Comparative Analysis of Footballers

N060 - Yash Dukhande



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DOMAIN THEORY

STATISTICAL ANALYSIS

Systematic process of collecting, cleaning, organizing, interpreting, and drawing meaningful insights from data.

Use of statistical techniques, methods, and tools to summarize and analyze data, identify patterns and trends, make inferences, and draw conclusions.

Goal is to extract useful information from data to inform decision-making, solve problems, and gain a deeper understanding of a phenomenon.

Used in Business and Economics, Healthcare and Medicine, Environmental Science, Engineering, etc.

Types of Data

Qualitative (Categorical):

Categories or labels, e.g., gender, color, or product type.

Quantitative (Numerical):

Measurable values, e.g., age, income, or temperature.

Types of Statistics

Descriptive Statistics: These methods help us summarize and describe data, e.g., mean, median, mode, standard deviation.

Data Visualization: It involves representing data graphically, e.g., histogram, scatter plot, piechart.



Data Description

Contains about 18000 rows (players) and 92 rows (different attributes)

Contains Details about Footballers like name, age, player value, wages, position, team, various ratings, traits, etc.

Dataset Link: https://data.world/raghav333/fifa-players

A statistical measure of the relationship between two variables. Measure of how much one variable changes in relation to another variable. Correlation can be positive, negative, or zero.

Correlation

r is a measure of the linear correlation of two variables. It is a number that ranges from -1 to 0 to +1, representing the strength of the relationship between the variables.

Two main types of correlation

- i) Karl Pearson Correlation
- ii) Spearman's Rank Correlation

Problem Statement

Perform a comprehensive analysis of FIFA player data to gain deep insights into player performance, attribute rankings, and the factors influencing player success. This analysis will hope to provide a holistic understanding of the football players ecosystem and answer critical questions for fans, clubs, and enthusiasts.



Reading the CSV File

Code:

fifa = read.csv('fifa_cleaned.csv') head(fifa)

```
> fifa = read.csv('fifa_cleaned.csv')
> head(fifa)
                                           full_name birth_date age height_cm weight_kgs positions nationality overall_rating potential value_euro wage_euro
      id
1 158023
             L. Messi Lionel Andrés Messi Cuccittini 1987-06-24 31
                                                                       170.18
                                                                                    72.1 CF, RW, ST
                                                                                                     Argentina
                                                                                                                                      94 110500000
2 190460
          C. Eriksen Christian Dannemann Eriksen 1992-02-14 27
                                                                                    76.2 CAM, RM, CM
                                                                                                       Denmark
3 195864
                                          Paul Pogba 1993-03-15 25
                                                                       190.50
                                                                                                        France
                                                                                                                                          73000000
                                                                                                                                                       255000
           P. Pogba
                                                                                    83.9
                                                                                            CM, CAM
                                                                                                                                      91
4 198219 L. Insigne
                                     Lorenzo Insigne 1991-06-04 27
                                                                       162.56
                                                                                                         Italy
                                                                                                                                          62000000
                                                                                                                                                       165000
5 201024 K. Koulibaly
                                   Kalidou Koulibaly 1991-06-20 27
                                                                       187.96
                                                                                    88.9
                                                                                                       Senegal
                                                                                                                                      91
                                                                                                                                          60000000
                                                                                                                                                       135000
                                                                                                CB
                                     Virgil van Dijk 1991-07-08 27
                                                                       193.04
                                                                                                CB Netherlands
                                                                                                                           88
                                                                                                                                                       215000
6 203376 V. van Dijk
                                                                                    92.1
                                                                                                                                      90
                                                                                                                                          59500000
 preferred_foot international_reputation.1.5. weak_foot.1.5. skill_moves.1.5.
                                                                                    work rate body type release clause euro
                                                                                                                                    club team club rating
                                                                                                                                 FC Barcelona
                                                                                  Medium/ Low
                                                                                                                  226500000
                                                                                                  Messi
                                                                                                                  133800000 Tottenham Hotspur
           Right
                                                                                 High/ Medium
                                                                                                 Normal
                                                                                                                  144200000 Manchester United
                                                                                                                                                       82
                                                                                                                                       Napoli
           Right
                                                                                 High/ Medium
                                                                                                 Normal
                                                                                                                  105400000
                                                                                                                                                       82
                                                                                   High/ High
                                                                                                 Normal
                                                                                                                  106500000
                                                                                                                                       Napoli
           Right
                                                                             2 Medium/ Medium
                                                                                                 Normal
                                                                                                                  114500000
                                                                                                                                    Liverpool
                                                                                                                                                       83
           Right
  club_position club_jersey_number club_join_date contract_end_year national_team national_rating national_team_position national_jersey_number crossing
                                       2004-07-01
            LCM
                                23
                                       2013-08-30
                                                               2020
                                                                                               78
                                                                                                                     CAM
                                                                                                                                                       88
                                                                          Denmark
                                       2016-08-09
            LCM
                                                                                                                     RDM
                                                               2021
                                                                           France
                                                                                                                                                       80
                                       2010-07-01
            LCB
                                26
                                       2014-07-01
                                                               2021
                                                                                               NΔ
                                                                                                                                                       30
            LCB
                                       2018-01-01
                                                               2023
                                                                      Netherlands
                                                                                               81
                                                                                                                                                       53
  finishing heading_accuracy short_passing volleys dribbling curve freekick_accuracy long_passing ball_control acceleration sprint_speed agility reactions
                                        92
                                                          97
                                                                93
                                                                                                            96
                                                                                                                         91
                                                                                  87
                          52
                                        91
                                                80
                                                          84
                                                                86
                                                                                                            91
                                                                                                                         76
                                                                                                                                      73
                          75
                                                                                                                         71
         75
                                                          90
                                                                87
                                                                                               78
                                                                                                            93
         77
                          56
                                        85
                                                                                  77
                                                                                                                         94
                                                                                                                                                         83
         22
                          83
                                        68
                                                          69
                                                                28
                                                                                  28
                                                                                               60
                                                                                                            63
                                                                                                                         70
                                                                                                                                      75
                                                                                                                                                         82
         52
                          83
                                        79
                                                          70
                                                                60
                                                                                  70
                                                                                               81
                                                                                                            76
                                                                                                                                               61
  balance shot_power jumping stamina strength long_shots aggression interceptions positioning vision penalties composure marking standing_tackle sliding_tackle
                                  72
                                                                 48
                                                                               22
                                                                                                                      96
                                                                                                                                                              26
       95
                          68
                                           66
                                                                                                            75
                                                                                                                               33
                                                                                                  91
                                                                                                                       88
       81
                          50
                                                                                                            67
                                                                                                                               59
                                                                                                                                                              22
                                  92
                                                                 46
                                                                               56
                                                                                                            82
```

