ANA 515 Practicum

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##Description of the data

```
The data is related to NBA Forecasts and is sourced from the https://github.com/fivethirtyeight/
data/tree/master/nba-forecasts.
```

##Install the following packages install.packages("dplyr") install.packages("tidyverse") install.packages("knitr") install.packages("bslib") install.packages("utils")

##Reading the data into R.

```
## get the dataset from GitHub/fivethirtyeight
url1 <- "https://projects.fivethirtyeight.com/nba-model/nba_elo_latest.csv"
nbaforecast1 <- read.csv(url1)

url2 <- "https://projects.fivethirtyeight.com/nba-model/nba_elo.csv"
nbaforecast2 <- read.csv(url2)

#Merging the datasheets
nbaforecast <- merge(nbaforecast1, nbaforecast2, all.x= TRUE, all.y = TRUE)
```

##Clean the data

```
library(dplyr)
```

```
## Warning: package 'dplyr' was built under R version 4.2.3
```

```
##
## Attaching package: 'dplyr'
```

```
## The following objects are masked from 'package:stats':
##
##     filter, lag
```

```
## The following objects are masked from 'package:base':
##
##     intersect, setdiff, setequal, union
```

```
library(tidyr)
```

```
## Warning: package 'tidyr' was built under R version 4.2.3
```

```
library(knitr)
```

```
## Warning: package 'knitr' was built under R version 4.2.3
```

```
library(bslib)
```

```
## Warning: package 'bslib' was built under R version 4.2.3
```

```
##
## Attaching package: 'bslib'
```

```
## The following object is masked from 'package:utils':
##
##     page
```

```
library(utils)
nbaforecast2023<-filter(nbaforecast, season ==2023)
nbaforecast2023 <- rename (nbaforecast2023, c(year = season, team_a=team1, team_b = team2, final
rating = total_rating))
bosceltics <- filter(nbaforecast2023, team_a=="BOS" | team_b=="BOS")
bosceltics %>%
  select(c(date, year, team_a, team_b, score1, score2, quality,importance, finalrating))
```

```
##           date year team_a team_b score1 score2 quality importance finalrating
## 1   2022-10-18 2023    BOS    PHI    126    117      96         13           55
## 2   2022-10-21 2023    MIA    BOS    104    111      96         23           60
## 3   2022-10-22 2023    ORL    BOS    120    126      35          2           19
## 4   2022-10-24 2023    CHI    BOS    120    102      80         17           49
## 5   2022-10-28 2023    BOS    CLE    123    132      84         11           48
## 6   2022-10-30 2023    BOS    WAS    112     94      70          8           39
## 7   2022-11-02 2023    CLE    BOS    114    113      89         23           56
## 8   2022-11-04 2023    BOS    CHI    123    119      78         17           48
## 9   2022-11-05 2023    NYK    BOS    118    133      81         36           59
## 10  2022-11-07 2023    MEM    BOS    106    109      92         10           51
## 11  2022-11-09 2023    BOS    DET    128    112      46          1           24
## 12  2022-11-11 2023    BOS    DEN    131    112      92          8           50
## 13  2022-11-12 2023    DET    BOS    108    117      37          3           20
## 14  2022-11-14 2023    BOS    OKC    126    122      65          3           34
## 15  2022-11-16 2023    ATL    BOS    101    126      89         21           55
## 16  2022-11-18 2023    NOP    BOS    109    117      90         27           59
## 17  2022-11-21 2023    CHI    BOS    121    107      79         27           53
## 18  2022-11-23 2023    BOS    DAL    125    112      93         17           55
## 19  2022-11-25 2023    BOS    SAC    122    104      81         16           49
## 20  2022-11-27 2023    BOS    WAS    130    121      75         15           45
## 21  2022-11-28 2023    BOS    CHO    140    105      30          5           18
## 22  2022-11-30 2023    BOS    MIA    134    121      85         13           49
## 23  2022-12-02 2023    BOS    MIA    116    120      90         18           54
## 24  2022-12-04 2023    BRK    BOS     92    103      91         32           62
## 25  2022-12-05 2023    TOR    BOS    110    116      93         26           60
## 26  2022-12-07 2023    PHO    BOS     98    125      93         17           55
## 27  2022-12-10 2023    GSW    BOS    123    107      92         27           60
## 28  2022-12-12 2023    LAC    BOS    113     93      84         38           61
## 29  2022-12-13 2023    LAL    BOS    118    122      76         20           48
## 30  2022-12-16 2023    BOS    ORL    109    117      54          2           28
## 31  2022-12-18 2023    BOS    ORL     92     95      49          2           26
## 32  2022-12-21 2023    BOS    IND    112    117      76         12           44
## 33  2022-12-23 2023    BOS    MIN    121    109      81         24           53
## 34  2022-12-25 2023    BOS    MIL    139    118      91          9           50
## 35  2022-12-27 2023    BOS    HOU    126    102      51          0           26
## 36  2022-12-29 2023    BOS    LAC    116    110      90         19           55
## 37  2023-01-01 2023    DEN    BOS    123    111      92          9           51
## 38  2023-01-03 2023    OKC    BOS    150    117      42          3           23
## 39  2023-01-05 2023    DAL    BOS     95    124      90         15           53
