, 111...
## $ Distance       <dbl> 203.868, 138.340, 241.327, 324.016, 348.109, 266.253, ...
## $ FlightTime    <dbl> 1.648, 3.973, 2.024, 4.071, 3.794, 3.150, 0.450, 4.91...
## $ Trajectory    <chr> "L", "P", "L", "L", "L", "L", "G", "F", "P", "F", "L"...
## $ HitValue       <dbl> 1, 0, 1, 0, 0, 0, 0, 0, 1, 0, 0, 1, 0, 0, 1, 2, ...
## $ RunValue       <dbl> 0.4383, -0.1256, 0.4308, -0.1581, 0.2825, 0.1377, -0....
## $ X3             <dbl> 58.7550, 60.4970, 57.7930, 63.2240, 55.4730, 59.6030, ...
## $ Y3             <dbl> 105.0660, 98.6230, 99.6620, 103.2320, 101.4620, 98.79...
## $ X4             <dbl> 16.9300, 18.5170, 30.7560, 27.4560, 21.1760, 30.0930, ...
## $ Y4             <dbl> 142.9930, 156.9040, 150.1480, 155.5090, 154.4670, 151...
## $ X5             <dbl> -71.2920, -65.8170, -83.6160, -72.8840, -73.0440, -70...
## $ Y5             <dbl> 83.7640, 91.1210, 104.2720, 93.6510, 94.0250, 92.7400...
## $ X6             <dbl> -40.4420, -42.3550, -44.6200, -55.1240, -51.3480, -49...
## $ Y6             <dbl> 130.4720, 147.0490, 146.4070, 139.6090, 141.4430, 143...
## $ X7             <dbl> -135.8070, -130.7820, -142.5570, -127.2930, -130.5630...
## $ Y7             <dbl> 283.6480, 261.0520, 272.3400, 265.8880, 294.9030, 266...
## $ X8             <dbl> 27.6290, 34.3070, -5.2660, 16.8030, 39.9160, -11.2190...
## $ Y8             <dbl> 344.4420, 321.5150, 334.8550, 323.2660, 326.9590, 329...
## $ X9             <dbl> 151.6090, 159.7350, 140.4290, 139.4220, 157.1300, 141...
## $ Y9             <dbl> 272.3630, 238.7830, 270.6160, 241.6650, 237.4160, 265...
## $ ballpos_x      <dbl> -47.1386419, 103.9761927, 22.9863063, -11.6780055, 93...
## $ ballpos_y      <dbl> 198.343219, 91.251918, 240.229647, 323.805846, 335.45...
```

## Viewing the range of RunValue

This is a plotting of the range of *RunValue* in order to get an understanding of what kind of spread is available.

```
fielding_data_df %>%
  ggplot(mapping = aes(x = batterid, y = RunValue)) +
  geom_point()
```

```
## Warning: Removed 2 rows containing missing values (geom_point).
```



The spread of this data mostly falls between 0.5 and -0.5, with some spread over 0.5 into 1.0

### Counting number of players

This gets a count of the number of different entires listed by player.

```
fielding_data_df %>%
  count(batterid) %>%
  arrange(desc(n))
```

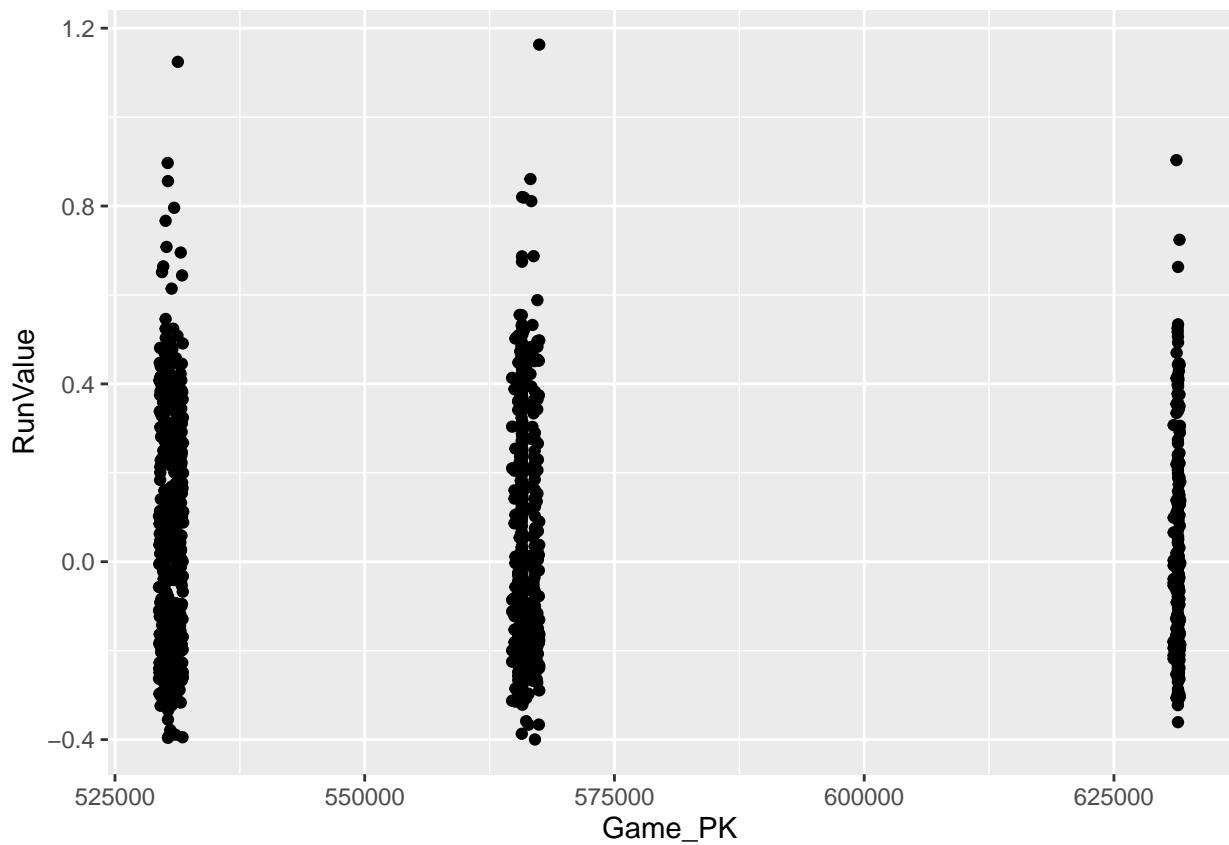
```
## # A tibble: 1,207 x 2
##   batterid     n
##       <dbl> <int>
## 1 593160    1187
## 2 543760    1088
## 3 488726    1061
## 4 596019    1049
## 5 516416    1039
## 6 514917    1036
## 7 493329    1034
## 8 453568    1033
## 9 518692    1032
## 10 592518   1020
## # ... with 1,197 more rows
```

## Getting one player's entires

This graphs the *RunValue* of player 593160, as they had the most number of entires in the table to see a potential spread.

```
player593160_data <- fielding_data_df %>%
  filter(batterid == 593160)

player593160_data %>%
  ggplot(mapping = aes(x = Game_PK, y = RunValue)) +
  geom_point()
```



```
player593160_data %>%
  summary()

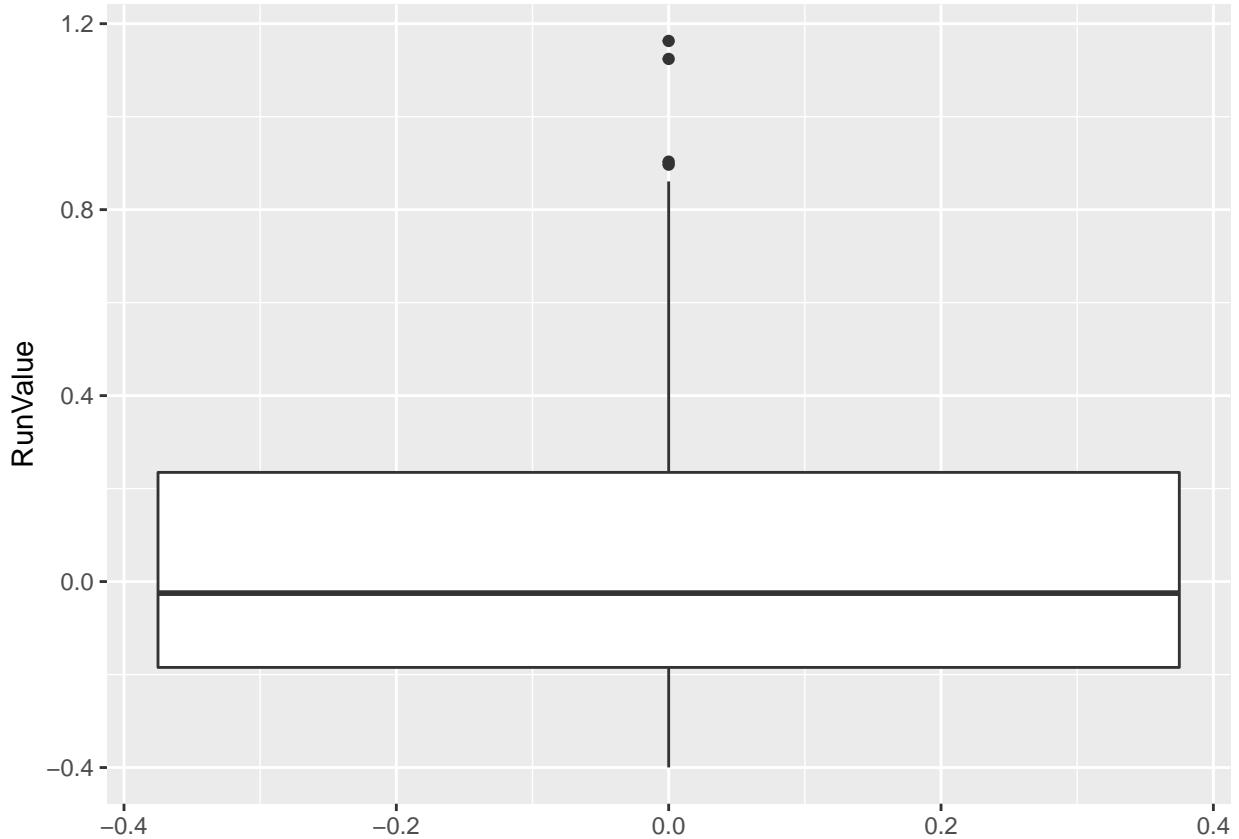
##      Game_PK      pitcherid      batterid      BatSide
##  Min.   :529408   Min.   :112526   Min.   :593160  Length:1187
##  1st Qu.:530974  1st Qu.:518617  1st Qu.:593160  Class  :character
##  Median :565706  Median :592644  Median :593160  Mode   :character
##  Mean   :563142  Mean   :564930  Mean   :593160
##  3rd Qu.:566903  3rd Qu.:621244  3rd Qu.:593160
##  Max.   :631645  Max.   :677976  Max.   :593160
##
##      PitcherHand      inning      PitchTypeCode      ExitVelocity
##  Length:1187      Min.   : 1.000  Length:1187      Min.   : 9.293
```

```

##  Class :character  1st Qu.: 2.000  Class :character  1st Qu.: 79.030
##  Mode  :character Median : 5.000  Mode  :character Median : 89.745
##               Mean   : 4.492  Mean   : 86.147
##               3rd Qu.: 7.000  3rd Qu.: 95.917
##               Max.   :14.000  Max.   :106.362
##
##    VertAngle      HorizAngle     Distance     FlightTime
##  Min.  :-72.726  Min.  :-88.65  Min.   : 1.651  Min.   :0.0090
##  1st Qu.: 1.327  1st Qu.: 80.08  1st Qu.: 47.373  1st Qu.:0.4042
##  Median : 15.024 Median : 92.93  Median :191.611  Median :2.1560
##  Mean   : 15.319 Mean   : 94.14  Mean   :177.705  Mean   :2.4848
##  3rd Qu.: 29.130 3rd Qu.:108.93 3rd Qu.:284.921 3rd Qu.:4.3495
##  Max.   : 82.918 Max.   :257.64  Max.   :408.470  Max.   :7.1680
##  NA's   :1
##
##    Trajectory      HitValue     RunValue      X3
##  Length:1187  Min.  :0.0000  Min.  :-0.39970  Min.   :34.30
##  Class :character 1st Qu.:0.0000  1st Qu.:-0.18465  1st Qu.:53.97
##  Mode  :character Median :0.0000  Median :-0.02480  Median :57.94
##               Mean   :0.4583  Mean   : 0.03721  Mean   :56.98
##               3rd Qu.:1.0000  3rd Qu.: 0.23485  3rd Qu.:60.48
##               Max.   :3.0000  Max.   : 1.16290  Max.   :77.68
##
##    Y3            X4            Y4            X5
##  Min.  : 60.73  Min.  :-24.64  Min.   :100.1  Min.   :-85.85
##  1st Qu.: 89.84 1st Qu.: 20.23  1st Qu.:148.8  1st Qu.:-69.98
##  Median : 96.92 Median : 25.76  Median :151.8  Median :-64.80
##  Mean   : 91.55 Mean   : 24.89  Mean   :150.2  Mean   :-63.58
##  3rd Qu.:100.47 3rd Qu.: 30.69  3rd Qu.:154.3  3rd Qu.:-56.46
##  Max.   :110.93 Max.   : 63.83  Max.   :164.6  Max.   :-40.72
##
##    Y5            X6            Y6            X7
##  Min.  : 62.99  Min.  :-61.63  Min.   : 88.98  Min.   :-166.90
##  1st Qu.: 79.96 1st Qu.:-47.38  1st Qu.:139.99  1st Qu.:-137.58
##  Median : 89.42 Median :-43.80  Median :142.90  Median :-129.78
##  Mean   : 87.80 Mean   :-43.17  Mean   :142.02  Mean   :-130.07
##  3rd Qu.: 94.72 3rd Qu.:-39.64  3rd Qu.:145.64  3rd Qu.:-122.02
##  Max.   :109.82 Max.   : 17.11  Max.   :154.11  Max.   :-94.97
##
##    Y7            X8            Y8            X9
##  Min.  :233.3  Min.  :-46.68  Min.   :280.1  Min.   : 88.04
##  1st Qu.:265.3 1st Qu.: 11.08  1st Qu.:312.2  1st Qu.:133.75
##  Median :272.4 Median : 19.25  Median :318.3  Median :140.47
##  Mean   :272.4 Mean   : 16.07  Mean   :318.6  Mean   :140.61
##  3rd Qu.:279.8 3rd Qu.: 25.08  3rd Qu.:325.8  3rd Qu.:147.55
##  Max.   :317.4 Max.   : 54.62  Max.   :352.7  Max.   :180.02
##
##    Y9      ballpos_x      ballpos_y
##  Min.  :207.6  Min.  :-228.6721  Min.   :-89.79
##  1st Qu.:244.6 1st Qu.: -26.6350  1st Qu.: 41.88
##  Median :253.8 Median :  0.2523  Median :171.90
##  Mean   :252.7 Mean   : 12.4247  Mean   :162.86
##  3rd Qu.:260.9 3rd Qu.: 62.2363  3rd Qu.:258.05
##  Max.   :289.3 Max.   : 214.6590  Max.   :407.30
##

```

```
player593160_data %>%
  select(RunValue) %>%
  ggplot(mapping = aes(y = RunValue)) +
  geom_boxplot()
```



### Positioning Analysis Based on RunValue

This is separating the individual player's data by run value to see if there are any possible trends or patterns.