Details about rows and columns

Code:

```
r = nrow(fifa)
c = ncol(fifa)
print(paste("Number of rows
in the dataset: ",r))
print(paste("Number of
columns in the dataset: ",c))
attribute = colnames(fifa)
print("Column Names of the
data set are:")
attribute
```

```
> r = nrow(fifa)
> c = ncol(fifa)
> print(paste("Number of rows in the dataset: ",r))
[1] "Number of rows in the dataset: 17954"
> print(paste("Number of columns in the dataset: ",c))
[1] "Number of columns in the dataset: 92"
```

```
> attribute = colnames(fifa)
> print("Column Names of the data set are:")
[1] "Column Names of the data set are:"
> attribute
 [1] "id"
                                       "name"
                                                                         "full name"
                                                                                                           "birth_date"
 [5] "age"
                                                                         "weight_kgs"
                                                                                                           "positions"
                                       "height cm"
                                                                                                           "value euro"
 [9] "nationality"
                                       "overall_rating"
                                                                         "potential"
[13] "wage_euro"
                                       "preferred_foot"
                                                                         "international_reputation.1.5." "weak_foot.1.5."
[17] "skill_moves.1.5."
                                                                         "body_type"
                                                                                                           "release_clause_euro"
                                       "work_rate"
[21] "club_team"
                                       "club_rating"
                                                                         "club_position"
                                                                                                           "club_jersey_number"
                                       "contract_end_year"
                                                                         "national_team"
                                                                                                           "national_rating"
[25] "club join date"
[29] "national_team_position"
                                       "national_jersey_number"
                                                                         "crossing"
                                                                                                           "finishing"
                                       "short_passing"
                                                                         "volleys"
                                                                                                           "dribbling"
[33] "heading_accuracy"
[37] "curve"
                                                                                                           "ball_control"
                                       "freekick_accuracy"
                                                                         "long_passing"
[41] "acceleration"
                                                                         "agility"
                                       "sprint_speed"
                                                                                                           "reactions"
[45] "balance"
                                       "shot_power"
                                                                         "jumping"
                                                                                                           "stamina"
                                                                         "aggression"
[49] "strength"
                                       "long shots"
                                                                                                           "interceptions"
[53] "positioning"
                                       "vision"
                                                                         "penalties"
                                                                                                           "composure"
[57] "marking"
                                                                         "sliding tackle"
                                                                                                           "GK diving"
                                       "standing tackle"
                                                                                                           "GK_reflexes"
[61] "GK_handling"
                                       "GK_kicking"
                                                                         "GK_positioning"
                                                                         "LS"
                                                                                                           "ST"
[65] "tags"
                                       "traits"
                                       "LW"
                                                                                                           "CF"
[69] "RS"
                                                                         "LF"
                                       "RW"
[73]
     "RF"
                                                                         "LAM"
                                                                                                           "CAM"
                                       "LM"
                                                                         "LCM"
                                                                                                           "CM"
[77]
     "RAM"
    "RCM"
                                       "RM"
                                                                         "LWB"
                                                                                                           "LDM"
[81]
[85] "CDM"
                                       "RDM"
                                                                         "RWB"
                                                                                                           "LB"
[89] "LCB"
                                       "CB"
                                                                         "RCB"
                                                                                                           "RB"
```

Filter out columns we do not need

Code:

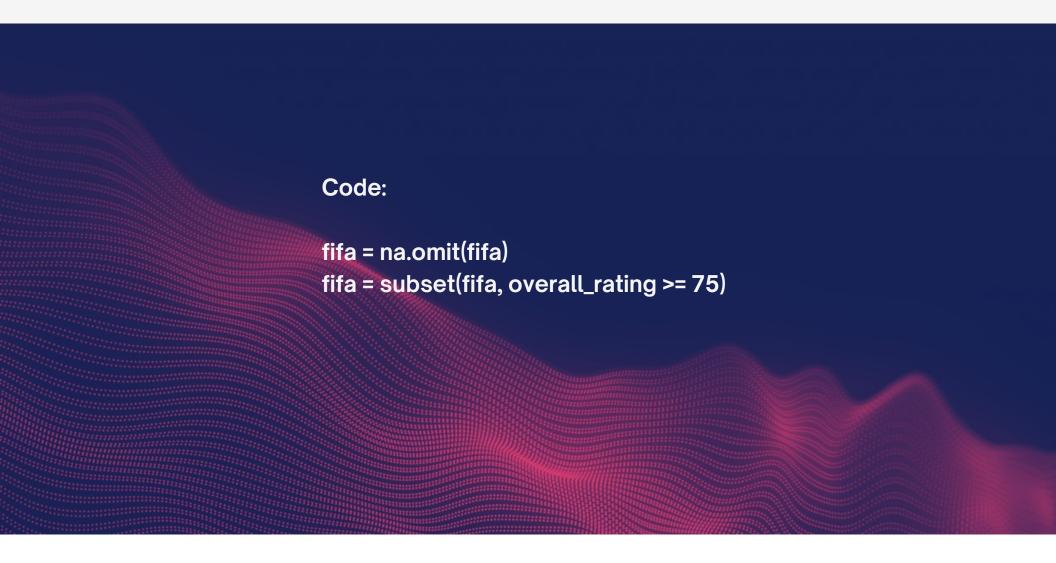
```
c1 = c('name', 'age', 'nationality', 'positions', 'overall_rating', 'value_euro', 'wage_euro',
    'club_team', 'crossing', 'finishing', 'heading_accuracy', 'short_passing', 'volleys',
    'dribbling', 'curve', 'freekick_accuracy', 'long_passing', 'ball_control', 'acceleration',
    'sprint_speed', 'agility', 'reactions', 'balance', 'shot_power', 'jumping', 'stamina',
    'strength', 'long_shots', 'aggression', 'interceptions', 'positioning', 'vision',
    'penalties', 'composure', 'marking', 'standing_tackle', 'sliding_tackle', 'GK_diving',
    'GK_handling', 'GK_kicking', 'GK_positioning', 'GK_reflexes')
fifa = fifa[,c1]
```