## 40  2023-01-07 2023    SAS    BOS    116    121      33          1           17
## 41  2023-01-09 2023    BOS    CHI    107     99      80         18           49
## 42  2023-01-11 2023    BOS    NOP    125    114      84          8           46
## 43  2023-01-12 2023    BRK    BOS     98    109      90         12           51
## 44  2023-01-14 2023    CHO    BOS    106    122      70          4           37
## 45  2023-01-16 2023    CHO    BOS    118    130      61          3           32
## 46  2023-01-19 2023    BOS    GSW    121    118      91         30           61
## 47  2023-01-21 2023    TOR    BOS    104    106      80         29           55
## 48  2023-01-23 2023    ORL    BOS    113     98      60          5           33
## 49  2023-01-24 2023    MIA    BOS     98     95      89         25           57
## 50  2023-01-26 2023    BOS    NYK    117    120      83         27           55
## 51  2023-01-28 2023    BOS    LAL    125    121      71         18           45
```

```
## 52  2023-02-01 2023    BOS    BRK    139     96       81          6          44
## 53  2023-02-03 2023    BOS    PHO     94    106       76         16          46
## 54  2023-02-06 2023    DET    BOS     99    111       41          4          23
## 55  2023-02-08 2023    BOS    PHI    106     99       91         13          52
## 56  2023-02-10 2023    BOS    CHO    127    116       50          3          27
## 57  2023-02-12 2023    BOS    MEM    119    109       89          8          49
## 58  2023-02-14 2023    MIL    BOS    131    125       82         13          48
## 59  2023-02-15 2023    BOS    DET    127    109       42          2          22
## 60  2023-02-23 2023    IND    BOS    138    142       68          7          38
## 61  2023-02-25 2023    PHI    BOS    107    110       94         12          53
## 62  2023-02-27 2023    NYK    BOS    109     94       90         16          53
## 63  2023-03-01 2023    BOS    CLE    117    113       93          7          50
## 64  2023-03-03 2023    BOS    BRK    105    115       84         14          49
## 65  2023-03-05 2023    BOS    NYK    129    131       91          5          48
## 66  2023-03-06 2023    CLE    BOS    118    114       87          6          47
## 67  2023-03-08 2023    BOS    POR    115     93       69         11          40
## 68  2023-03-11 2023    ATL    BOS    125    134       88         40          64
## 69  2023-03-13 2023    HOU    BOS    111    109       24          1          13
## 70  2023-03-15 2023    MIN    BOS    102    104       89         58          74
## 71  2023-03-17 2023    POR    BOS    112    126       72          7          40
## 72  2023-03-18 2023    UTA    BOS    118    117       59         26          43
## 73  2023-03-21 2023    SAC    BOS    109    132       83          4          44
## 74  2023-03-24 2023    BOS    IND    120     95       73          5          39
## 75  2023-03-26 2023    BOS    SAS    137     93       30          0          15
## 76  2023-03-28 2023    WAS    BOS    130    111       68          6          37
## 77  2023-03-30 2023    MIL    BOS     99    140       95         22          59
## 78  2023-03-31 2023    BOS    UTA    122    114       35          3          19
## 79  2023-04-04 2023    PHI    BOS    103    101       95         17          56
## 80  2023-04-05 2023    BOS    TOR     97     93       86         64          75
## 81  2023-04-07 2023    BOS    TOR    121    102       87         13          50
## 82  2023-04-09 2023    BOS    ATL    120    114       46          3          25
## 83  2023-04-15 2023    BOS    ATL    112     99       93         86          90
## 84  2023-04-18 2023    BOS    ATL    119    106       93         71          82
## 85  2023-04-21 2023    ATL    BOS    130    122       93         38          66
## 86  2023-04-23 2023    ATL    BOS    121    129       93         94          94
## 87  2023-04-25 2023    BOS    ATL    117    119       93         25          59
## 88  2023-04-27 2023    ATL    BOS    120    128       93        100          97
## 89  2023-05-01 2023    BOS    PHI    115    119       96        100          98
## 90  2023-05-03 2023    BOS    PHI    121     87       99        100         100
## 91  2023-05-05 2023    PHI    BOS    102    114       98        100          99
## 92  2023-05-07 2023    PHI    BOS    116    115       98        100          99
## 93  2023-05-09 2023    BOS    PHI    103    115       98        100          99
## 94  2023-05-11 2023    PHI    BOS     86     95       98        100          99
## 95  2023-05-14 2023    BOS    PHI    112     88       98        100          99
## 96  2023-05-17 2023    BOS    MIA    116    123       97        100          99
## 97  2023-05-19 2023    BOS    MIA    105    111       97        100          99
## 98  2023-05-21 2023    MIA    BOS    128    102       97        100          99
## 99  2023-05-23 2023    MIA    BOS     99    116       97        100          99
## 100 2023-05-25 2023    BOS    MIA    110     97       97        100          99
```

```
## 101 2023-05-27 2023    MIA    BOS    103    104      97       100          99
## 102 2023-05-29 2023    BOS    MIA     84    103      97       100          99
```