```
player593160_data_pos <- player593160_data %>%
  filter(RunValue > 0)
```

```
player593160_data_neg_zero <- player593160_data %>%
  filter(RunValue <= 0)
```

```
player593160_data_pos %>%
  summary()
```

```
##      Game_PK      pitcherid      batterid      BatSide
##  Min.   :529408   Min.   :112526   Min.   :593160   Length:567
##  1st Qu.:530776   1st Qu.:511701   1st Qu.:593160   Class  :character
##  Median :565522   Median :592165   Median :593160   Mode   :character
##  Mean    :560041   Mean    :562439   Mean    :593160
```

```

## 3rd Qu.:566590   3rd Qu.:621181   3rd Qu.:593160
## Max.    :631645   Max.    :677976   Max.    :593160
##
## PitcherHand          inning      PitchTypeCode      ExitVelocity
## Length:567           Min.     : 1.0      Length:567       Min.     : 9.293
## Class :character     1st Qu.: 2.0      Class :character 1st Qu.: 85.237
## Mode  :character     Median  : 4.0      Mode  :character Median  : 94.704
##                           Mean    : 4.4                           Mean    : 90.144
##                           3rd Qu.: 7.0                           3rd Qu.: 98.917
##                           Max.    :14.0                           Max.    :106.362
##
## VertAngle            HorizAngle    Distance      FlightTime
## Min.   :-58.384     Min.   :-88.65     Min.   : 1.651     Min.   :0.031
## 1st Qu.: 7.631      1st Qu.: 81.06    1st Qu.:111.531   1st Qu.:1.009
## Median : 13.568     Median : 92.84    Median :195.796   Median :1.919
## Mean   : 13.238     Mean   : 93.50    Mean   :196.413   Mean   :2.091
## 3rd Qu.: 20.213     3rd Qu.:109.25   3rd Qu.:268.024   3rd Qu.:2.983
## Max.   : 42.687     Max.   :137.52    Max.   :408.470   Max.   :5.791
## NA's   :1
##
## Trajectory           HitValue      RunValue      X3
## Length:567           Min.   :0.000     Min.   :0.0008   Min.   :34.30
## Class :character     1st Qu.:0.000     1st Qu.:0.1197   1st Qu.:54.04
## Mode  :character     Median :1.000     Median :0.2456   Median :57.71
##                           Mean   :0.806     Mean   :0.2705   Mean   :56.74
##                           3rd Qu.:1.000     3rd Qu.:0.4001   3rd Qu.:60.19
##                           Max.   :3.000     Max.   :1.1629   Max.   :77.38
##
## Y3                  X4          Y4          X5
## Min.   : 60.96     Min.   :-16.18    Min.   :101.7    Min.   :-85.07
## 1st Qu.: 88.39     1st Qu.: 20.65    1st Qu.:148.4    1st Qu.:-69.97
## Median : 96.72     Median : 25.45    Median :151.9    Median :-64.88
## Mean   : 91.09     Mean   : 24.82    Mean   :150.0    Mean   :-63.60
## 3rd Qu.:100.37     3rd Qu.: 30.32    3rd Qu.:154.2    3rd Qu.:-57.38
## Max.   :108.84     Max.   : 63.83    Max.   :162.9    Max.   :-40.72
##
## Y5                  X6          Y6          X7
## Min.   : 65.91     Min.   :-61.63    Min.   : 95.9    Min.   :-166.90
## 1st Qu.: 80.20     1st Qu.:-47.29    1st Qu.:139.9    1st Qu.:-137.40
## Median : 88.89     Median :-43.70    Median :142.8    Median :-129.38
## Mean   : 87.92     Mean   :-42.87    Mean   :141.9    Mean   :-130.21
## 3rd Qu.: 94.40     3rd Qu.:-39.23    3rd Qu.:145.7    3rd Qu.:-122.90
## Max.   :109.82     Max.   : 17.11    Max.   :154.1    Max.   :-94.97
##
## Y7                  X8          Y8          X9
## Min.   :236.1      Min.   :-38.55    Min.   :286.6    Min.   :103.6
## 1st Qu.:265.3      1st Qu.: 10.07   1st Qu.:312.5   1st Qu.:133.0
## Median :271.9      Median : 18.71   Median :318.3    Median :139.8
## Mean   :271.7      Mean   : 15.85   Mean   :318.8    Mean   :139.8
## 3rd Qu.:278.9      3rd Qu.: 25.46   3rd Qu.:325.5   3rd Qu.:146.7
## Max.   :317.4      Max.   : 54.62   Max.   :352.7    Max.   :180.0
##
## Y9                  ballpos_x      ballpos_y
## Min.   :207.6      Min.   :-228.6721  Min.   :-89.79
## 1st Qu.:246.7      1st Qu.:-49.3231  1st Qu.:101.66

```

```

## Median :254.1    Median : -0.3184   Median :176.75
## Mean   :253.6    Mean   : -0.4613   Mean   :180.82
## 3rd Qu.:261.3    3rd Qu.: 52.0467   3rd Qu.:248.01
## Max.   :289.3    Max.   : 205.4932   Max.   :407.30
##
```

player593160\_data\_neg\_zero %>%

```

summary()

```

	Game_PK	pitcherid	batterid	BatSide
## Min.	:529408	Min. :112526	Min. :593160	Length:620
## 1st Qu.:	531122	1st Qu.:519096	1st Qu.:593160	Class :character
## Median :	565715	Median :592773	Median :593160	Mode :character
## Mean :	565978	Mean :567207	Mean :593160	
## 3rd Qu.:	567014	3rd Qu.:621385	3rd Qu.:593160	
## Max. :	631645	Max. :677976	Max. :593160	
## PitcherHand		inning	PitchTypeCode	ExitVelocity
## Length:620		Min. : 1.000	Length:620	Min. : 17.78
## Class :character		1st Qu.: 2.000	Class :character	1st Qu.: 76.53
## Mode :character		Median : 5.000	Mode :character	Median : 85.44
##		Mean : 4.576		Mean : 82.49
##		3rd Qu.: 7.000		3rd Qu.: 91.70
##		Max. :11.000		Max. :105.80
## VertAngle		HorizAngle	Distance	FlightTime
## Min. :-72.726		Min. : 35.16	Min. : 1.807	Min. : 0.0090
## 1st Qu.:-7.343		1st Qu.: 79.30	1st Qu.: 15.688	1st Qu.:0.1177
## Median : 24.233		Median : 93.24	Median :160.203	Median :3.4880
## Mean : 17.218		Mean : 94.73	Mean :160.596	Mean :2.8446
## 3rd Qu.: 40.877		3rd Qu.:108.23	3rd Qu.:291.714	3rd Qu.:5.2283
## Max. : 82.918		Max. :257.64	Max. :397.678	Max. :7.1680
## Trajectory		HitValue	RunValue	X3
## Length:620		Min. :0.0000	Min. :-0.3997	Min. :36.82
## Class :character		1st Qu.:0.0000	1st Qu.:-0.2390	1st Qu.:53.91
## Mode :character		Median :0.0000	Median :-0.1825	Median :58.27
##		Mean : 0.1403	Mean :-0.1762	Mean :57.19
##		3rd Qu.:0.0000	3rd Qu.:-0.1123	3rd Qu.:60.71
##		Max. :2.0000	Max. : 0.0000	Max. :77.68
## Y3		X4	Y4	X5
## Min. : 60.73		Min. :-24.64	Min. :100.1	Min. :-85.85
## 1st Qu.: 90.87		1st Qu.: 19.88	1st Qu.:149.2	1st Qu.:-69.98
## Median : 97.02		Median : 25.99	Median :151.8	Median :-64.80
## Mean : 91.98		Mean : 24.95	Mean :150.4	Mean :-63.56
## 3rd Qu.:100.50		3rd Qu.: 31.06	3rd Qu.:154.3	3rd Qu.:-55.84
## Max. :110.93		Max. : 54.98	Max. :164.6	Max. :-42.49
## Y5		X6	Y6	X7
## Min. : 62.99		Min. :-61.21	Min. : 88.98	Min. :-161.3
## 1st Qu.: 79.82		1st Qu.:-47.44	1st Qu.:140.08	1st Qu.:-137.7
## Median : 89.77		Median :-43.83	Median :143.03	Median :-130.0
## Mean : 87.68		Mean :-43.45	Mean :142.09	Mean :-129.9
## 3rd Qu.: 94.77		3rd Qu.:-39.90	3rd Qu.:145.61	3rd Qu.:-121.4
## Max. :107.49		Max. :-13.88	Max. :153.03	Max. :-98.4
## Y7		X8	Y8	X9
## Min. :233.3		Min. :-46.68	Min. :280.1	Min. : 88.04
## 1st Qu.:265.2		1st Qu.: 12.31	1st Qu.:311.8	1st Qu.:134.77

```

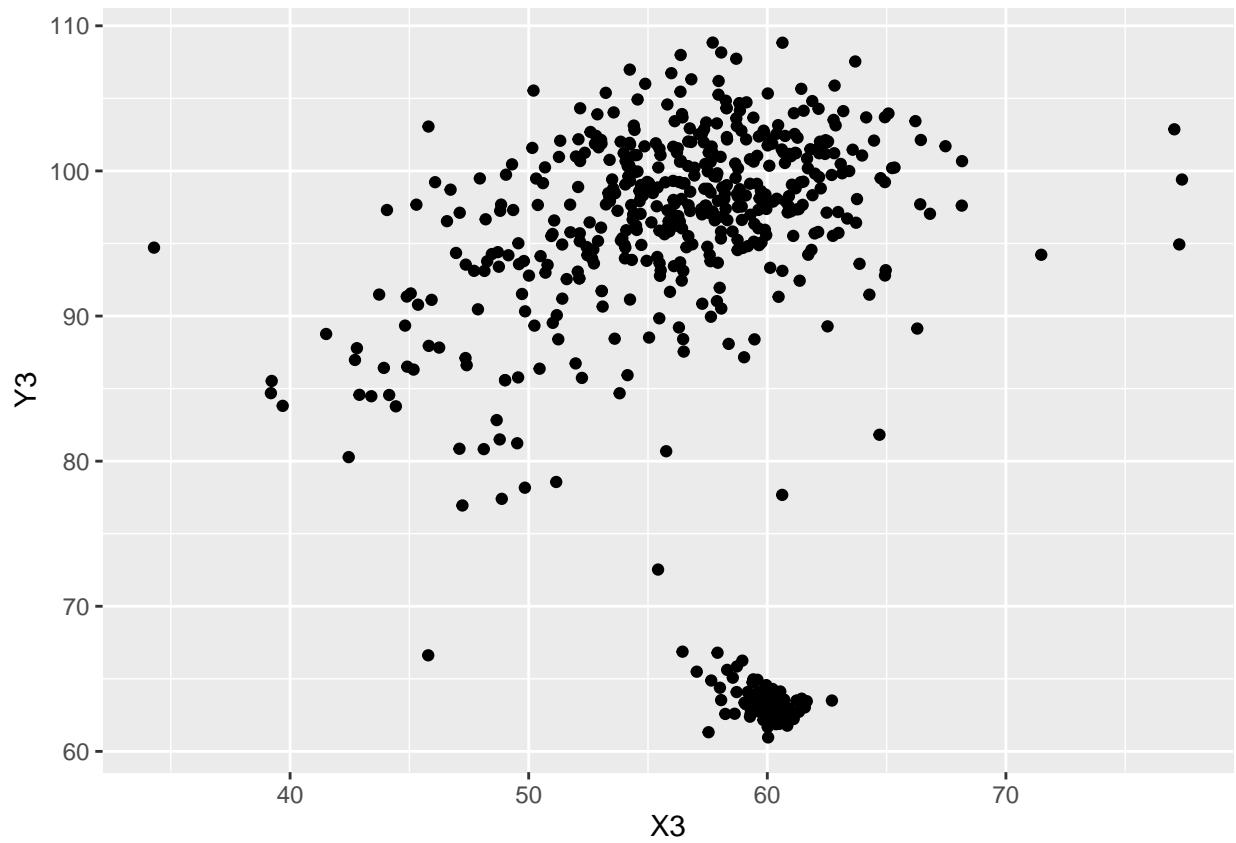
##   Median :273.1    Median : 19.46    Median :318.2    Median :141.03
##   Mean   :273.0    Mean   : 16.27    Mean   :318.4    Mean   :141.31
##   3rd Qu.:280.5   3rd Qu.: 24.76   3rd Qu.:325.9   3rd Qu.:148.01
##   Max.   :313.7   Max.   : 48.88   Max.   :351.9   Max.   :171.77
##   Y9      ballpos_x      ballpos_y
##   Min.   :211.3   Min.   :-194.9650  Min.   : 1.487
##   1st Qu.:243.1   1st Qu.: -7.7999  1st Qu.: 15.009
##   Median :253.4   Median :  0.4752  Median :145.275
##   Mean   :251.9   Mean   : 24.2092  Mean   :146.439
##   3rd Qu.:260.4   3rd Qu.: 77.7917  3rd Qu.:264.965
##   Max.   :285.8   Max.   :214.6590  Max.   :396.054

```

```

player593160_data_pos %>%
  select(X3, Y3) %>%
  ggplot(mapping = aes(x = X3, y = Y3)) +
  geom_point()