To get summary of dataset

Code: summary(fifa)

```
> summary(fifa)
                                    nationality
                                                        positions
                                                                          overall rating
                                                                                                                                 club team
    name
                                                                                            value euro
                                                                                                                 wage euro
                                                                                                                                                      crossing
Length: 17954
                   Min. :17.00
                                    Length: 17954
                                                       Length: 17954
                                                                          Min.
                                                                                :47.00
                                                                                          Min.
                                                                                                      10000
                                                                                                              Min. : 1000
                                                                                                                                Length: 17954
                                                                                                                                                   Min. : 5.0
                   1st Ou.: 22.00
                                                                                                     325000
                                                                                                              1st Qu.: 1000
Class : character
                                    Class :character
                                                       Class : character
                                                                          1st Qu.:62.00
                                                                                          1st Ou.:
                                                                                                                                Class : character
                                                                                                                                                   1st Ou.:38.0
Mode :character
                   Median :25.00
                                   Mode :character
                                                       Mode :character
                                                                          Median :66.00
                                                                                          Median :
                                                                                                     700000
                                                                                                              Median :
                                                                                                                         3000
                                                                                                                                Mode :character
                                                                                                                                                   Median :54.0
                   Mean :25.57
                                                                                 :66.24
                                                                                          Mean_:
                                                                                                    2479280
                                                                                                              Mean_:
                                                                                                                        9902
                                                                                                                                                   Mean :49.7
                   3rd Qu.:29.00
                                                                          3rd Ou.:71.00
                                                                                          3rd Qu.: 2100000
                                                                                                              3rd Qu.: 2000
                                                                                                                                                   3rd Ou.:64.0
                                                                                                 :110300000
                   Max. :46.00
                                                                                 :94.00
                                                                                           Max.
                                                                                                              Max.
                                                                                                                      :565000
                                                                                                                                                          :93.0
                                                                          Max.
                                                                                                                                                   Max.
                                                                                          NA's
                                                                                                 :255
                                                                                                              NA's
                                                                                                                     :246
  finishing
                                                                    dribbling
                                                                                                                                     ball_control
                heading_accuracy short_passing
                                                     volleys
                                                                                                 freekick_accuracy
                                                                                                                    long passing
                                                                                      cur
      : 2.00
                Min. : 4.00
                                  Min. : 7.00
                                                       : 3.00
                                                                  Min. : 4.00
                                                                                  Min.
                                                                                                        : 3.00
                                                                                                                                    Min. : 5.00
                                  1st Qu.:53.00
1st Qu.:30.00
                1st Qu.:44.00
                                                  1st Qu.:30.00
                                                                  1st Qu.:49.00
                                                                                  1st Qu.:34.0
                                                                                                 1st Qu.:30.00
                                                                                                                    1st Qu.:43.00
                                                                                                                                    1st Qu.:54.00
Median:49.00
                Median :56.00
                                  Median :62.00
                                                  Median:44.00
                                                                  Median :61.00
                                                                                  Median: 49.0
                                                                                                 Median :41.00
                                                                                                                    Median:56.00
                                                                                                                                    Median :63.00
     :45.36
                                       :58.57
                                                       :42.76
                                                                                  Mean :47.1
                                                                                                                         :52.67
                Mean
                      :52.15
                                  Mean
                                                  Mean
                                                                  Mean
                                                                       :55.28
                                                                                                 Mean
                                                                                                        :42.69
                                                                                                                    Mean
                                                                                                                                    Mean :58.22
                                                                                                                                    3rd Qu.:69.00
3rd Qu.:62.00
                 3rd Qu.:64.00
                                  3rd Qu.:68.00
                                                  3rd Qu.:57.00
                                                                  3rd Qu.:68.00
                                                                                  3rd Qu.:62.0
                                                                                                 3rd Qu.:56.00
                                                                                                                    3rd Qu.:64.00
       :95.00
                       :94.00
                                         :93.00
                                                         :90.00
                                                                        :97.00
                                                                                  Max.
                                                                                         :94.0
                                                                                                                           :93.00
                Max.
                                  Max.
                                                  Max.
                                                                  Max.
                                                                                                 Max.
                                                                                                        :94.00
                                                                                                                    Max.
                                                                                                                                    Max.
                                                                                                                                          :96.00
 acceleration
                sprint speed
                                  agility
                                                 reactions
                                                                  balance
                                                                                                                                                  long shots
                                                                                 shot power
                                                                                                  jumping
                                                                                                                   stamina
                                                                                                                                   strength
Min. :12.0
               Min.
                      :12.0
                              Min. :11.00
                                               Min.
                                                      :24.00
                                                               Min.
                                                                      :16.00
                                                                               Min. : 2.00
                                                                                               Min.
                                                                                                     :15.00
                                                                                                               Min.
                                                                                                                      :12.00
                                                                                                                                Min.
                                                                                                                                      :20.00
                                                                                                                                                Min. : 3.00
                                                               1st Qu.:56.00
                                                                                                                                1st Qu.:58.00
1st Ou.:57.0
                1st Ou.:58.0
                               1st Ou.:55.00
                                               1st Ou.:56.00
                                                                               1st Ou.:45.00
                                                                                               1st Ou.:58.00
                                                                                                               1st Ou.:56.00
                                                                                                                                                1st Qu.:32.00
Median :67.0
                                                               Median :66.00
                                                                                               Median :66.00
                                                                                                                                Median :66.00
                Median :67.0
                              Median :66.00
                                               Median:62.00
                                                                               Median:59.00
                                                                                                               Median :66.00
                                                                                                                                                Median:51.00
      :64.7
                      :64.8
                                     :63.38
                                                     :61.82
                                                                      :63.87
                                                                                     :55.32
                                                                                                     :64.96
                                                                                                                      :63.13
                                                                                                                                      :65.16
                                                                                                                                                      :46.85
                Mean
                                               Mean
                                                               Mean
                                                                               Mean
                                                                                                Mean
                                                                                                                Mean
                                                                                                                                Mean
                                                                                                                                                Mean
3rd Qu.:75.0
                3rd Qu.:75.0
                               3rd Qu.:74.00
                                               3rd Qu.:68.00
                                                               3rd Qu.:74.00
                                                                               3rd Qu.:68.00
                                                                                                3rd Qu.:73.00
                                                                                                                3rd Qu.:74.00
                                                                                                                                3rd Qu.:74.00
                                                                                                                                                3rd Qu.:62.00
       :97.0
               Max.
                      :96.0
                              Max.
                                     :96.00
                                               Max.
                                                      :96.00
                                                               Max.
                                                                      :96.00
                                                                               Max.
                                                                                      :95.00
                                                                                               Max.
                                                                                                      :95.00
                                                                                                               Max.
                                                                                                                      :97.00
                                                                                                                                Max.
                                                                                                                                       :97.00
                                                                                                                                                Max.
                                                                                                                                                       :94.00
  aggression
                interceptions
                                  positioning
                                                     vision
                                                                   penalties
                                                                                                     marking
                                                                                                                  standing tackle sliding tackle
                                                                                                                                                    GK diving
                                                                                   composure
                                                       :10.00
                                                                 Min. : 5.00
                                                                                                                                 Min. : 3.00
Min. :11.00
                Min. : 3.00
                                 Min. : 2.00
                                                 Min.
                                                                                 Min. :12.00
                                                                                                 Min. : 3.00
                                                                                                                 Min. : 2.00
                                                                                                                                                  Min. : 1.00
1st Ou.:44.00
                1st Ou.:26.00
                                 1st Ou.:38.00
                                                 1st Ou.:44.00
                                                                 1st Ou.:38.00
                                                                                 1st Ou.:51.00
                                                                                                                  1st Ou.:27.00
                                                                                                                                                  1st Ou.: 8.00
                                                                                                 1st Ou.:30.00
                                                                                                                                  1st Ou.:24.00
Median:59.00
                Median:52.00
                                 Median :55.00
                                                 Median :55.00
                                                                 Median:49.00
                                                                                 Median:60.00
                                                                                                 Median :52.50
                                                                                                                  Median:55.00
                                                                                                                                  Median:52.00
                                                                                                                                                  Median :11.00
      :55.82
                                       :49.86
                                                       :53.41
                                                                                                                        :47.73
                Mean
                       :46.66
                                 Mean
                                                 Mean
                                                                 Mean
                                                                        :48.36
                                                                                 Mean
                                                                                        :58.68
                                                                                                 Mean
                                                                                                        :47.16
                                                                                                                  Mean
                                                                                                                                  Mean
                                                                                                                                        :45.71
                                                                                                                                                  Mean
                                                                                                                                                       :16.78
3rd Qu.:69.00
                                 3rd Ou.:64.00
                                                 3rd Qu.:64.00
                                                                 3rd Qu.:60.00
                 3rd Qu.:64.00
                                                                                 3rd Qu.:67.00
                                                                                                 3rd Qu.:64.00
                                                                                                                  3rd Qu.:66.00
                                                                                                                                  3rd Qu.:64.00
                                                                                                                                                  3rd Qu.:14.00
       :95.00
                        :92.00
                                        :95.00
                                                 Max.
                                                        :94.00
                                                                 Max.
                                                                        :92.00
                                                                                 Max.
                                                                                        :96.00
                                                                                                 Max.
                                                                                                        :94.00
                                                                                                                  Max.
                                                                                                                         :93.00
                                                                                                                                  Max.
                                                                                                                                         :90.00
                                                                                                                                                  Max.
                                                                                                                                                         :90.00
```