##Characterstics of the data

This data set has 102 rows and 27 columns.

##Summary Staistics

```
        kable(str(bosceltics))
```

```
## 'data.frame':    102 obs. of  27 variables:
##  $ date          : chr  "2022-10-18" "2022-10-21" "2022-10-22" "2022-10-24" ...
##  $ year          : int  2023 2023 2023 2023 2023 2023 2023 2023 2023 2023 ...
##  $ neutral       : int  0 0 0 0 0 0 0 0 0 0 ...
##  $ playoff       : chr  "" "" "" "" ...
##  $ team_a        : chr  "BOS" "MIA" "ORL" "CHI" ...
##  $ team_b        : chr  "PHI" "BOS" "BOS" "BOS" ...
##  $ elo1_pre      : num  1658 1599 1359 1433 1651 ...
##  $ elo2_pre      : num  1582 1662 1672 1675 1524 ...
##  $ elo_prob1     : num  0.733 0.553 0.228 0.307 0.787 ...
##  $ elo_prob2     : num  0.267 0.447 0.772 0.693 0.213 ...
##  $ elo1_post     : num  1662 1589 1356 1457 1632 ...
##  $ elo2_post     : num  1578 1672 1675 1651 1543 ...
##  $ carm.elo1_pre : num  NA NA NA NA NA NA NA NA NA NA ...
##  $ carm.elo2_pre : num  NA NA NA NA NA NA NA NA NA NA ...
##  $ carm.elo_prob1: num  NA NA NA NA NA NA NA NA NA NA ...
##  $ carm.elo_prob2: num  NA NA NA NA NA NA NA NA NA NA ...
##  $ carm.elo1_post: num  NA NA NA NA NA NA NA NA NA NA ...
##  $ carm.elo2_post: num  NA NA NA NA NA NA NA NA NA NA ...
##  $ raptor1_pre   : num  1693 1641 1298 1479 1699 ...
##  $ raptor2_pre   : num  1642 1691 1676 1699 1505 ...
##  $ raptor_prob1  : num  0.671 0.541 0.146 0.311 0.819 ...
##  $ raptor_prob2  : num  0.329 0.459 0.854 0.689 0.181 ...
##  $ score1        : int  126 104 120 120 123 112 114 123 118 106 ...
##  $ score2        : int  117 111 126 102 132 94 113 119 133 109 ...
##  $ quality       : int  96 96 35 80 84 70 89 78 81 92 ...
##  $ importance    : int  13 23 2 17 11 8 23 17 36 10 ...
##  $ finalrating   : int  55 60 19 49 48 39 56 48 59 51 ...
```