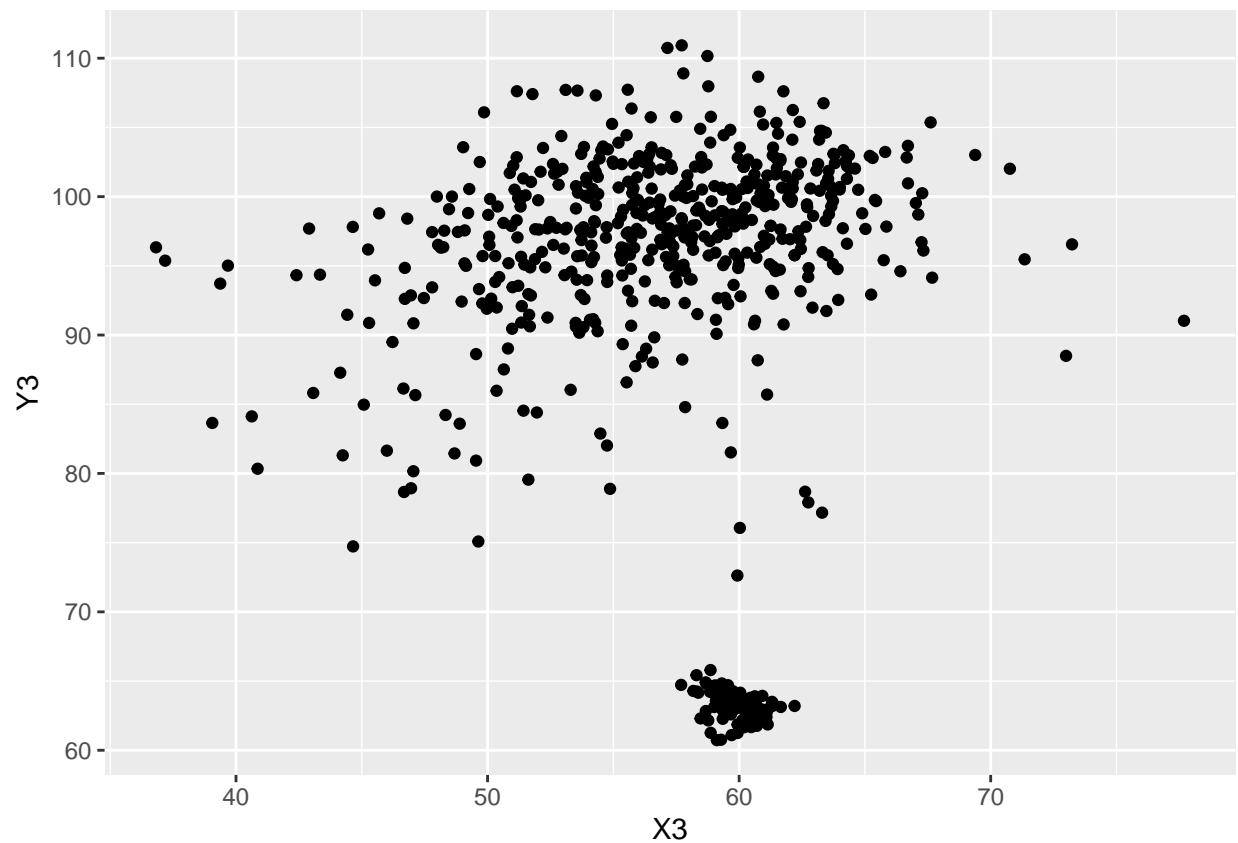
```



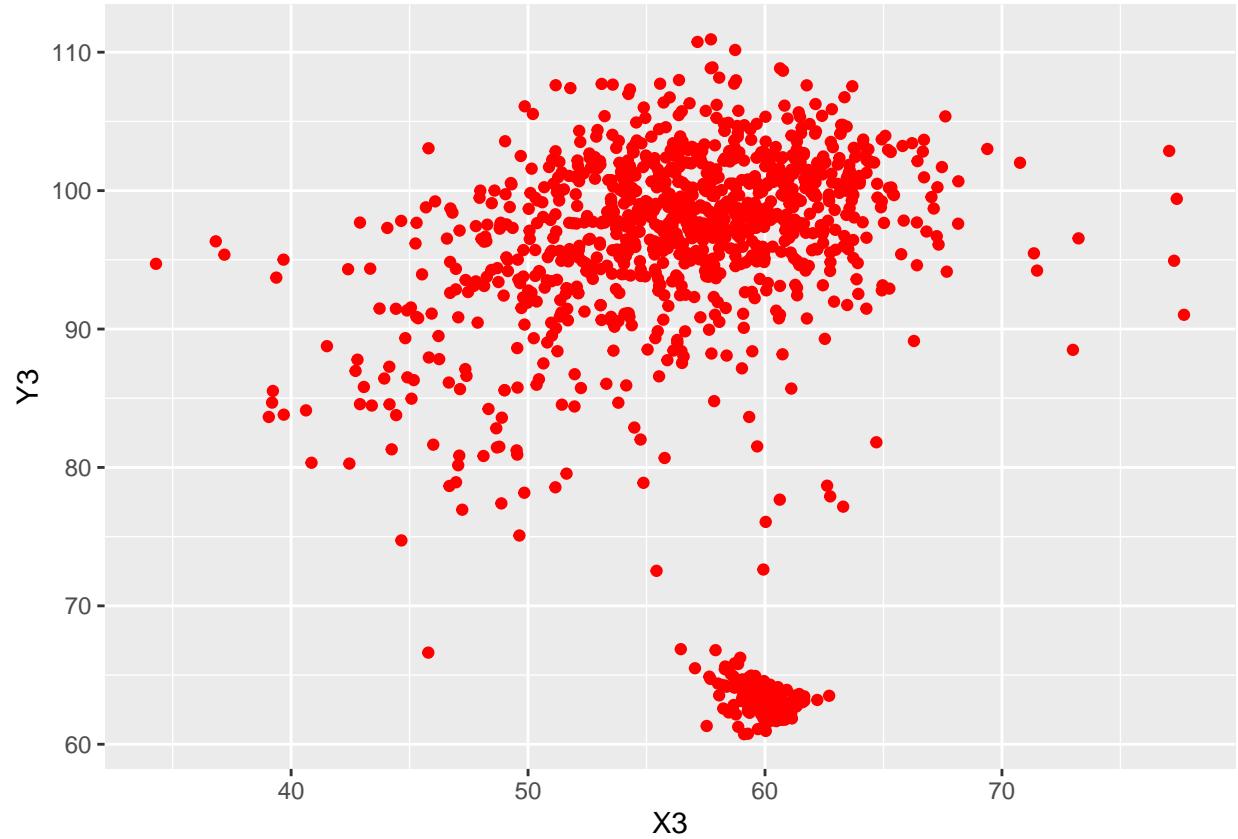
```

player593160_data_neg_zero %>%
  select(X3, Y3) %>%
  ggplot(mapping = aes(x = X3, y = Y3)) +
  geom_point()