To remove NA Values and Filter out the rows



Final Summary of Cleaned Data

Code: summary(fifa)

```
> summary(fifa)
                                     nationality
                                                         positions
                                                                            overall rating
                                                                                              value euro
                                                                                                                                   club team
                         age
                                                                                                                   wage euro
     name
Length: 2009
                    Min.
                          :18.00
                                     Length: 2009
                                                        Length: 2009
                                                                            Min.
                                                                                  :75.00
                                                                                            Min. :
                                                                                                                 Min. : 1000
                                                                                                                                  Length: 2009
                                                                                                       450000
                    1st Qu.:25.00
                                                                            1st Qu.:76.00
                                                                                            1st Qu.: 7000000
                                                                                                                 1st Qu.: 20000
                                                                                                                                  Class :character
Class : character
                                     Class :character
                                                        Class :character
Mode :character
                    Median:28.00
                                                        Mode :character
                                                                            Median :77.00
                                                                                            Median: 9500000
                                                                                                                 Median : 31000
                                                                                                                                  Mode :character
                                     Mode :character
                    Mean :27.69
                                                                                   :78.14
                                                                                                   : 13155363
                                                                                                                 Mean : 45990
                                                                            Mean
                                                                                            Mean
                    3rd Qu.:30.00
                                                                            3rd Qu.:80.00
                                                                                            3rd Qu.: 14000000
                                                                                                                 3rd Qu.: 53000
                                                                                   :94.00
                                                                                            Max.
                                                                                                                       :565000
                    Max. :41.00
                                                                            Max.
                                                                                                   :110500000
                                                                                                                 Max.
    crossing
                   finishing
                                 heading accuracy short passing
                                                                       vollevs
                                                                                     dribbling
                                                                                                        curve
                                                                                                                    freekick accuracy long passing
      : 7.00
                        : 5.00
                                 Min.
                                       : 7.00
                                                   Min.
                                                          :11.00
                                                                   Min.
                                                                         : 7.0
                                                                                          : 7.00
                                                                                                   Min.
                                                                                                         : 8.00
                                                                                                                    Min. : 7.00
                                                                                                                                      Min. :11.00
Min.
                 Min.
                                                                                   Min.
1st Qu.:52.00
                 1st Qu.:42.00
                                 1st Qu.:53.00
                                                   1st Qu.:69.00
                                                                   1st Qu.:41.0
                                                                                   1st Qu.:64.00
                                                                                                   1st Qu.:49.00
                                                                                                                    1st Qu.: 40.00
                                                                                                                                      1st Qu.:59.00
Median :68.00
                 Median :63.00
                                 Median :65.00
                                                   Median :75.00
                                                                   Median :60.0
                                                                                   Median :74.00
                                                                                                   Median :67.00
                                                                                                                    Median :57.00
                                                                                                                                      Median :69.00
       :60.89
                 Mean
                        :56.36
                                 Mean
                                        :60.88
                                                   Mean
                                                          :70.81
                                                                   Mean
                                                                          :54.7
                                                                                   Mean
                                                                                          :67.13
                                                                                                   Mean
                                                                                                          :60.08
                                                                                                                           :53.91
                                                                                                                                      Mean
                                                                                                                                             :64.95
                                                                                                                    Mean
3rd Qu.:75.00
                 3rd Qu.:73.00
                                 3rd Qu.:75.00
                                                   3rd Qu.:78.00
                                                                   3rd Qu.:71.0
                                                                                   3rd Qu.:79.00
                                                                                                   3rd Qu.:75.00
                                                                                                                    3rd Qu.:70.00
                                                                                                                                      3rd Qu.:75.00
        :93.00
                                                                   Max.
                                                                                                   Max.
                 Max.
                        :95.00
                                 Max.
                                         :94.00
                                                   Max.
                                                          :93.00
                                                                          :90.0
                                                                                   Max.
                                                                                          :97.00
                                                                                                          :94.00
                                                                                                                    Max.
                                                                                                                           :94.00
                                                                                                                                      Max.
                                                                                                                                             :93.00
 ball control
                 acceleration
                                  sprint speed
                                                   agility
                                                                   reactions
                                                                                    balance
                                                                                                   shot power
                                                                                                                     jumping
                                                                                                                                      stamina
                                                                                                                                                      strength
      : 9.0
                       :28.00
                                       :26.0
                                                       :19.00
                                                                        :53.00
                                                                                        :20.00
                                                                                                        :12.00
                                                                                                                         :30.00
                                                                                                                                          :17.00
                                                                                                                                                   Min.
                                                                                                                                                          :29.00
                Min.
                                Min.
                                                Min.
                                                                Min.
                                                                                 Min.
                                                                                                 Min.
                                                                                                                  Min.
                                                                                                                                  Min.
1st Qu.:70.0
                1st Qu.:61.00
                                1st Qu.:63.0
                                                1st Qu.:62.00
                                                                1st Qu.:72.00
                                                                                 1st Qu.:58.00
                                                                                                 1st Qu.:64.00
                                                                                                                  1st Qu.:64.00
                                                                                                                                  1st Qu.:67.00