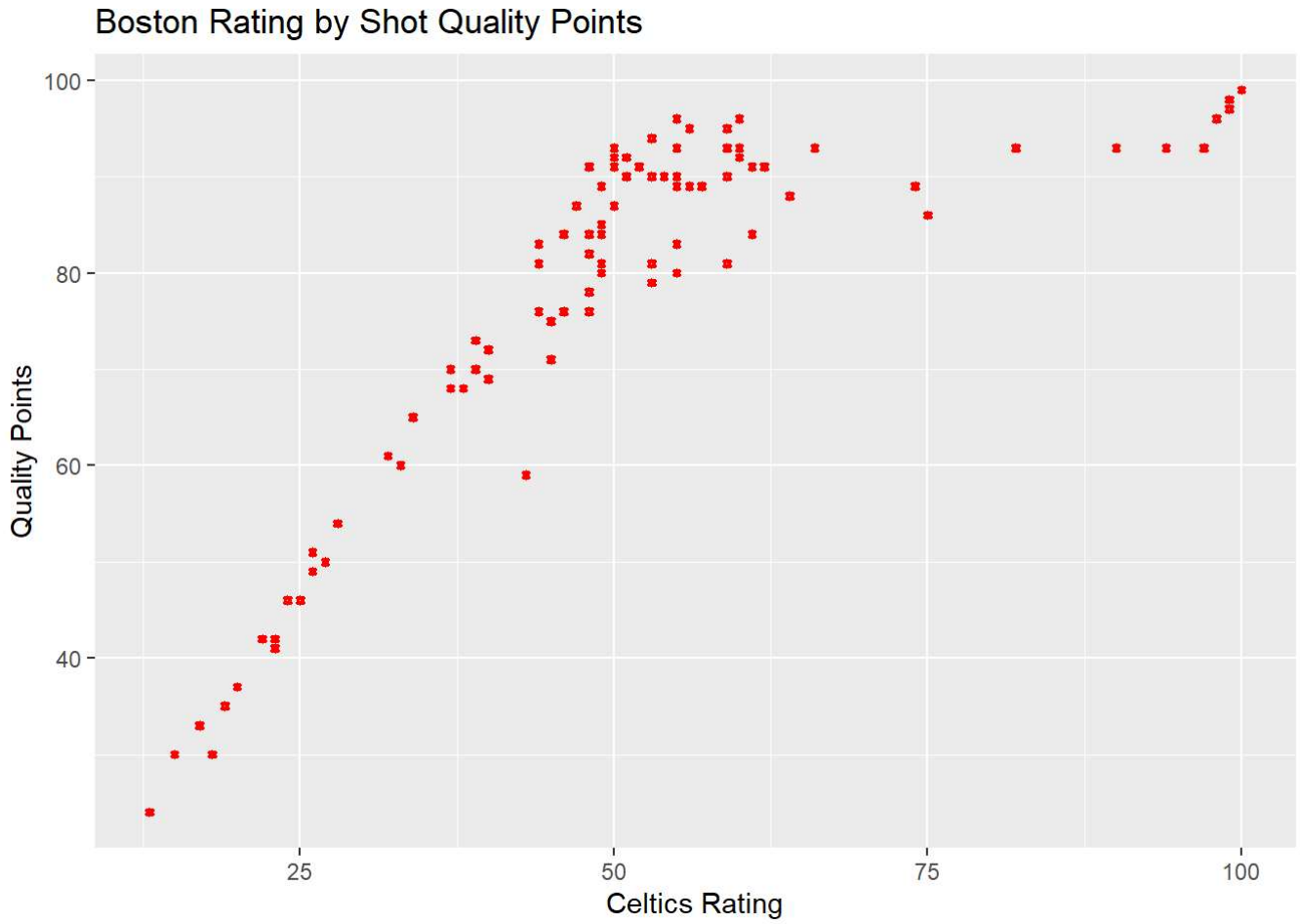
Print Scatter Plot

This scatter plot shows the rating of Boston Celtics by the shot quality. As shot quality is the key indicator in basket ball and it predicts the shot outcome by evaluating the quality of an attempt.

```
## Print Scatterplot
library(ggplot2)
```

```
## Warning: package 'ggplot2' was built under R version 4.2.3
```