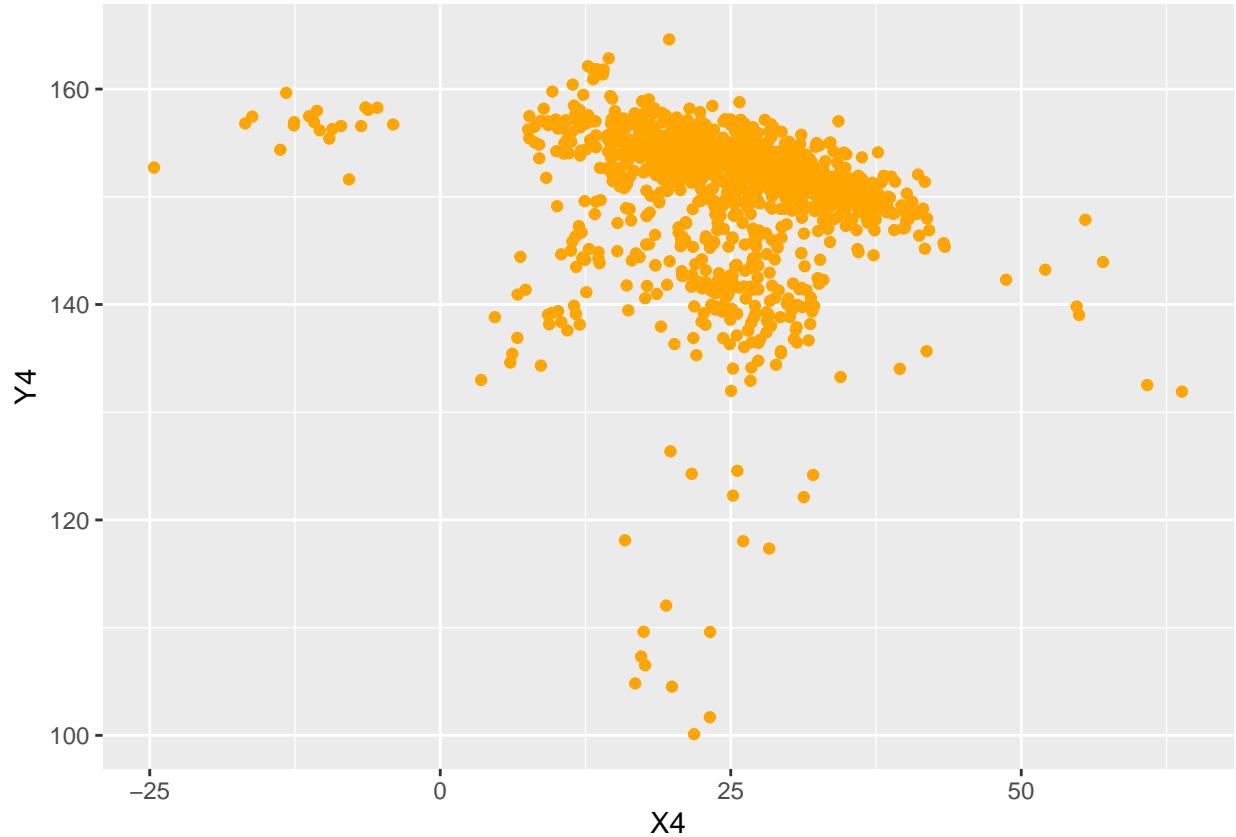
```



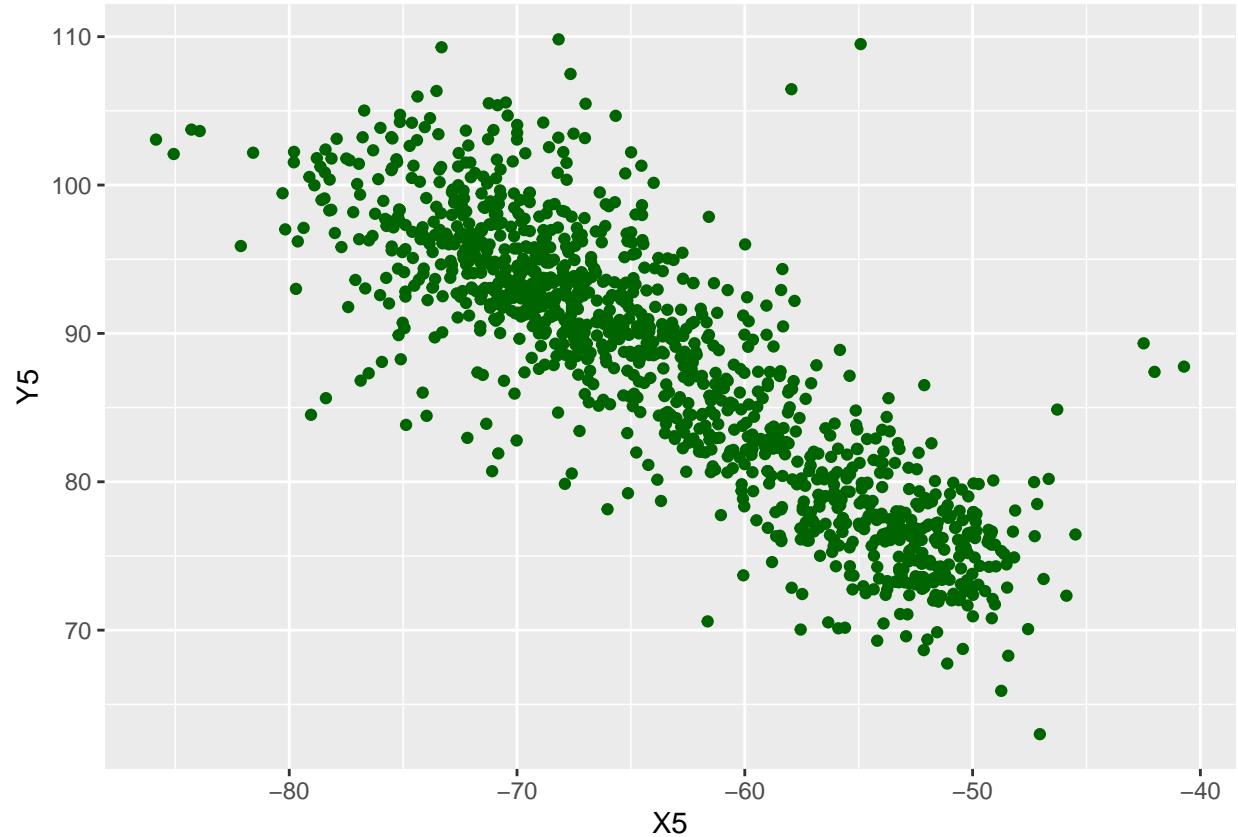
```
player593160_data %>%
  select(X3, Y3) %>%
  ggplot(mapping = aes(x = X3, y = Y3)) +
  geom_point(color = "red")
```



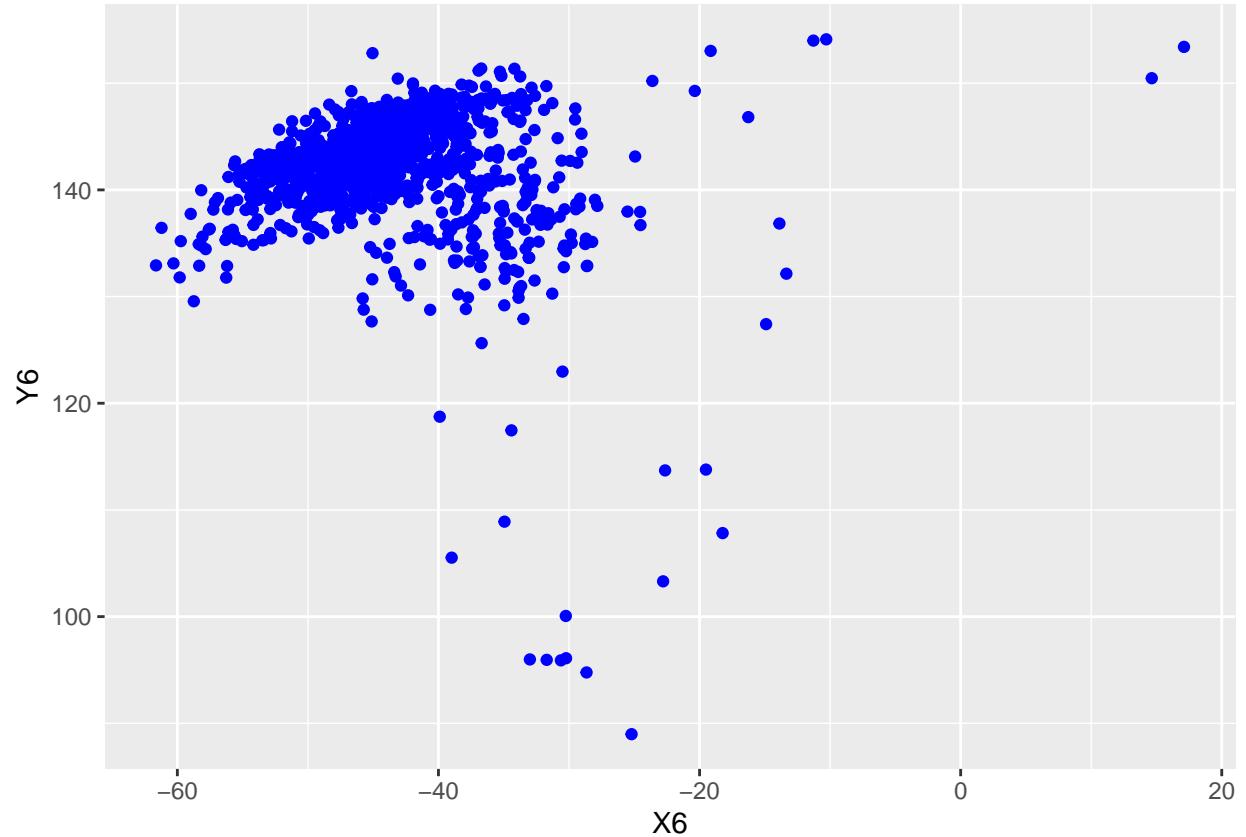
```
player593160_data %>%
  select(X4, Y4) %>%
  ggplot(mapping = aes(x = X4, y = Y4)) +
  geom_point(color = "orange")
```



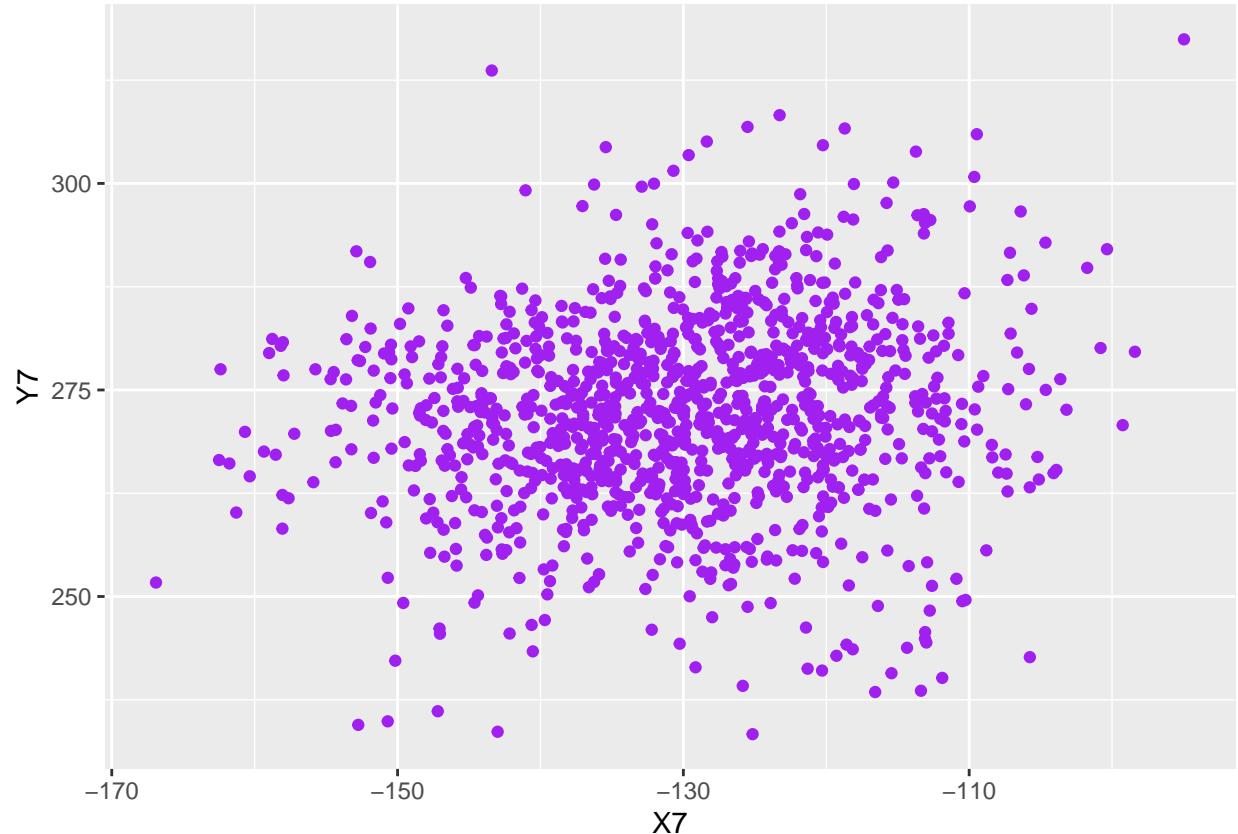
```
player593160_data %>%
  select(X5, Y5) %>%
  ggplot(mapping = aes(x = X5, y = Y5)) +
  geom_point(color = "dark green")
```



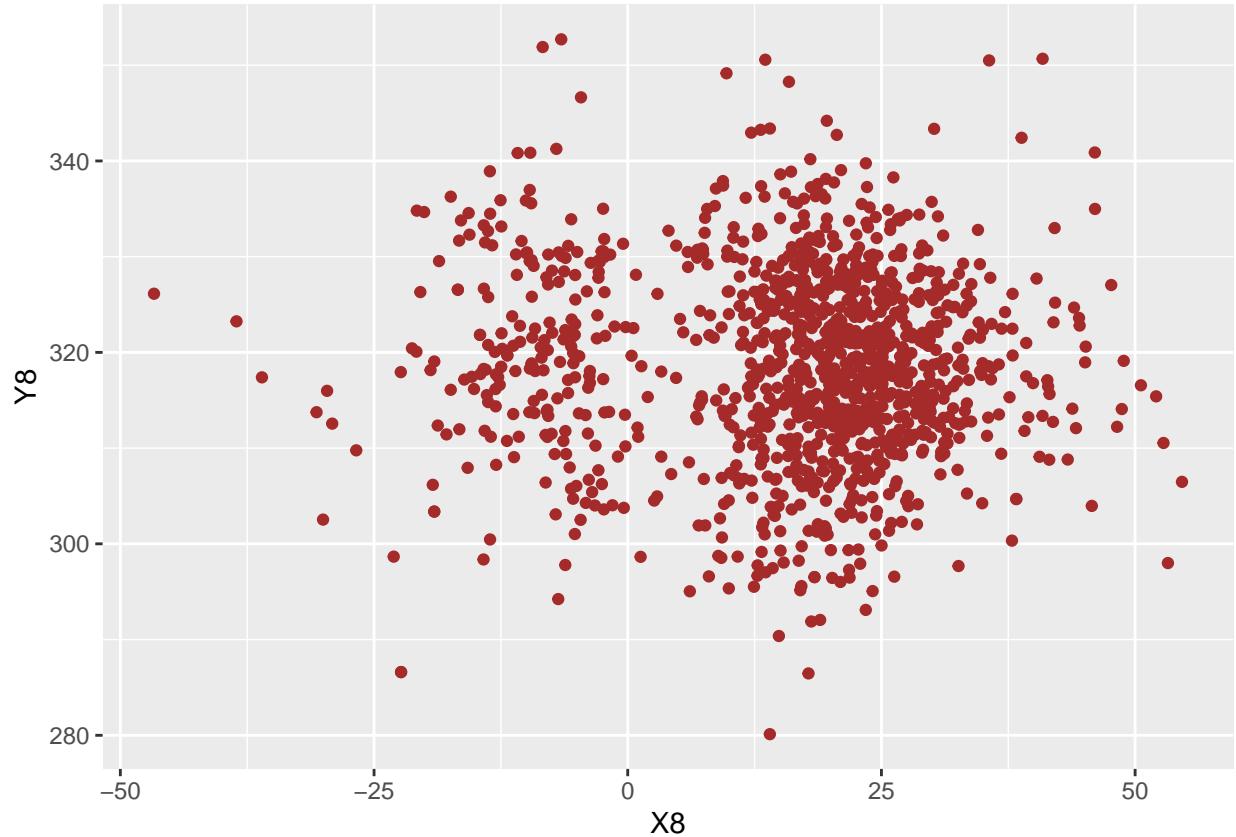
```
player593160_data %>%
  select(X6, Y6) %>%
  ggplot(mapping = aes(x = X6, y = Y6)) +
  geom_point(color = "blue")
```



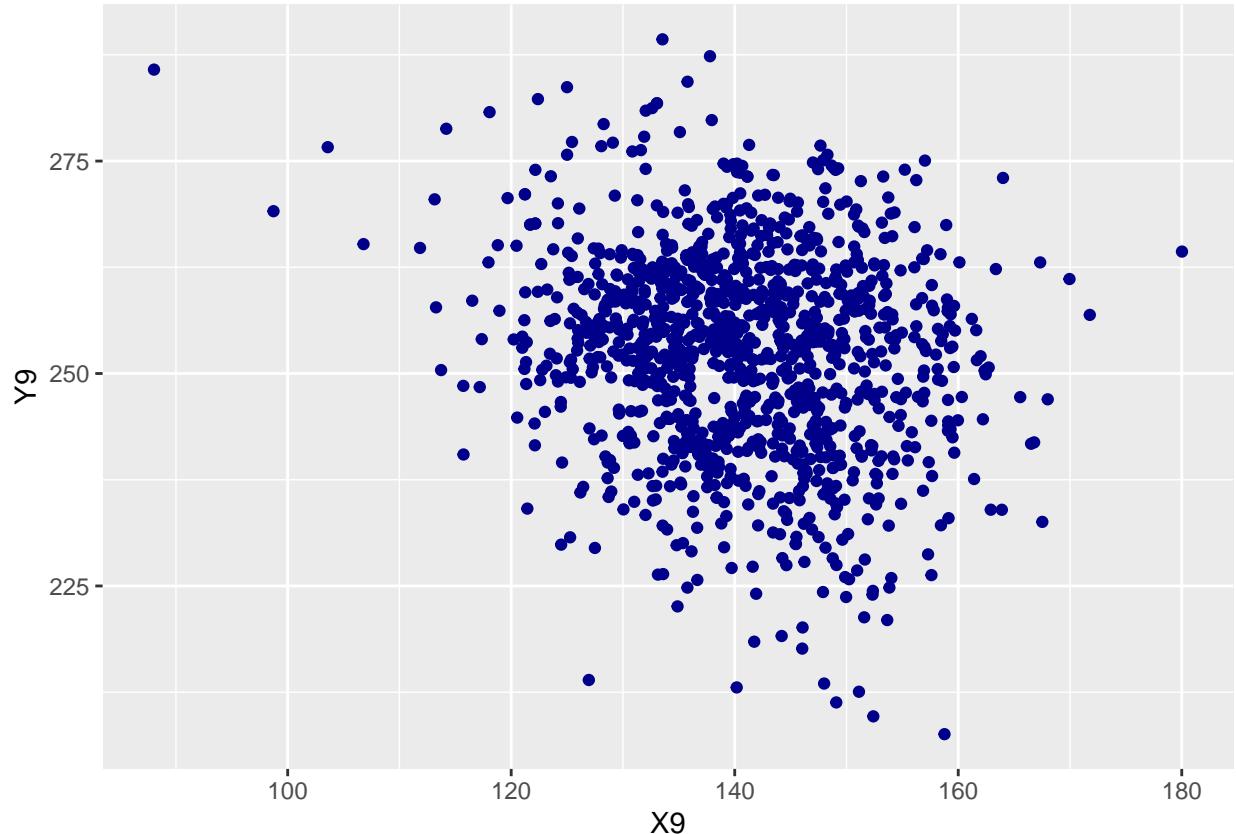
```
player593160_data %>%
  select(X7, Y7) %>%
  ggplot(mapping = aes(x = X7, y = Y7)) +
  geom_point(color = "purple")
```



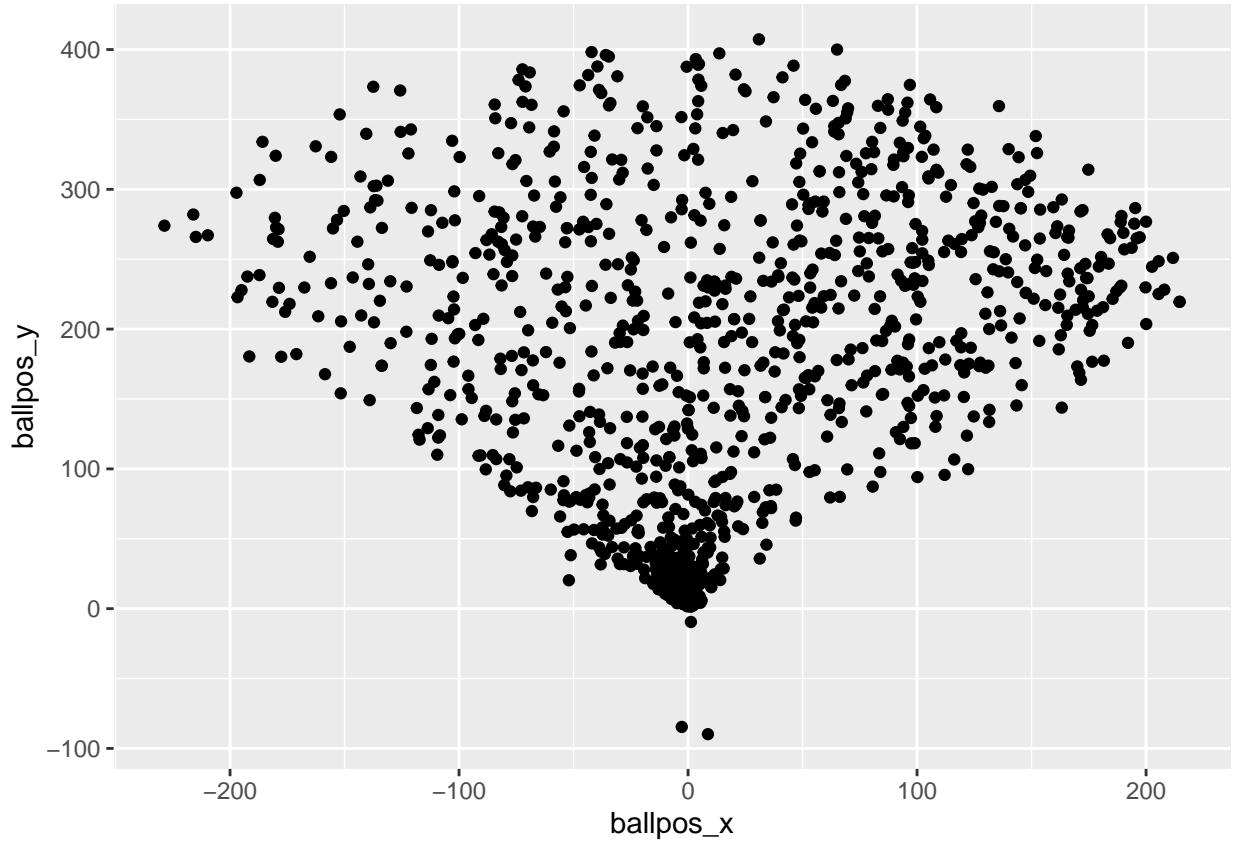
```
player593160_data %>%
  select(X8, Y8) %>%
  ggplot(mapping = aes(x = X8, y = Y8)) +
  geom_point(color = "brown")
```



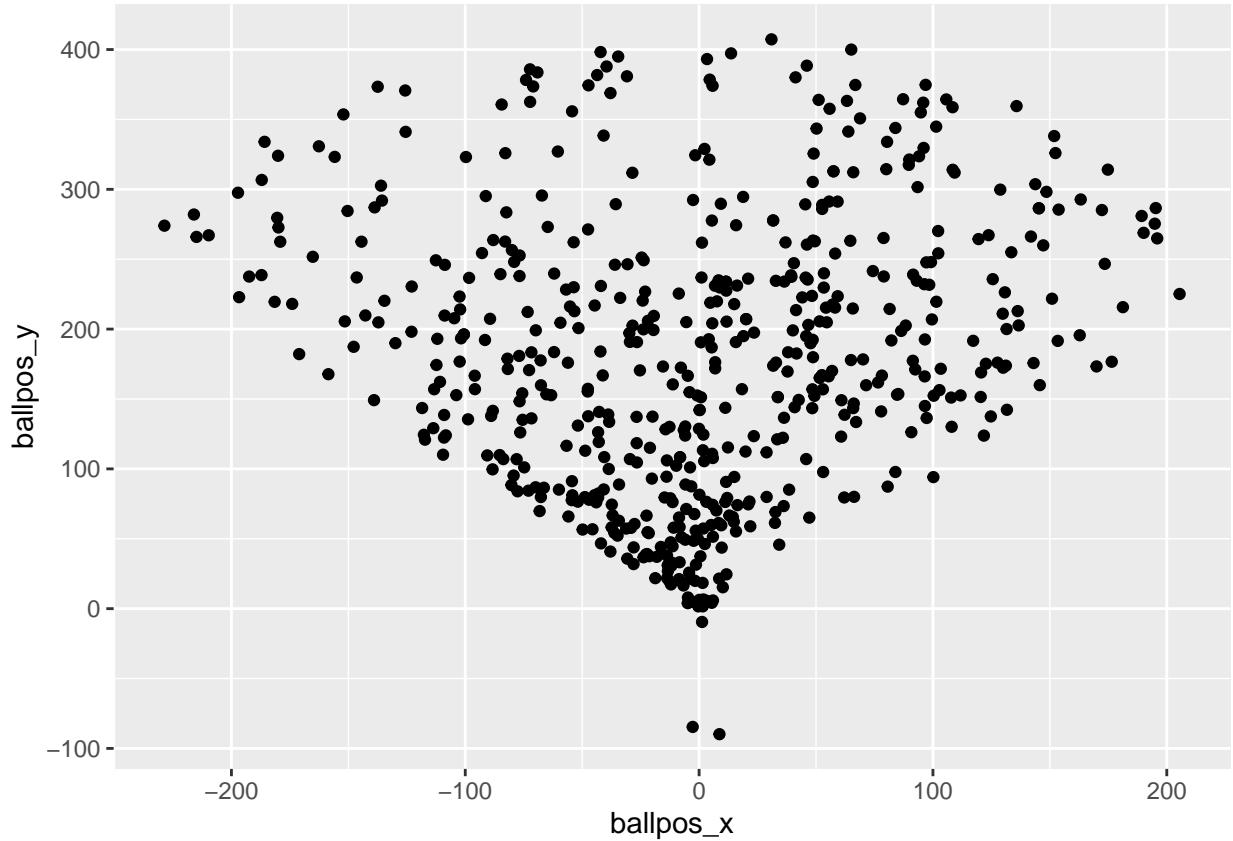
```
player593160_data %>%
  select(X9, Y9) %>%
  ggplot(mapping = aes(x = X9, y = Y9)) +
  geom_point(color = "dark blue")
```



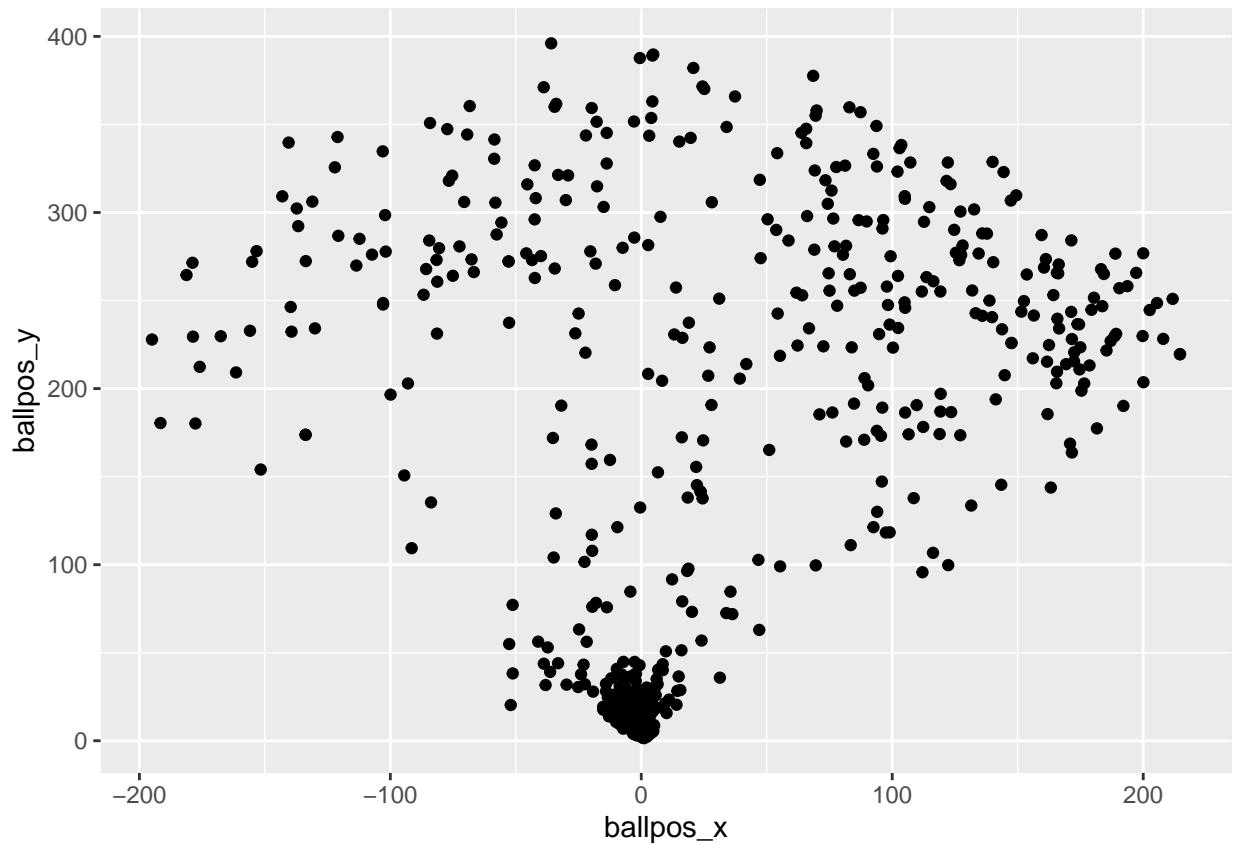
```
player593160_data %>%
  select(ballpos_x, ballpos_y) %>%
  ggplot(mapping = aes(x = ballpos_x, y = ballpos_y)) +
  geom_point()
```