                                                                                                                                                   1st Qu.:64.00
Median:76.0
                Median :71.00
                                Median :72.0
                                                Median:72.00
                                                                Median :75.00
                                                                                 Median :69.00
                                                                                                 Median:74.00
                                                                                                                  Median :71.00
                                                                                                                                  Median:74.00
                                                                                                                                                   Median:72.00
       :70.7
                       :69.21
                                Mean
                                      :69.5
                                                Mean
                                                       :69.25
                                                                Mean
                                                                        :75.37
                                                                                 Mean
                                                                                        :66.63
                                                                                                 Mean
                                                                                                        :67.55
                                                                                                                  Mean :69.56
                                                                                                                                  Mean
                                                                                                                                         :71.03
                                                                                                                                                   Mean
                                                                                                                                                          :70.66
Mean
                Mean
3rd Qu.:80.0
                                3rd Qu.:78.0
                3rd Qu.:79.00
                                                3rd Qu.:79.00
                                                                3rd Qu.:78.00
                                                                                 3rd Qu.:77.00
                                                                                                 3rd Qu.:79.00
                                                                                                                  3rd Qu.:77.00
                                                                                                                                  3rd Qu.:80.00
                                                                                                                                                   3rd Qu.:78.00
                                                                        :96.00
       :96.0
                       :97.00
                                Max.
                                       :96.0
                                                Max.
                                                       :96.00
                                                                Max.
                                                                                 Max.
                                                                                        :96.00
                                                                                                 Max.
                                                                                                        :95.00
                                                                                                                  Max.
                                                                                                                         :95.00
                                                                                                                                  Max.
                                                                                                                                         :97.00
                                                                                                                                                   Max.
  long shots
                              interceptions
                                                positioning
                                                                   vision
                                                                                 penalties
                                                                                                                  marking
                                                                                                                               standing tackle sliding tackle
                aggression
                                                                                                composure
                     :11.00
                              Min.
                                     : 9.00
                                                      : 4.00
                                                                                     : 9.0
                                                                                                      :25.00
                                                                                                                     : 9.00
                                                                                                                               Min.
                                                                                                                                      : 7.00
                                                                                                                                               Min.
                                                                                                                                                      : 8.00
       : 7
              Min.
                                               Min.
                                                                       :11.0
                                                                               Min.
                                                                                              Min.
                                                                                                               Min.
1st Qu.:52
              1st Qu.:58.00
                              1st Qu.:35.00
                                               1st Qu.:53.00
                                                               1st Qu.:59.0
                                                                               1st Qu.:47.0
                                                                                              1st Qu.:69.00
                                                                                                               1st Qu.:37.00
                                                                                                                               1st Qu.:34.00
                                                                                                                                                1st Qu.:29.00
Median :68
              Median :71.00
                              Median :68.00
                                               Median :70.00
                                                               Median :70.0
                                                                               Median :61.0
                                                                                              Median :74.00
                                                                                                               Median :65.00
                                                                                                                               Median :68.00
                                                                                                                                                Median :63.00
Mean
       :60
              Mean
                    :66.11
                              Mean
                                     :56.87
                                               Mean
                                                     :61.47
                                                               Mean
                                                                      :66.3
                                                                               Mean
                                                                                     :57.4
                                                                                              Mean
                                                                                                     :72.93
                                                                                                               Mean
                                                                                                                      :56.39
                                                                                                                               Mean
                                                                                                                                      :56.39
                                                                                                                                                Mean
                                                                                                                                                      :53.25
3rd Qu.:74
              3rd Qu.:79.00
                              3rd Qu.:76.00
                                               3rd Qu.:76.00
                                                               3rd Qu.:76.0
                                                                               3rd Qu.:70.0
                                                                                              3rd Qu.:78.00
                                                                                                               3rd Qu.:75.00
                                                                                                                               3rd Qu.:77.00
                                                                                                                                                3rd Qu.:75.00
        :94
                     :95.00
                                      :92.00
                                                      :95.00
                                                               Max.
                                                                       :94.0
                                                                                      :92.0
                                                                                                      :96.00
                                                                                                               Max.
                                                                                                                      :94.00
                                                                                                                                       :93.00
                                                                                                                                                       :90.00
Max.
                                                                                                                               Max.
                                                                   GK_reflexes
                  GK_handling
                                    GK kicking
                                                  GK_positioning
  GK diving
                                 Min. : 1.00
                                                        : 1.00
                                                                  Min. : 1.0
      : 1.00
                 Min.
                        : 1.00
                                                  Min.
1st Qu.: 8.00
                 1st Qu.: 8.00
                                 1st Qu.: 8.00
                                                  1st Qu.: 8.00
                                                                  1st Qu.: 8.0
Median:11.00
                 Median :11.00
                                 Median:11.00
                                                  Median :11.00
                                                                  Median :11.0
Mean :17.09
                 Mean
                        :16.76
                                 Mean
                                        :16.49
                                                  Mean
                                                         :16.88
                                                                  Mean
                                                                        :17.1
3rd Qu.:14.00
                 3rd Qu.:14.00
                                 3rd Qu.:14.00
                                                  3rd Qu.:14.00
                                                                  3rd Qu.:14.0
```