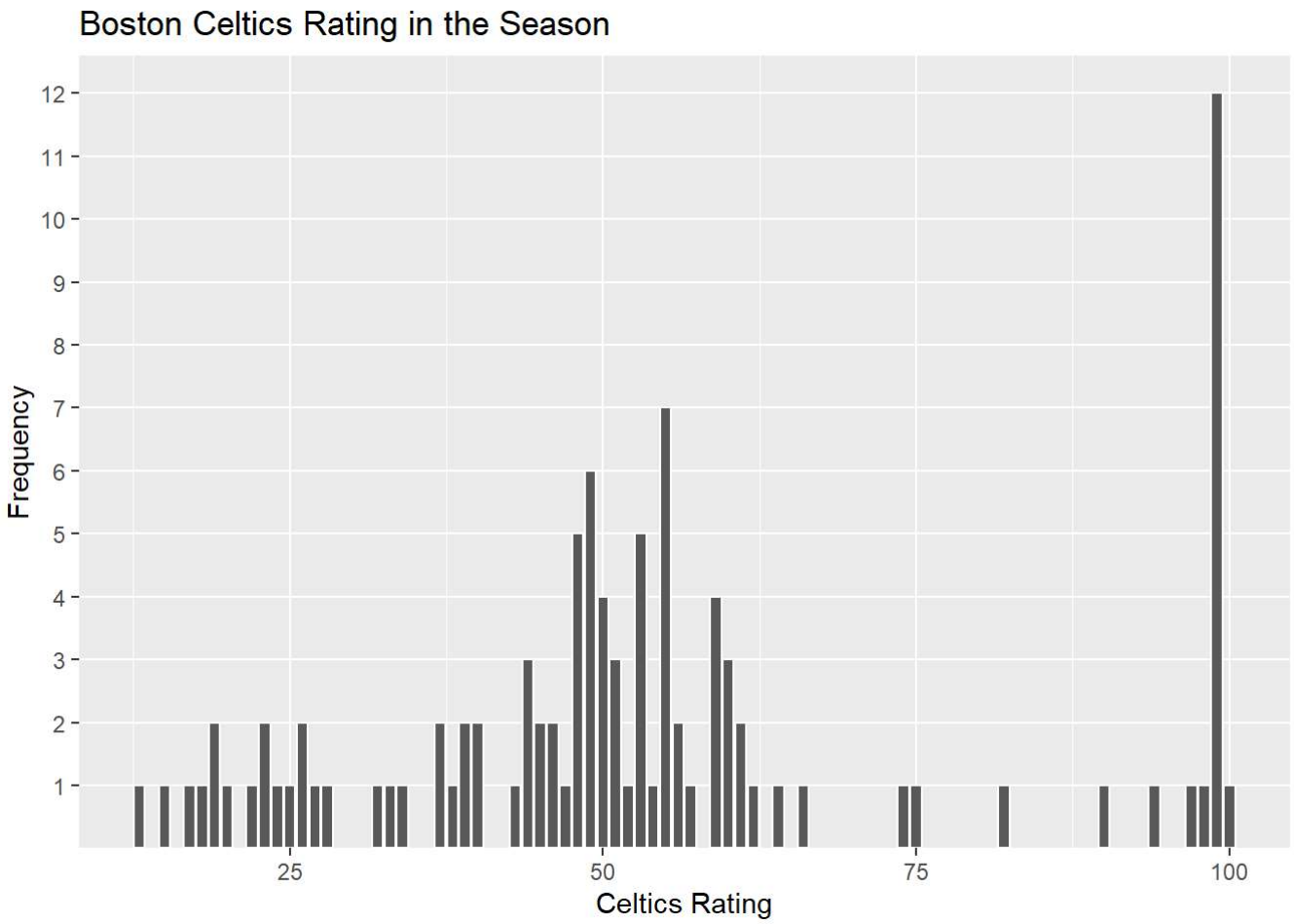
```
ggplot(data = bosceltics, aes(x = finalrating, y = quality))+ geom_point(
    color="red",shape=11,size=0.2,stroke = 1)+
  labs(title = "Boston Rating by Shot Quality Points", x = "Celtics Rating", y="Quality Points")
```



Print Bar Chart

This bar chart shows the frequency of Celtics final rating in the whole season.

```
ggplot(data=bosceltics)+
  geom_bar(mapping = aes(x = finalrating), color='white')+
  labs(title = "Boston Celtics Rating in the Season", x = "Celtics Rating", y="Frequency") + sca
le_y_discrete(limits=c("1","2", "3","4","5", "6","7","8","9","10","11","12"))
```



saving clean data

```
write.csv(bosceltics,"cleanedbosceltics.csv")
```