```
player593160_data_pos %>%
  select(ballpos_x, ballpos_y) %>%
  ggplot(mapping = aes(x = ballpos_x, y = ballpos_y)) +
  geom_point()
```



```
player593160_data_neg_zero %>%
  select(ballpos_x, ballpos_y) %>%
  ggplot(mapping = aes(x = ballpos_x, y = ballpos_y)) +
  geom_point()
```

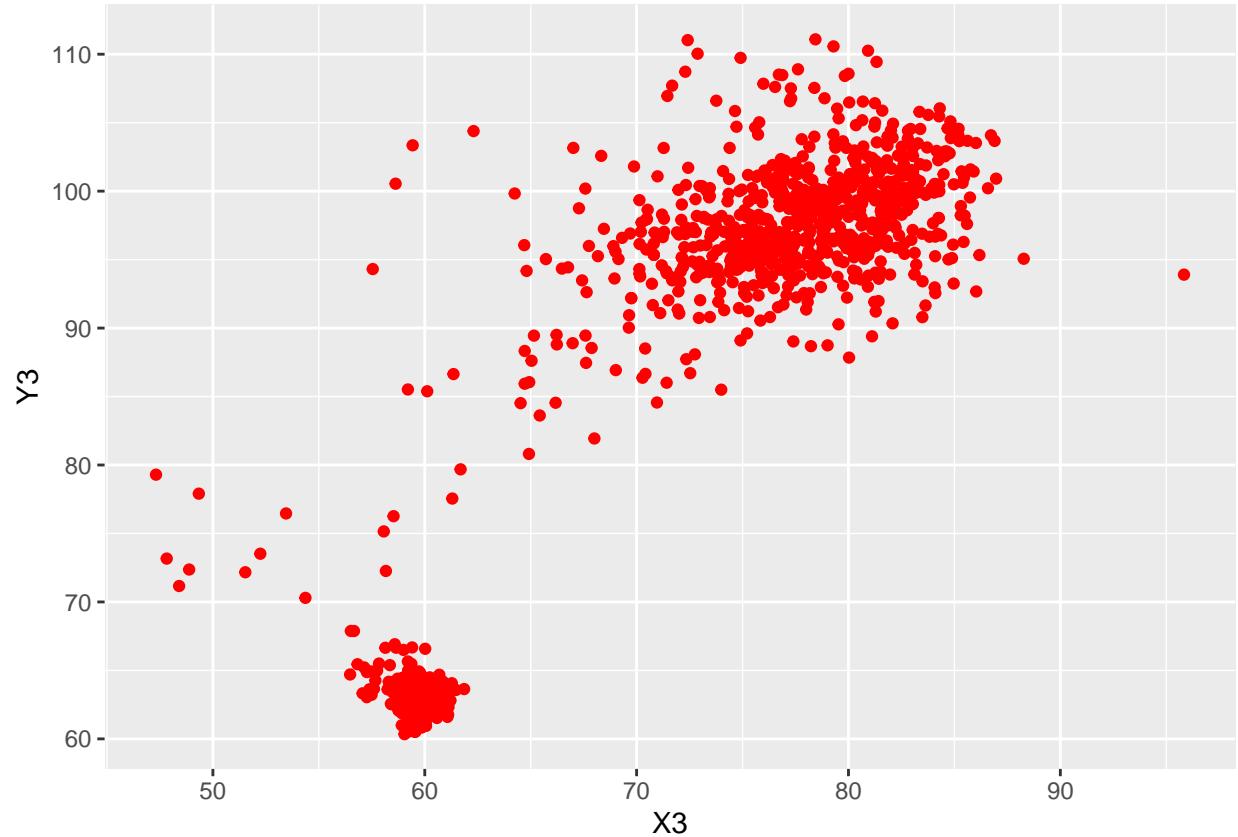


### Checking the RunValue and Positioning on a Left-Handed Player

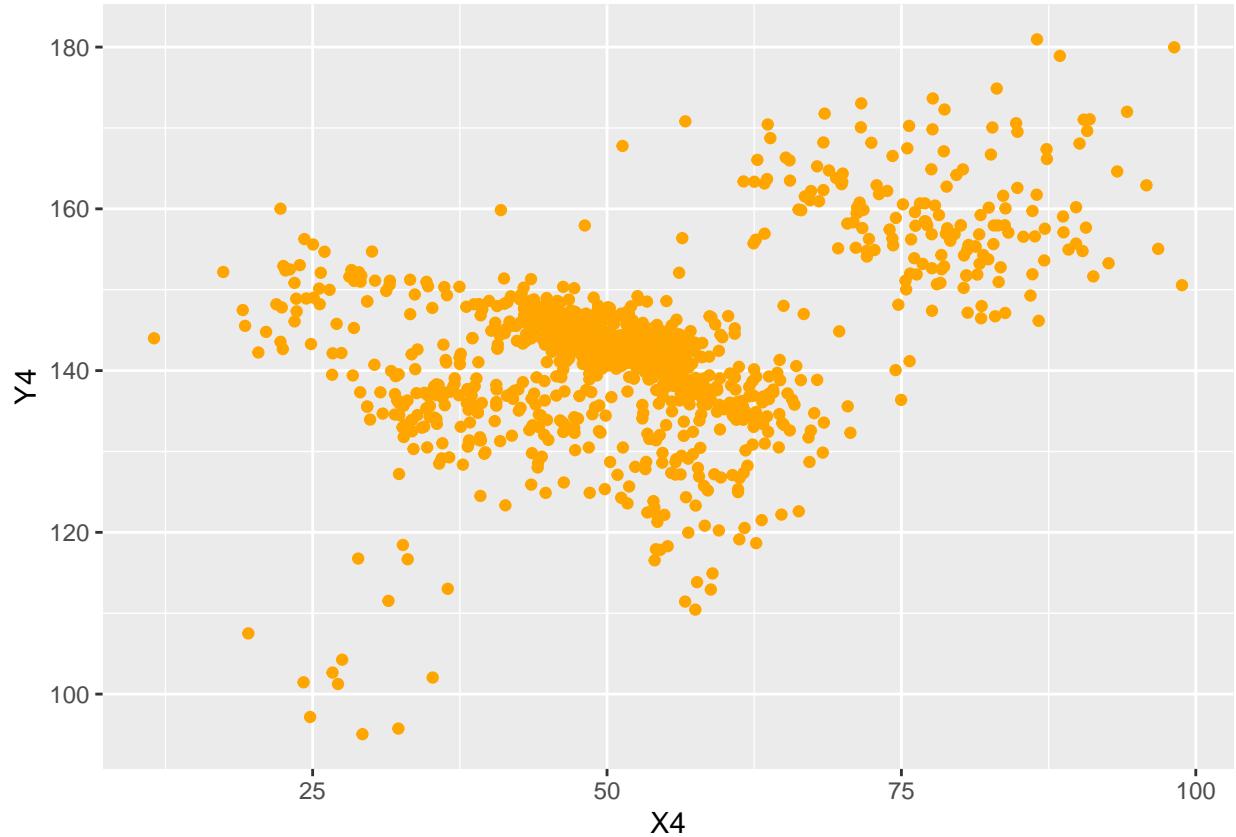
This filters for a left handed player instead.