Code:

```
attacking = c('finishing','heading_accuracy','freekick_accuracy','shot_power','penalties')
a = c('Finish',",'Head',",'Freekick',",'Shot Pow',",'Pen',")
playmaking = c('crossing','short_passing','dribbling','long_passing','vision')
p = c('Cross',",'Short Pass',",'Drib',",'Long Pass',",'Vision',")
physicality = c('sprint_speed','reactions','jumping','stamina','strength')
p1 = c('Speed',",'React',",'Jump',",'Stamina',",'Strength',")
defending = c('interceptions', 'positioning','marking', 'standing_tackle', 'sliding_tackle')
d = c('Intercept',", 'Position',", 'Mark',", 'Stand Tackle',", 'Slide Tackle',")
goalkeeping = c('GK_diving','GK_handling', 'GK_kicking', 'GK_positioning', 'GK_reflexes')
g = c('Dive',", 'Handle',", 'Kick',", 'Position',", 'Reflex',")
```

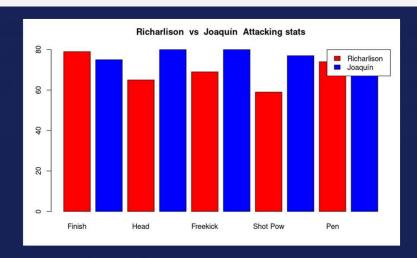
```
random_names = sample(fifa$name, size = 2)
n1 = random_names[1]
n2 = random_names[2]
r1 = which(fifa$name == n1)
r2 = which(fifa$name == n2)
name1 = fifa$name[r1]
age1 = fifa$age[r1]
nationality1 = fifa$nationality[r1]
position1 = fifa$positions[r1]
rating1 = fifa$overall_rating[r1]
value1 = fifa$value euro[r1]
attacking1 = unlist(fifa[r1,attacking])
playmaking1 = unlist(fifa[r1,playmaking])
physicality1 = unlist(fifa[r1,physicality])
defending1 = unlist(fifa[r1,defending])
goalkeeping1 = unlist(fifa[r1,goalkeeping])
```

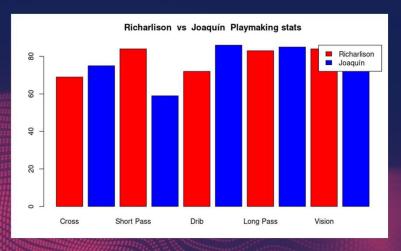
```
name2 = fifa$name[r2]
age2 = fifa$age[r2]
nationality2 = fifa$nationality[r2]
position2 = fifa$positions[r2]
rating2 = fifa$overall_rating[r2]
value2 = fifa$value_euro[r2]
attacking2 = unlist(fifa[r2, attacking])
playmaking2 = unlist(fifa[r2, playmaking])
physicality2 = unlist(fifa[r2, physicality])
defending2 = unlist(fifa[r2, defending])
goalkeeping2 = unlist(fifa[r2, goalkeeping])
print(paste(name1,' vs ', name2, ' Comparison'))
print(paste('Age: ', age1, ' | ', age2))
print(paste('Nationality: ', nationality1, ' | ', nationality2))
print(paste('Position: ', position1, ' | ', position2))
print(paste('Rating: ', rating1, ' | ', rating2))
print(paste('Value(Euros): ', value1, ' | ', value2))
```

```
barplot(c(attacking1,attacking2),col = c('red','blue'),width = 2,names.arg = a, main = paste(name1,' vs ',
name2, 'Attacking stats'))
legend("topright", legend = c(name1,name2), fill = c('red','blue'))
barplot(c(playmaking1,playmaking2),col = c('red','blue'),width = 2,names.arg = p, main = paste(name1,' vs ',
name2, 'Playmaking stats'))
legend("topright", legend = c(name1,name2), fill = c('red', 'blue'))
barplot(c(physicality1,physicality2),col = c('red','blue'),width = 2,names.arg = p1, main = paste(name1,' vs ',
name2, 'Physicality stats'))
legend("topright", legend = c(name1,name2), fill = c('red', 'blue'))
barplot(c(defending1,defending2),col = c('red','blue'),width = 2,names.arg = d, main = paste(name1,' vs ',
name2, 'Defending stats'))
legend("topright", legend = c(name1,name2), fill = c('red', 'blue'))
barplot(c(goalkeeping1,goalkeeping2),col = c('red','blue'),width = 2,names.arg = g, main = paste(name1,' vs ',
name2, 'Goalkeeping stats'))
legend("topright", legend = c(name1,name2), fill = c('red','blue'))
```

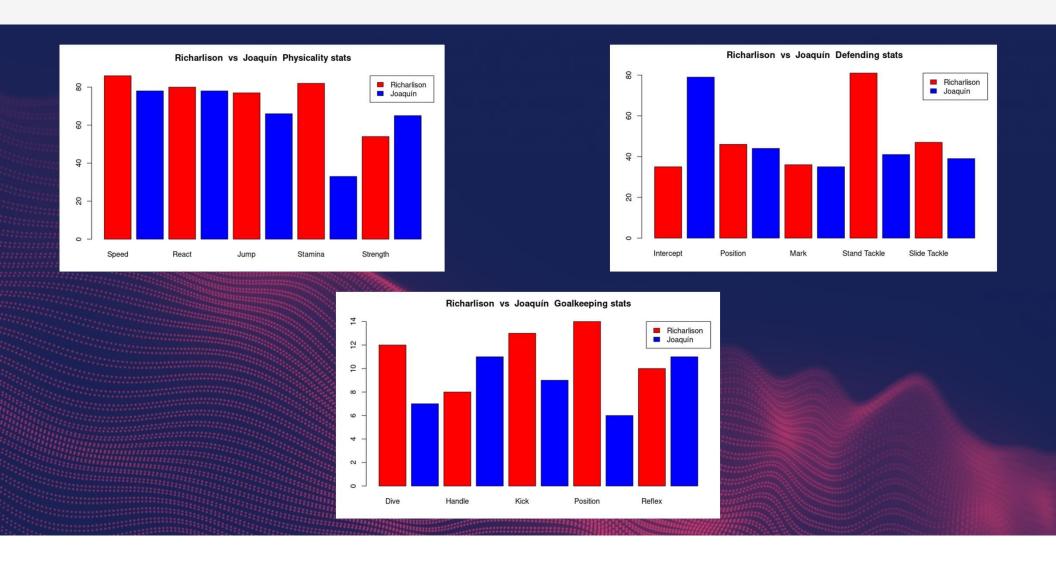
Screen Shots of the Code

```
> print(paste(name1,' vs ', name2, ' Comparison'))
[1] "Richarlison vs Joaquín Comparison"
> print(paste('Age: ', age1, ' | ', age2))
[1] "Age: 21 | 37"
> print(paste('Nationality: ', nationality1, ' | ', nationality2))
[1] "Nationality: Brazil | Spain"
> print(paste('Position: ', position1, ' | ', position2))
[1] "Position: ST,LW,LM | LM,ST,RM"
> print(paste('Rating: ', rating1, ' | ', rating2))
[1] "Rating: 80 | 81"
> print(paste('Value(Euros): ', value1, ' | ', value2))
[1] "Value(Euros): 2.1e+07 | 6e+06"
```





Screen Shots of the Code



Correlation Analysis

```
corelation = function(z){
 if(z==0){
  print('No relation')
 }else if(z<0){
  print('Negative corelation')
 }else{
  print("Positive corelation")
 z = abs(z)
 if(z == 1){
  print("Perfect Relation")
 }else if(z>0.7){
  print("Strong Relation")
 }else if(z>0.3){
  print("Moderate Relation")
 }else{
  print("Weak Relation")
```

Correlation Analysis

```
fifa$attacking = (fifa$finishing + fifa$heading_accuracy + fifa$freekick_accuracy + fifa$shot_power +
fifa$penalties)/5
fifa$playmaking = (fifa$crossing + fifa$short_passing + fifa$dribbling + fifa$long_passing + fifa$vision)/5
fifa$physicality = (fifa$sprint_speed + fifa$reactions + fifa$jumping + fifa$stamina + fifa$strength)/5
fifa$defending = (fifa$interceptions + fifa$positioning + fifa$marking + fifa$standing_tackle +
fifa$sliding_tackle)/5
fifa$goalkeeping = (fifa$GK_diving + fifa$GK_handling + fifa$GK_kicking + fifa$GK_positioning +
fifa$GK_reflexes)/5
pairs(fifa[,c('age','value_euro','overall_rating')])
x = cor(fifa$age,fifa$value_euro)
print(paste('Age and Value Corelation is: ',x))
corelation(x)
x = cor(fifa$age,fifa$overall_rating)
print(paste('Age and Rating Corelation is: ',x))
corelation(x)
x = cor(fifa$value_euro,fifa$value_euro)
print(paste('Rating and Value Corelation is: ',x))
corelation(x)
```

Correlation Analysis

```
plot(fifa$attacking,fifa$overall_rating)
x = cor(fifa$attacking,fifa$overall_rating)
print(paste('Attacking and Rating Corelation is: ',x))
corelation(x)
```

plot(fifa\$playmaking,fifa\$overall_rating)
x = cor(fifa\$playmaking,fifa\$overall_rating)
print(paste('Playmaking and Rating Corelation is: ',x))
corelation(x)

plot(fifa\$physicality,fifa\$overall_rating)
x = cor(fifa\$physicality,fifa\$overall_rating)
print(paste('Physicality and Rating Corelation is: ',x))
corelation(x)

plot(fifa\$defending,fifa\$overall_rating)

x = cor(fifa\$defending,fifa\$overall_rating)