```
player488726_data <- fielding_data_df %>%
  filter(batterid == 488726)
```

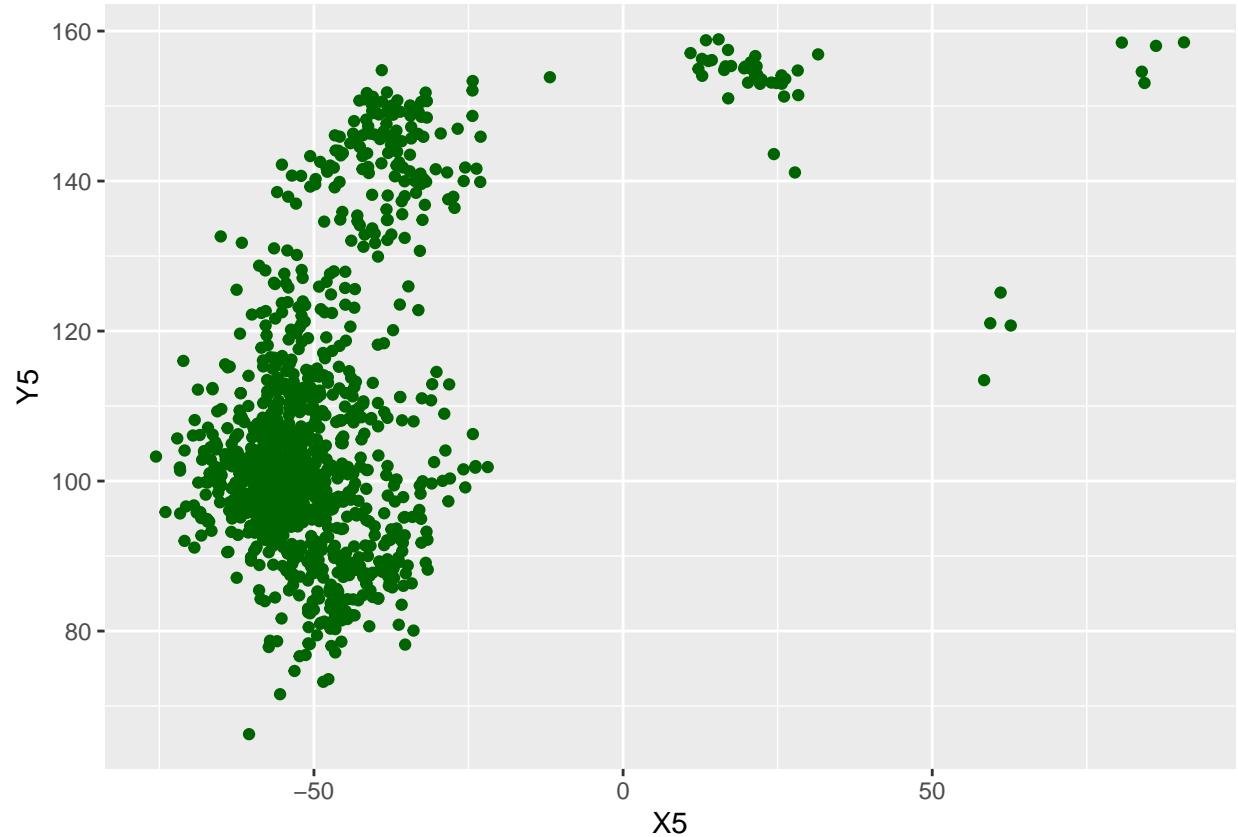
```
player488726_data %>%
  select(X3, Y3) %>%
  ggplot(mapping = aes(x = X3, y = Y3)) +
  geom_point(color = "red")
```



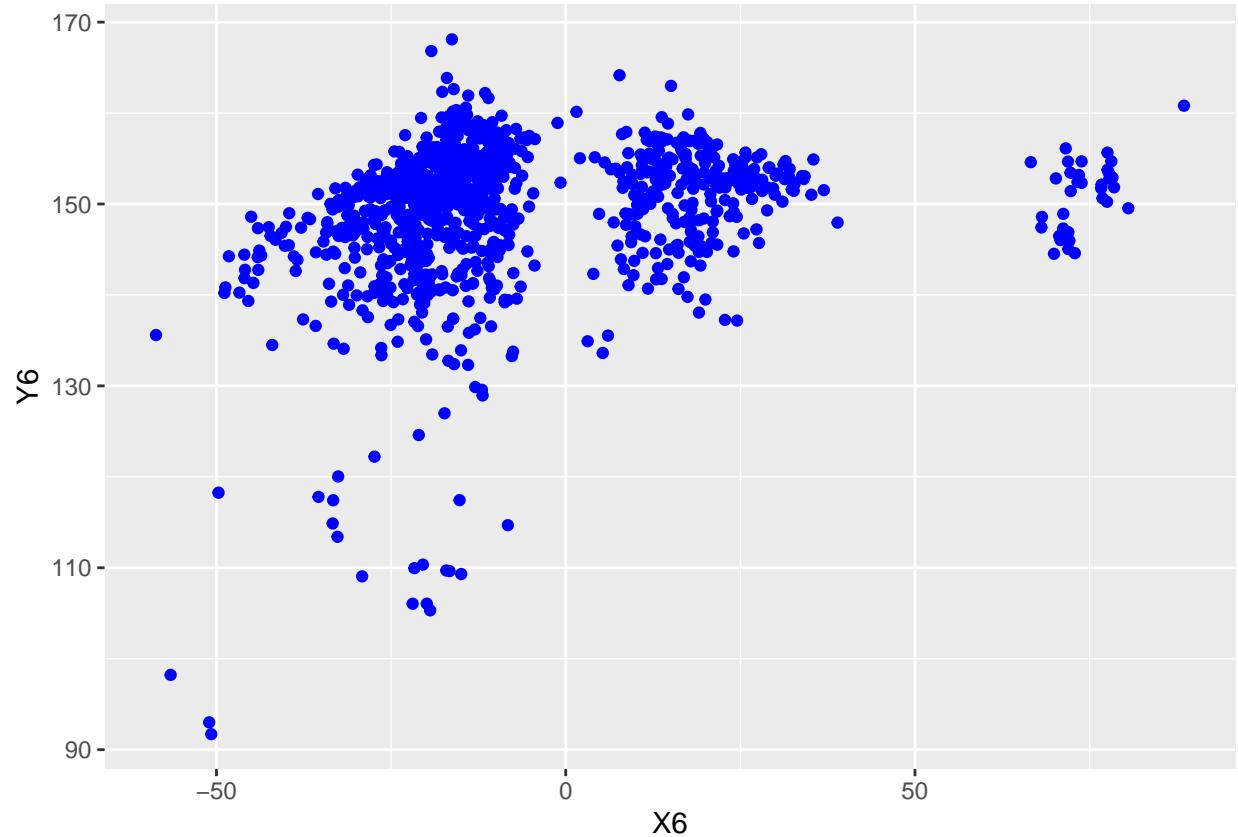
```
player488726_data %>%
  select(X4, Y4) %>%
  ggplot(mapping = aes(x = X4, y = Y4)) +
  geom_point(color = "orange")
```



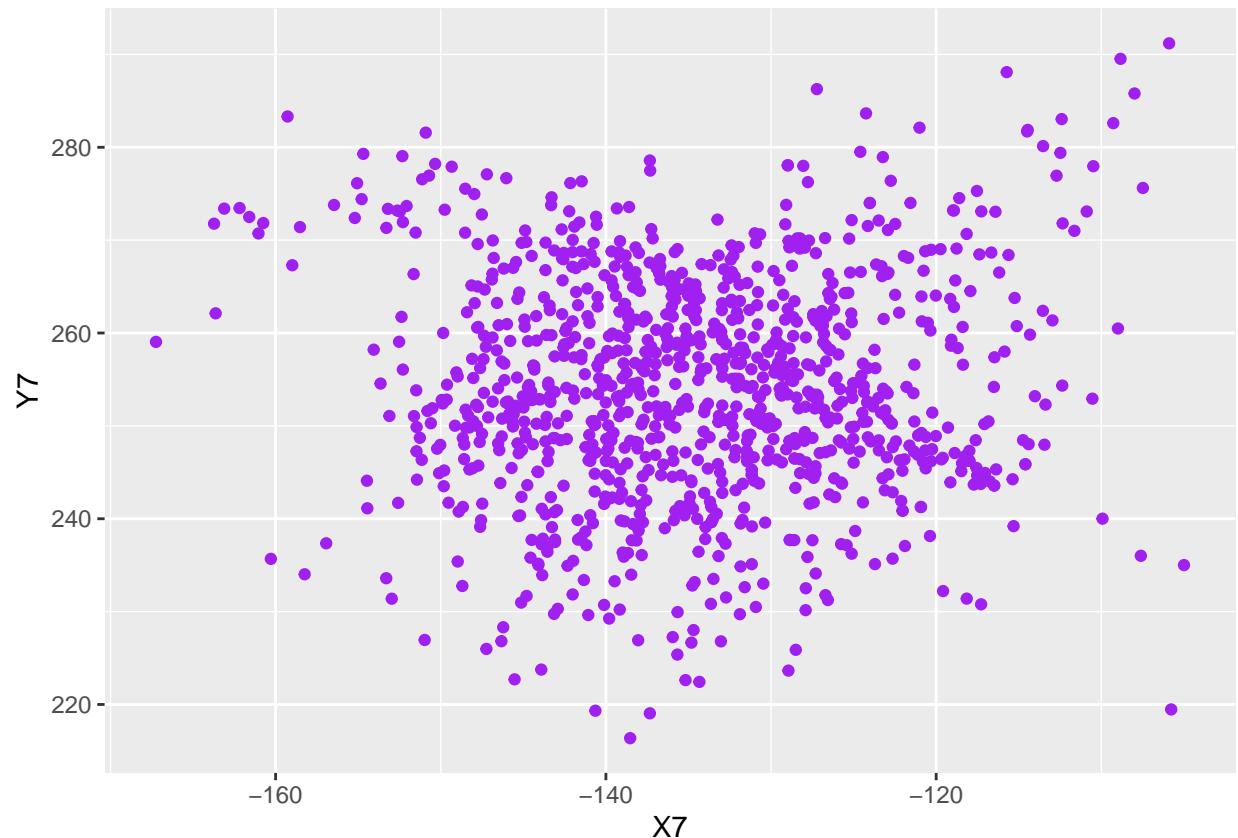
```
player488726_data %>%
  select(X5, Y5) %>%
  ggplot(mapping = aes(x = X5, y = Y5)) +
  geom_point(color = "dark green")
```



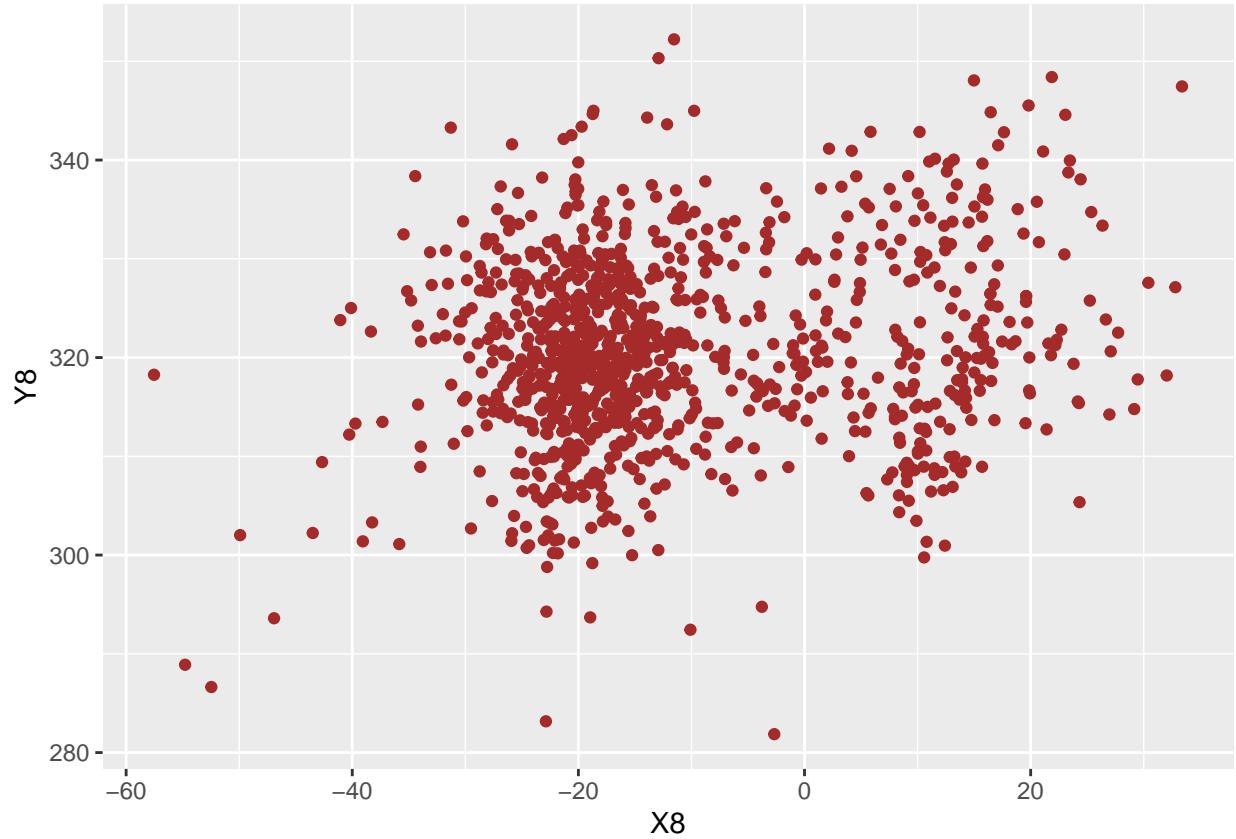
```
player488726_data %>%
  select(X6, Y6) %>%
  ggplot(mapping = aes(x = X6, y = Y6)) +
  geom_point(color = "blue")
```



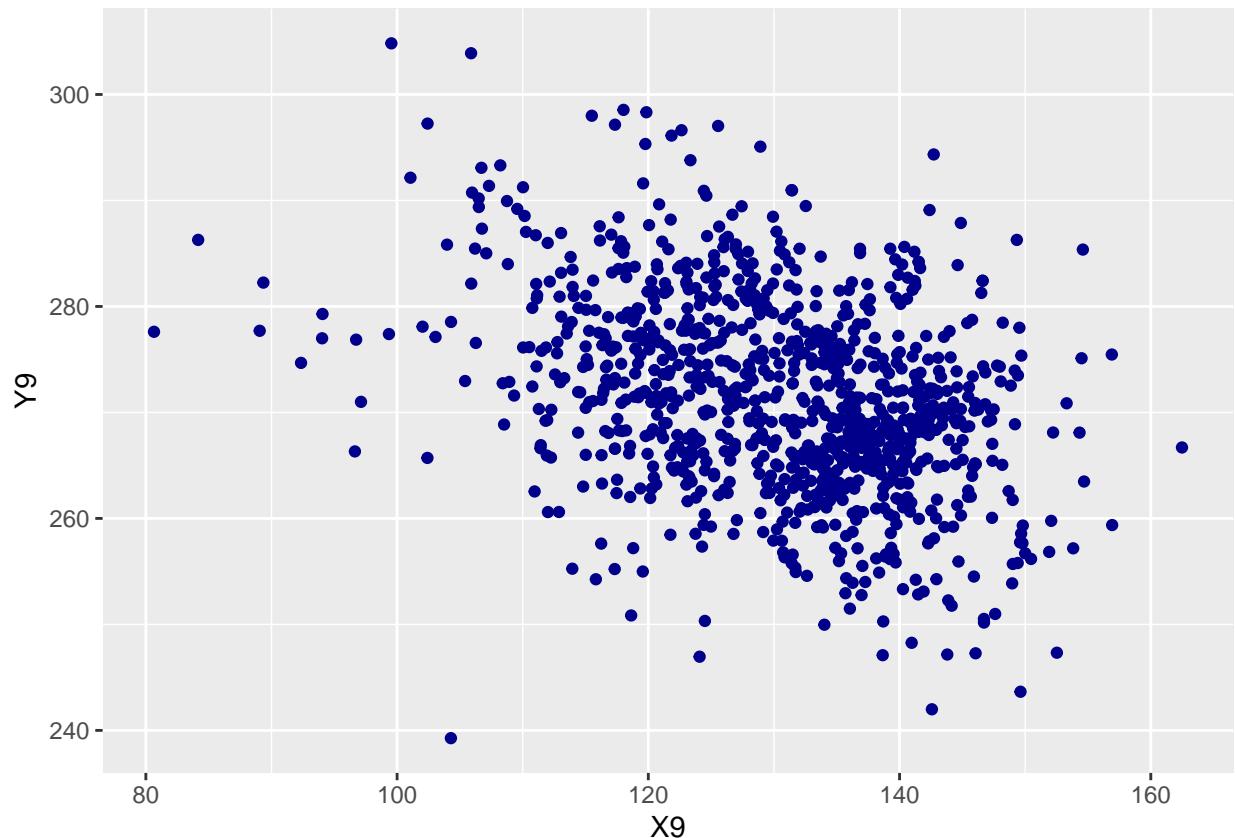
```
player488726_data %>%
  select(X7, Y7) %>%
  ggplot(mapping = aes(x = X7, y = Y7)) +
  geom_point(color = "purple")
```



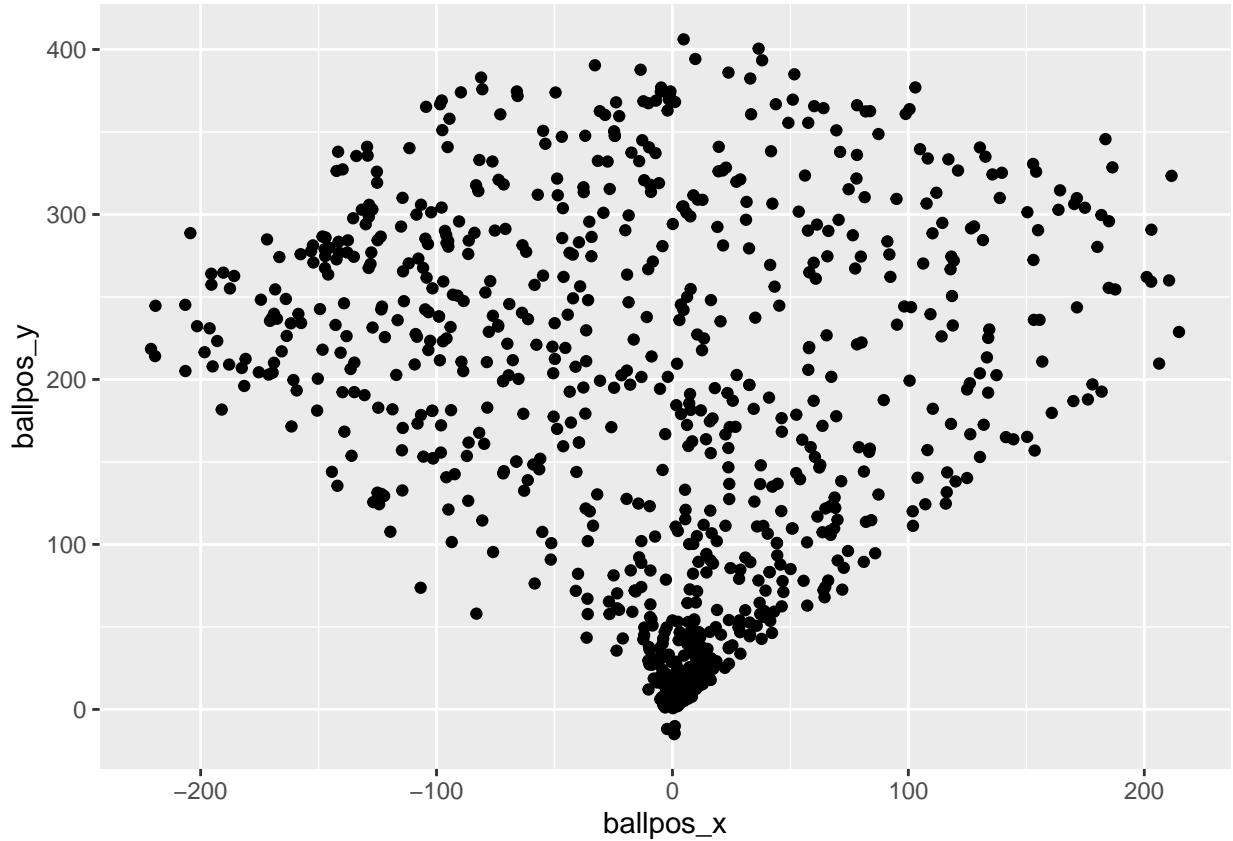
```
player488726_data %>%
  select(X8, Y8) %>%
  ggplot(mapping = aes(x = X8, y = Y8)) +
  geom_point(color = "brown")
```