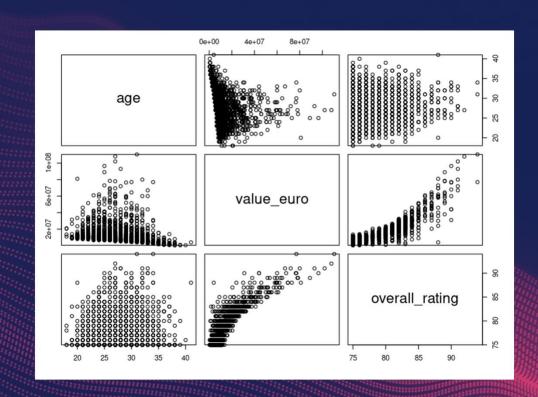
print(paste('Defending and Rating Corelation is: ',x))

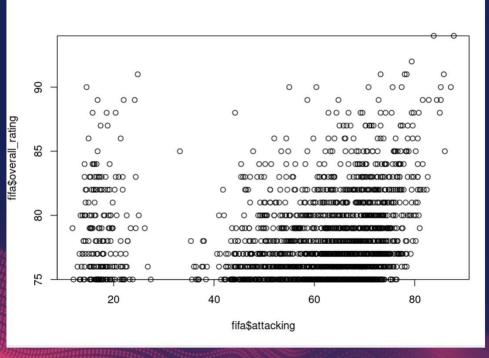
corelation(x)

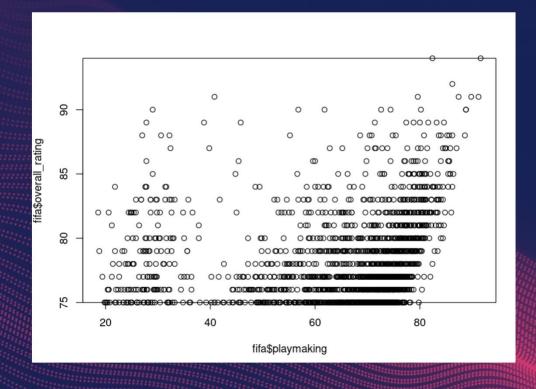
plot(fifa\$goalkeeping,fifa\$overall_rating)
x = cor(fifa\$goalkeeping,fifa\$overall_rating)
print(paste('Goalkeeping and Rating Corelation is:
',x))
corelation(x)

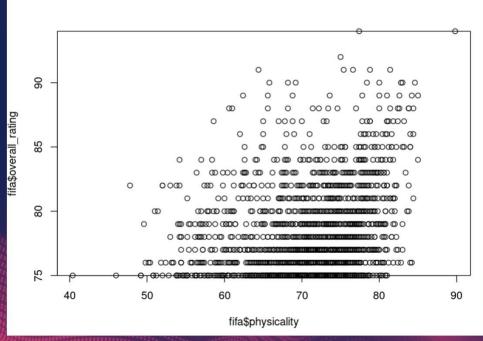
```
> print(paste('Age and Value Corelation is: ',x))
[1] "Age and Value Corelation is: -0.217981177691301"
> corelation(x)
[1] "Negative corelation"
[1] "Weak Relation"
> x = cor(fifa$age,fifa$overall rating)
> print(paste('Age and Rating Corelation is: ',x))
[1] "Age and Rating Corelation is: 0.0651301574824295"
> corelation(x)
[1] "Positive corelation"
[1] "Weak Relation"
> x = cor(fifa$value_euro,fifa$value_euro)
> print(paste('Rating and Value Corelation is: ',x))
[1] "Rating and Value Corelation is: 1"
> corelation(x)
[1] "Positive corelation"
[1] "Perfect Relation"
```

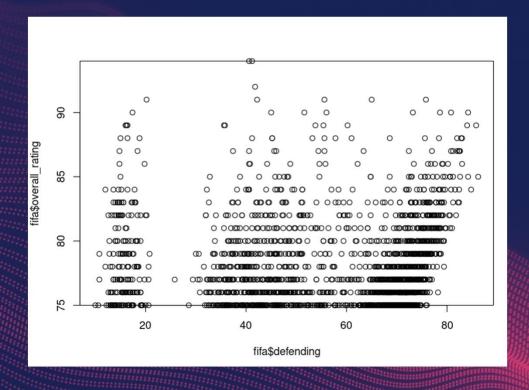
```
> plot(fifa$attacking,fifa$overall rating)
> x = cor(fifa$attacking,fifa$overall rating)
> print(paste('Attacking and Rating Corelation is: ',x))
[1] "Attacking and Rating Corelation is: 0.111466186260536"
> corelation(x)
[1] "Positive corelation"
[1] "Weak Relation"
> plot(fifa$playmaking,fifa$overall_rating)
> x = cor(fifa$playmaking,fifa$overall_rating)
> print(paste('Playmaking and Rating Corelation is: ',x))
[1] "Playmaking and Rating Corelation is: 0.145250713770987"
> corelation(x)
[1] "Positive corelation"
[1] "Weak Relation"
> plot(fifa$physicality,fifa$overall rating)
> x = cor(fifa$physicality,fifa$overall rating)
> print(paste('Physicality and Rating Corelation is: ',x))
[1] "Physicality and Rating Corelation is: 0.230272042794233"
> corelation(x)
[1] "Positive corelation"
[1] "Weak Relation"
> plot(fifa$defending,fifa$overall rating)
> x = cor(fifa$defending,fifa$overall rating)
> print(paste('Defending and Rating Corelation is: ',x))
[1] "Defending and Rating Corelation is: 0.0148059066251064"
> corelation(x)
[1] "Positive corelation"
[1] "Weak Relation"
```

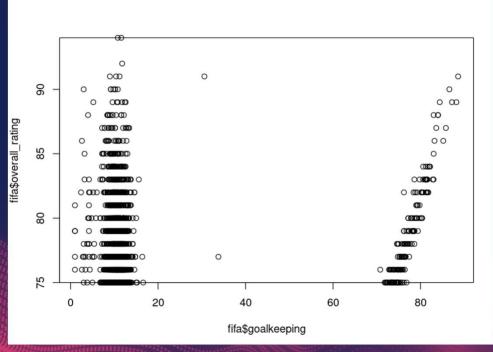
















CONCLUSION

We have successfully implemented Data Cleaning and Analysis.

This data analysis used by scouting, clubs, managing team and award organizations to name a few.