```
player488726_data %>%
  select(X9, Y9) %>%
  ggplot(mapping = aes(x = X9, y = Y9)) +
  geom_point(color = "dark blue")
```



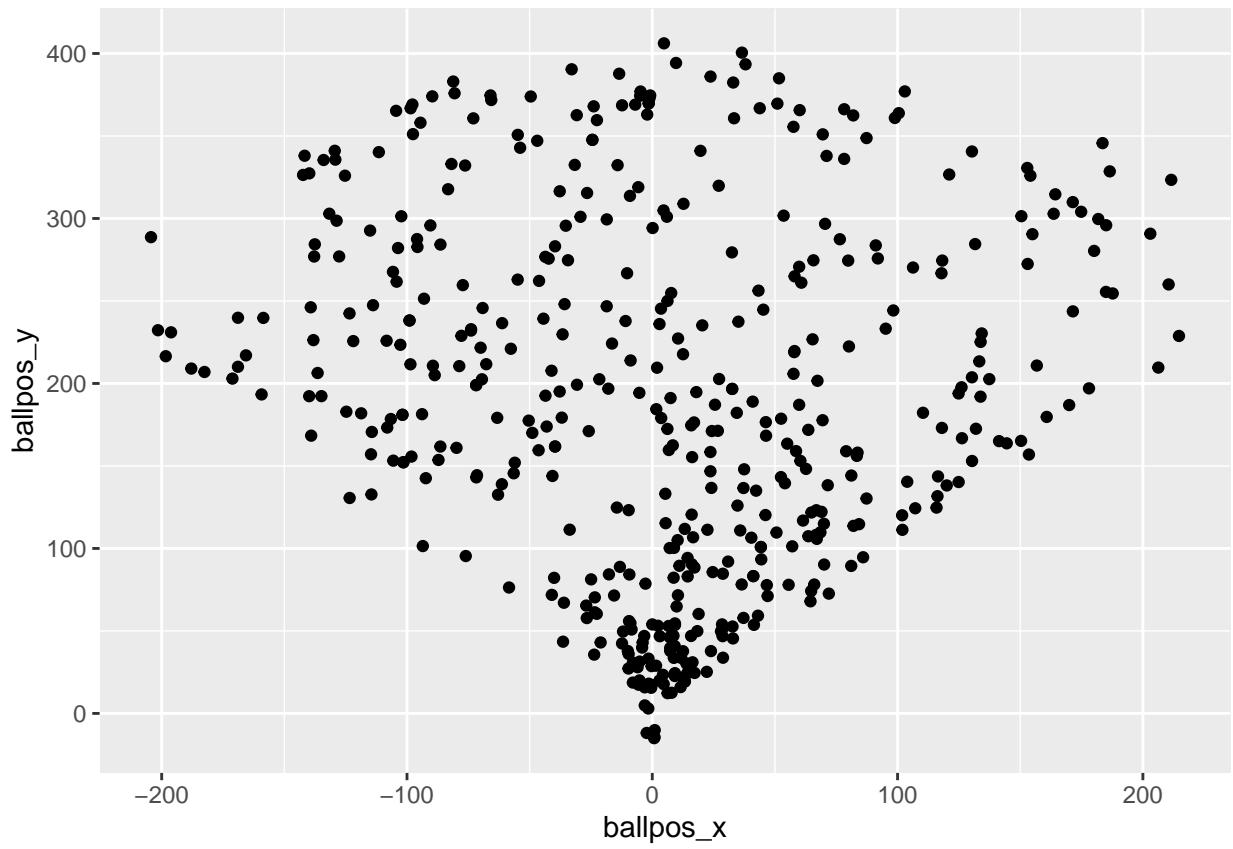
```
player488726_data %>%
  select(ballpos_x, ballpos_y) %>%
  ggplot(mapping = aes(x = ballpos_x, y = ballpos_y)) +
  geom_point()
```



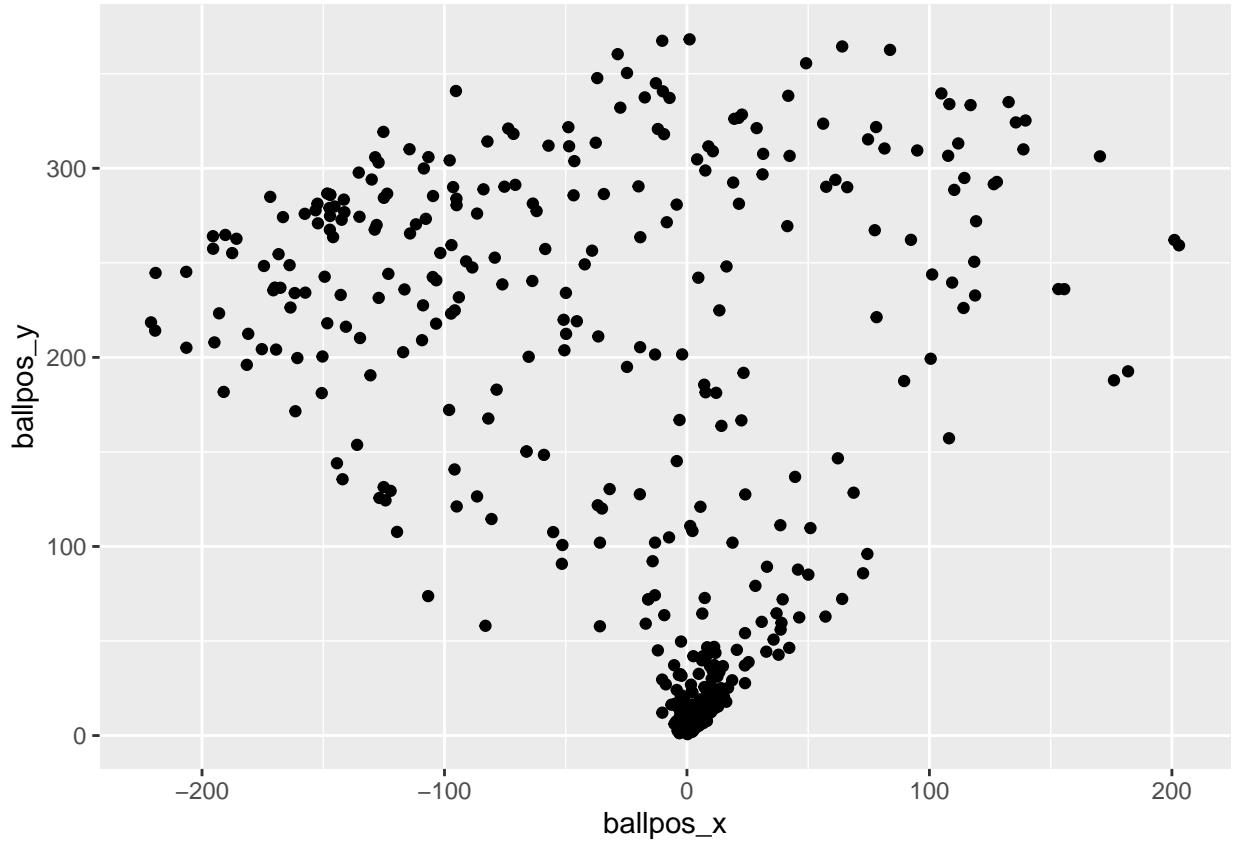
```
player488726_data_pos <- player488726_data %>%
  filter(RunValue > 0)
```

```
player488726_data_neg_zero <- player488726_data %>%
  filter(RunValue <= 0)
```

```
player488726_data_pos %>%
  select(ballpos_x, ballpos_y) %>%
  ggplot(mapping = aes(x = ballpos_x, y = ballpos_y)) +
  geom_point()
```



```
player488726_data_neg_zero %>%
  select(ballpos_x, ballpos_y) %>%
  ggplot(mapping = aes(x = ballpos_x, y = ballpos_y)) +
  geom_point()
```



```
player488726_data %>%
  summary()
```

```
##      Game_PK      pitcherid      batterid      BatSide
##  Min.   :529512   Min.   :112526   Min.   :488726   Length:1061
##  1st Qu.:530818  1st Qu.:519008  1st Qu.:488726  Class  :character
##  Median :565530  Median :592454  Median :488726  Mode   :character
##  Mean   :559387  Mean   :565689  Mean   :488726
##  3rd Qu.:566379  3rd Qu.:607560  3rd Qu.:488726
##  Max.   :631453  Max.   :676606  Max.   :488726
##  PitcherHand      inning      PitchTypeCode      ExitVelocity
##  Length:1061      Min.   : 1.00  Length:1061      Min.   : 35.14
##  Class  :character 1st Qu.: 3.00  Class  :character  1st Qu.: 82.56
##  Mode   :character  Median : 5.00  Mode   :character  Median : 91.75
##                           Mean   : 4.65  Mean   : 88.93
##                           3rd Qu.: 7.00  3rd Qu.: 98.63
##                           Max.   :13.00  Max.   :108.46
##  VertAngle      HorizAngle      Distance      FlightTime
##  Min.   :-74.946   Min.   :-86.34   Min.   : 0.755  Min.   :0.016
##  1st Qu.:- 5.660   1st Qu.: 65.57   1st Qu.: 19.752  1st Qu.:0.145
##  Median :  9.571   Median : 81.51   Median :156.194  Median :1.432
##  Mean   :  9.349   Mean   : 81.86   Mean   :158.586  Mean   :2.099
##  3rd Qu.: 24.534   3rd Qu.: 97.82   3rd Qu.:282.048  3rd Qu.:3.926
##  Max.   : 80.698   Max.   :261.30   Max.   :406.177  Max.   :6.555
##  Trajectory      HitValue      RunValue      X3
```

```

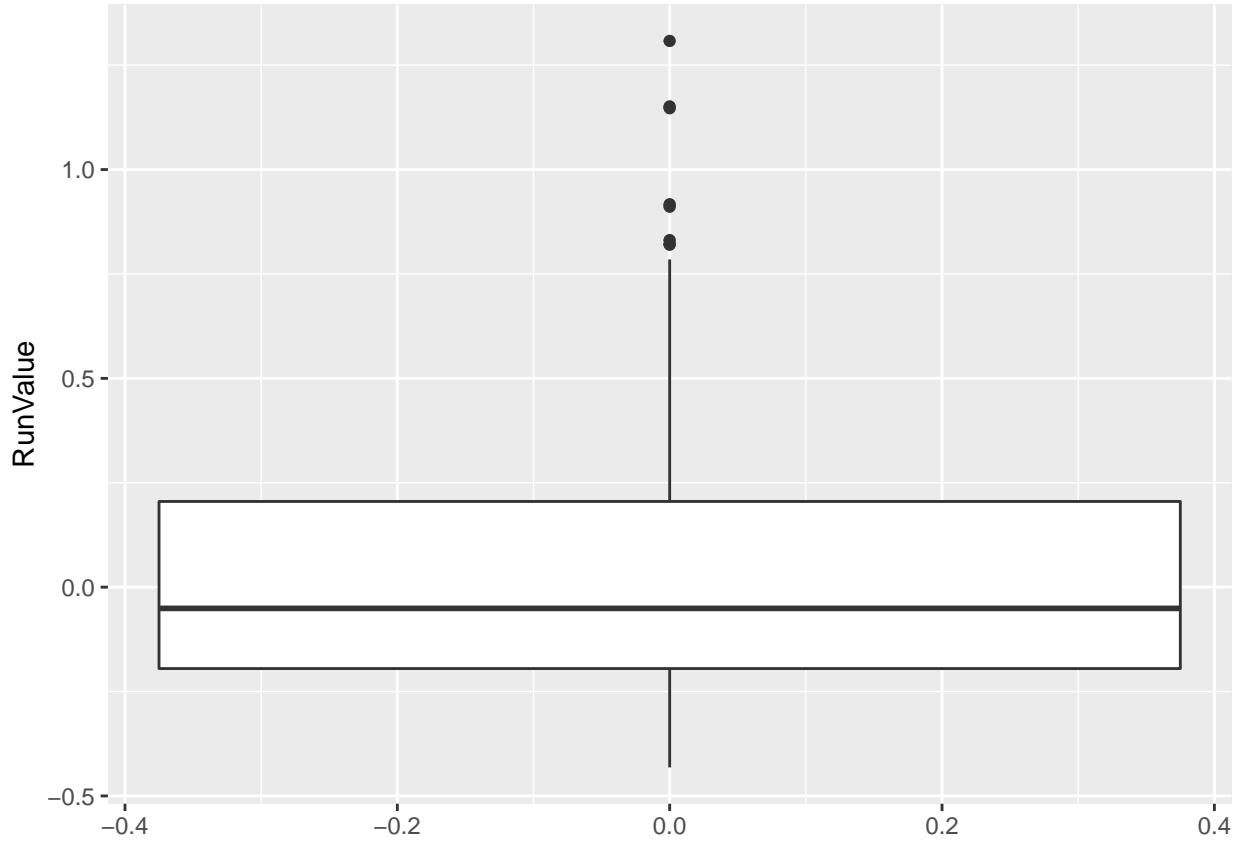
##  Length:1061      Min.   :0.0000  Min.   :-0.43170  Min.   :47.31
##  Class :character  1st Qu.:0.0000  1st Qu.:-0.19500  1st Qu.:64.25
##  Mode  :character  Median :0.0000  Median :-0.05090  Median :76.03
##                           Mean   :0.4232  Mean    : 0.01465  Mean   :73.13
##                           3rd Qu.:1.0000  3rd Qu.: 0.20520  3rd Qu.:80.14
##                           Max.   :3.0000  Max.    : 1.30810  Max.   :95.84
##      Y3          X4          Y4          X5
##  Min.   :60.34   Min.   :11.53   Min.   : 95.05  Min.   :-75.54
##  1st Qu.:85.50   1st Qu.:45.08   1st Qu.:137.18  1st Qu.:-56.50
##  Median :96.03   Median :51.40   Median :142.66  Median :-50.59
##  Mean   :89.50   Mean   :52.91   Mean   :142.73  Mean   :-46.60
##  3rd Qu.:99.54   3rd Qu.:58.96   3rd Qu.:147.05  3rd Qu.:-42.06
##  Max.   :111.08  Max.   :98.83   Max.   :180.96  Max.   : 90.72
##      Y5          X6          Y6          X7
##  Min.   :66.25   Min.   :-58.656  Min.   : 91.7   Min.   :-167.2
##  1st Qu.:95.19   1st Qu.:-21.792  1st Qu.:146.4   1st Qu.:-141.9
##  Median :102.28  Median :-14.684  Median :151.1   Median :-134.8
##  Mean   :108.37  Mean   :-7.285   Mean   :149.2   Mean   :-134.5
##  3rd Qu.:115.24  3rd Qu.: 9.808   3rd Qu.:153.9   3rd Qu.:-127.4
##  Max.   :158.90  Max.   :88.509   Max.   :168.1   Max.   :-105.0
##      Y7          X8          Y8          X9
##  Min.   :216.4   Min.   :-57.535  Min.   :281.9   Min.   : 80.65
##  1st Qu.:246.3   1st Qu.:-21.185  1st Qu.:314.6   1st Qu.:122.77
##  Median :253.7   Median :-16.367  Median :320.2   Median :131.83
##  Mean   :254.1   Mean   :-11.415  Mean   :320.6   Mean   :130.31
##  3rd Qu.:262.4   3rd Qu.:-2.644   3rd Qu.:327.0   3rd Qu.:138.71
##  Max.   :291.2   Max.   :33.385   Max.   :352.2   Max.   :162.48
##      Y9          ballpos_x      ballpos_y
##  Min.   :239.3   Min.   :-221.036  Min.   :-15.00
##  1st Qu.:265.4   1st Qu.:-39.638   1st Qu.: 17.21
##  Median :270.5   Median : 1.882   Median :135.54
##  Mean   :271.3   Mean   :-7.319   Mean   :145.73
##  3rd Qu.:277.2   3rd Qu.: 19.643   3rd Qu.:252.73
##  Max.   :304.8   Max.   :214.712   Max.   :406.15

```

```

player488726_data %>%
  select(RunValue) %>%
  ggplot(mapping = aes(y = RunValue)) +
  geom_boxplot()

```



###Attempting to sort via Batting Hand

This code is an attempt to sort the data based on batter hand before determining the size of the inputs

```
lefties_data <- fielding_data_df %>%
  filter(stringr::str_detect(BatSide, "L"))

lefties_data %>%
  count(batterid) %>%
  arrange(desc(n))
```

```
## # A tibble: 466 x 2
##       batterid     n
##       <dbl> <int>
## 1     488726 1061
## 2     453568 1033
## 3     518692 1032
## 4     455976  947
## 5     543333  935
## 6     519203  933
## 7     592696  922
## 8     460086  900
## 9     458015  881
## 10    641355  867
## # ... with 456 more rows
```

```
lefties_data %>%
  summary()
```

```
##      Game_PK      pitcherid      batterid      BatSide
##  Min.   :529406   Min.   :112526   Min.   :282332   Length:106274
##  1st Qu.:530853   1st Qu.:518876   1st Qu.:518692   Class  :character
##  Median :565320   Median :592717   Median :573262   Mode   :character
##  Mean   :562219   Mean   :568568   Mean   :564359
##  3rd Qu.:567009   3rd Qu.:621237   3rd Qu.:609275
##  Max.   :631685   Max.   :685493   Max.   :676606
##
##      PitcherHand      inning      PitchTypeCode      ExitVelocity
##  Length:106274   Min.   : 1.000   Length:106274   Min.   : 0.3871
##  Class  :character  1st Qu.: 3.000   Class  :character  1st Qu.: 79.3992
##  Mode   :character  Median : 5.000   Mode   :character  Median : 90.1497
##                           Mean   : 4.946   Mean   : 87.4074
##                           3rd Qu.: 7.000   3rd Qu.: 97.7921
##                           Max.   :19.000   Max.   :120.3087
##
##      VertAngle      HorizAngle      Distance      FlightTime
##  Min.   :-89.079   Min.   :-89.85   Min.   : 0.161   Min.   :-0.007
##  1st Qu.:-5.458   1st Qu.: 66.81   1st Qu.: 20.006   1st Qu.: 0.153
##  Median : 11.133   Median : 82.01   Median :155.567   Median : 1.605
##  Mean   : 10.896   Mean   : 82.89   Mean   :160.002   Mean   : 2.268
##  3rd Qu.: 27.882   3rd Qu.: 97.82   3rd Qu.:280.388   3rd Qu.: 4.245
##  Max.   : 89.752   Max.   :269.88   Max.   :529.611   Max.   : 7.580
##  NA's   :119
##
##      Trajectory      HitValue      RunValue      X3
##  Length:106274   Min.   :0.0000   Min.   :-0.4690   Min.   : 25.72
##  Class  :character  1st Qu.:0.0000   1st Qu.:-0.2011   1st Qu.: 64.12
##  Mode   :character  Median :0.0000   Median :-0.0679   Median : 75.23
##                           Mean   :0.3945   Mean   : 0.0104   Mean   : 72.53
##                           3rd Qu.:1.0000   3rd Qu.: 0.1879   3rd Qu.: 79.35
##                           Max.   :3.0000   Max.   : 1.4780   Max.   :107.05
##                           NA's   :1
##
##      Y3          X4          Y4          X5
##  Min.   : 51.01   Min.   :-60.90   Min.   : 72.5   Min.   :-96.39
##  1st Qu.: 86.32   1st Qu.: 45.29   1st Qu.:137.6   1st Qu.:-56.17
##  Median : 95.89   Median : 52.15   Median :143.1   Median :-49.34
##  Mean   : 89.98   Mean   : 54.69   Mean   :143.5   Mean   :-44.79
##  3rd Qu.: 99.39   3rd Qu.: 62.67   3rd Qu.:148.9   3rd Qu.:-41.79
##  Max.   :129.65   Max.   :119.06   Max.   :201.5   Max.   :114.57
##
##      Y5          X6          Y6          X7
##  Min.   : 48.99   Min.   :-73.694  Min.   : 59.9   Min.   :-217.02
##  1st Qu.: 90.68   1st Qu.:-24.409  1st Qu.:146.8   1st Qu.:-146.41
##  Median :101.12   Median :-15.489  Median :151.6   Median :-139.53
##  Mean   :106.33   Mean   :-8.271   Mean   :149.5   Mean   :-138.90
##  3rd Qu.:115.69   3rd Qu.: 12.318  3rd Qu.:154.5   3rd Qu.:-131.96
##  Max.   :200.74   Max.   :104.662  Max.   :192.9   Max.   :-82.96
##
##      Y7          X8          Y8          X9
##  Min.   :184.7    Min.   :-87.314  Min.   :245.6   Min.   : 47.16
```

```

## 1st Qu.:248.4    1st Qu.:-21.826   1st Qu.:314.4    1st Qu.:123.89
## Median :257.4    Median :-15.564    Median :321.5    Median :132.21
## Mean   :257.0    Mean  :-10.358    Mean  :321.3    Mean  :131.86
## 3rd Qu.:265.9    3rd Qu.: 5.901    3rd Qu.:328.4    3rd Qu.:140.27
## Max.   :325.7    Max.  : 64.496    Max.  :370.3    Max.  :184.76
##
##          Y9           ballpos_x       ballpos_y
##  Min.   :206.8     Min.   :-267.611   Min.   :-184.59
##  1st Qu.:264.7    1st Qu.:-35.603   1st Qu.: 17.74
##  Median :271.7    Median : 1.623    Median :138.03
##  Mean   :272.1    Mean  :-4.004    Mean  :146.17
##  3rd Qu.:279.1    3rd Qu.: 27.972   3rd Qu.:251.14
##  Max.   :331.5    Max.  :346.163   Max.  :506.41
##
```

```

righties_data <- fielding_data_df %>%
  filter(stringr::str_detect(BatSide, "R"))

```

```

righties_data %>%
  count(batterid) %>%
  arrange(desc(n))

```

```

## # A tibble: 844 x 2
##   batterid     n
##   <dbl> <int>
## 1 593160    1187
## 2 543760    1088
## 3 516416    1039
## 4 493329    1034
## 5 592518    1020
## 6 607208    1006
## 7 518934     999
## 8 607680     992
## 9 592206     987
## 10 605141    967
## # ... with 834 more rows

```

```

righties_data %>%
  summary()

```

```

## #> #> #> Game_PK      pitcherid      batterid      BatSide
## #> #> Min.   :529406   Min.   :112526   Min.   :112526   Length:151814
## #> #> 1st Qu.:530826   1st Qu.:518516   1st Qu.:516770   Class  :character
## #> #> Median :565275   Median :592314   Median :575929   Mode   :character
## #> #> Mean   :561482   Mean   :565070   Mean   :563172
## #> #> 3rd Qu.:567007   3rd Qu.:621111   3rd Qu.:614177
## #> #> Max.   :631685   Max.   :685493   Max.   :680777
##
## #> #> PitcherHand      inning      PitchTypeCode      ExitVelocity
## #> #> Length:151814     Min.   : 1.000   Length:151814     Min.   : 3.724
## #> #> Class  :character  1st Qu.: 3.000   Class  :character  1st Qu.: 78.962
## #> #> Mode   :character  Median : 5.000   Mode   :character  Median : 90.284

```

```

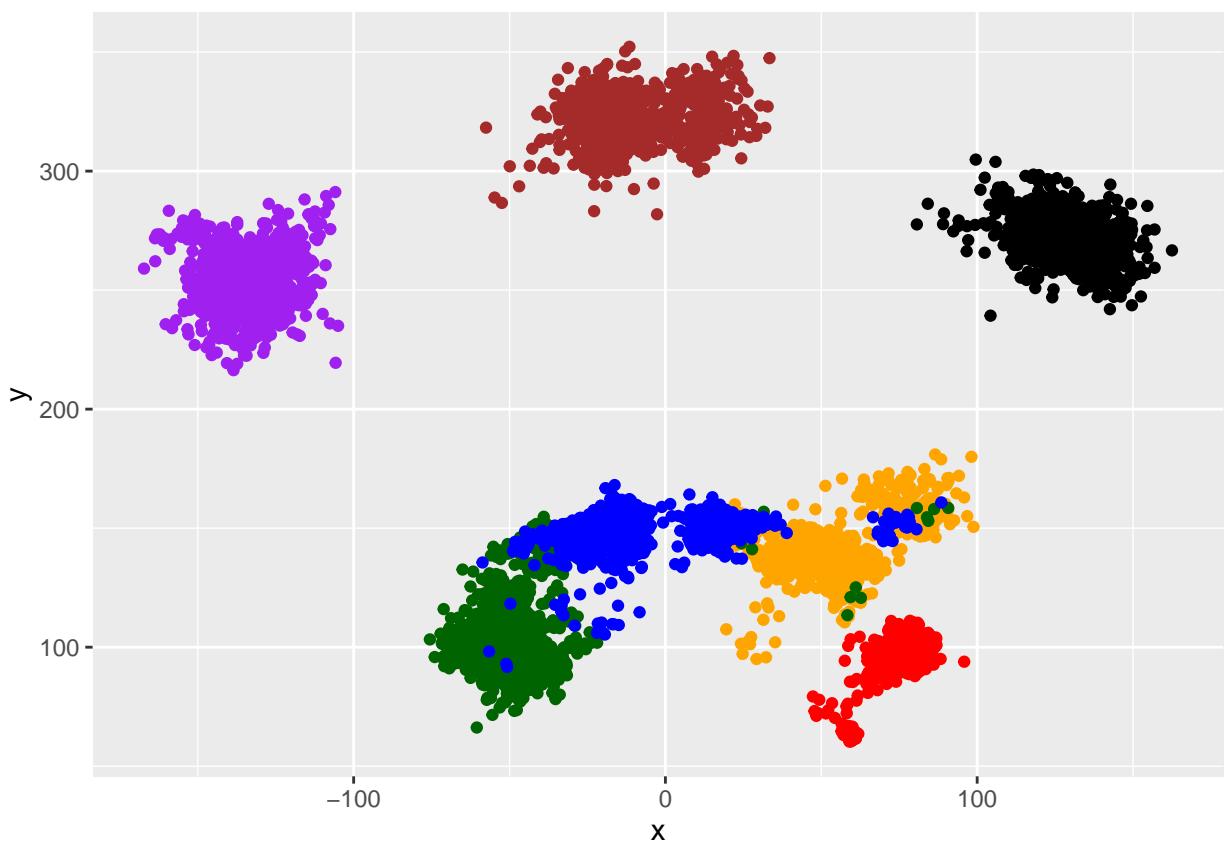
##                               Mean   : 4.953                               Mean   : 87.519
##                               3rd Qu.: 7.000                               3rd Qu.: 98.435
##                               Max.   :19.000                               Max.   :121.098
##
##      VertAngle      HorizAngle      Distance      FlightTime
##  Min.   :-89.037   Min.   :-89.77   Min.   : 0.157   Min.   :-0.527
##  1st Qu.: -6.409   1st Qu.: 82.19   1st Qu.: 18.297   1st Qu.: 0.138
##  Median  : 10.371   Median  : 97.94   Median  :145.820   Median  : 1.521
##  Mean    : 10.423   Mean    : 96.55   Mean    :156.544   Mean    : 2.244
##  3rd Qu.: 27.531   3rd Qu.:113.06   3rd Qu.:278.101   3rd Qu.: 4.234
##  Max.   : 89.875   Max.   :270.00   Max.   :577.328   Max.   : 9.864
##  NA's    :144
##
##      Trajectory      HitValue      RunValue      X3
##  Length:151814   Min.   :0.0000   Min.   :-0.46900   Min.   : 0.56
##  Class  :character 1st Qu.:0.0000   1st Qu.:-0.19570   1st Qu.:54.65
##  Mode   :character  Median :0.0000   Median :-0.06140   Median :58.39
##                           Mean   :0.3928   Mean   : 0.01624   Mean   :57.54
##                           3rd Qu.:1.0000   3rd Qu.: 0.19510   3rd Qu.:60.42
##                           Max.   :3.0000   Max.   : 1.43150   Max.   :98.21
##                           NA's   :1
##
##      Y3            X4            Y4            X5
##  Min.   :-5.107   Min.   :-60.00   Min.   : 59.84   Min.   :-98.90
##  1st Qu.: 87.619   1st Qu.: 12.95   1st Qu.:148.17   1st Qu.:-73.92
##  Median  : 98.600   Median  : 21.08   Median :152.58   Median :-70.53
##  Mean    : 91.818   Mean    : 17.87   Mean   :150.74   Mean   :-69.45
##  3rd Qu.:102.115   3rd Qu.: 27.32   3rd Qu.:155.28   3rd Qu.:-66.39
##  Max.   :130.205   Max.   : 97.50   Max.   :191.48   Max.   :-25.27
##
##      Y5            X6            Y6            X7
##  Min.   : 51.25   Min.   :-93.80   Min.   : 83.52   Min.   :-225.02
##  1st Qu.: 90.50   1st Qu.:-51.18   1st Qu.:137.57   1st Qu.:-140.34
##  Median  : 94.68   Median :-46.10   Median :141.29   Median :-132.25
##  Mean    : 93.58   Mean   :-45.87   Mean   :140.41   Mean   :-131.71
##  3rd Qu.: 98.25   3rd Qu.:-40.96   3rd Qu.:144.40   3rd Qu.:-123.40
##  Max.   :152.75   Max.   : 85.70   Max.   :187.00   Max.   :-53.99
##
##      Y7            X8            Y8            X9
##  Min.   :155.8    Min.   :-84.382   Min.   :251.0    Min.   : 27.67
##  1st Qu.:264.9    1st Qu.: -6.406   1st Qu.:315.3    1st Qu.:130.63
##  Median  :272.1    Median  : 15.887   Median :322.2    Median :137.60
##  Mean    :272.6    Mean   : 10.329   Mean   :322.1    Mean   :137.37
##  3rd Qu.:279.9    3rd Qu.: 22.783   3rd Qu.:329.2    3rd Qu.:144.35
##  Max.   :345.9    Max.   : 96.889   Max.   :378.1    Max.   :193.06
##
##      Y9      ballpos_x      ballpos_y
##  Min.   :161.0    Min.   :-310.481   Min.   :-200.43
##  1st Qu.:250.4    1st Qu.: -25.790   1st Qu.: 16.01
##  Median  :258.7    Median  :-1.611    Median : 129.84
##  Mean    :258.5    Mean   :  3.055   Mean   : 143.04
##  3rd Qu.:266.9    3rd Qu.: 31.990   3rd Qu.: 249.35
##  Max.   :317.7    Max.   : 346.042   Max.   : 563.55
##

```

```

player488726_data %>%
  select(X3, Y3, X4, Y4, X5, Y5, X6, Y6, X7, Y7, X8, Y8, X9, Y9) %>%
  ggplot(mapping = aes(x = "X", y = "Y")) +
  geom_point(aes(x = X3, y = Y3), color = "red") +
  geom_point(aes(x = X4, y = Y4), color = "orange") +
  geom_point(aes(x = X5, y = Y5), color = "dark green") +
  geom_point(aes(x = X6, y = Y6), color = "blue") +
  geom_point(aes(x = X7, y = Y7), color = "purple") +
  geom_point(aes(x = X8, y = Y8), color = "brown") +
  geom_point(aes(x = X9, y = Y9))

```



```

player593160_data %>%
  select(X3, Y3, X4, Y4, X5, Y5, X6, Y6, X7, Y7, X8, Y8, X9, Y9) %>%
  ggplot(mapping = aes(x = "X", y = "Y")) +
  geom_point(aes(x = X3, y = Y3), color = "red") +
  geom_point(aes(x = X4, y = Y4), color = "orange") +
  geom_point(aes(x = X5, y = Y5), color = "dark green") +
  geom_point(aes(x = X6, y = Y6), color = "blue") +
  geom_point(aes(x = X7, y = Y7), color = "purple") +
  geom_point(aes(x = X8, y = Y8), color = "brown") +
  geom_point(aes(x = X9, y = Y9))

```

