# R Notebook

```
library(tidyverse)
```

```
## -- Attaching packages --------------------------------------- tidyverse 1.3.1 --
```

```
## v ggplot2 3.3.5     v purrr   0.3.4
## v tibble  3.1.4     v dplyr   1.0.7
## v tidyr   1.1.3     v stringr 1.4.0
## v readr   2.0.1     v forcats 0.5.1
```

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

```
mydata <- read.csv("~/Desktop/grouped_by_country.csv")
mydata
```

```
##         Country Pos. movement_acceleration movement_agility movement_balance
## 1     Argentina   16              64.72624         63.77169         65.18182
## 2     Australia   28              64.58667         61.82667         62.63111
## 3       Belgium    3              63.96350         64.29562         63.68978
## 4        Brazil    6              66.61330         65.51355         64.11823
## 5      Colombia    9              66.65936         64.54637         64.96796
## 6    Costa Rica   30              69.76667         66.86667         65.50000
## 7       Croatia    2              62.52294         60.29358         58.24771
## 8       Denmark   11              62.48844         61.94220         62.23988
## 9         Egypt   31              66.45161         64.83871         66.38710
## 10      England    4              65.63503         63.11268         64.34476
## 11       France    1              64.25051         62.63497         64.07975
## 12      Germany   23              63.25855         62.49167         62.08852
## 13      Iceland   29              64.66038         63.69811         64.45283
## 14         Iran   18              66.76471         65.47059         62.94118
## 15        Japan   15              61.75325         63.20346         66.04545
## 16       Mexico   12              63.94167         63.46111         66.55000
## 17      Morocco   27              70.78481         71.46835         68.08861
## 18      Nigeria   21              73.43651         67.62698         65.85714
## 19       Panama   32              65.06250         62.68750         61.31250
## 20         Peru   20              68.34483         66.06897         68.65517
## 21       Poland   25              61.78274         61.75000         61.95536
## 22     Portugal   13              66.04144         66.86188         65.83149
## 23       Russia    8              62.38436         60.49837         61.89902
## 24 Saudi Arabia   26              63.66465         62.66767         65.25680
## 25      Senegal   17              68.93798         64.45736         61.67442
## 26       Serbia   22              61.66667         59.77273         58.78788
## 27        Spain   10              64.09862         64.20020         64.67949
## 28       Sweden    7              62.91033         62.41304         61.20380
## 29  Switzerland   14              61.74138         59.41810         62.32759
## 30      Tunisia   24              65.58065         65.58065         63.54839
## 31      Uruguay    5              65.59477         63.51634         64.46405
```

```
##    power_jumping     pace movement_reactions movement_sprint_speed
## 1       65.09194 68.01508           63.82851               64.80269
## 2       63.51556 68.67692           57.04889               65.40000
## 3       66.68613 68.15880           63.82117               64.03285
## 4       65.18103 68.81541           68.01108               66.93719
## 5       66.01349 69.55741           61.73524               66.58685
## 6       69.06667 73.29630           65.70000               70.60000
## 7       62.31193 66.38776           63.72477               63.19266
## 8       64.78035 67.08525           60.13006               63.98266
## 9       62.48387 69.60714           64.54839               67.32258
## 10      64.61727 68.47531           57.72750               65.41825
## 11      64.91002 67.48786           61.82209               64.27198
## 12      65.21472 67.31225           61.91762               63.93076
## 13      67.15094 67.34694           62.33962               66.26415
## 14      63.52941 75.14286           65.70588               67.35294
## 15      63.63853 66.12285           58.69481               61.72944
## 16      64.75000 67.70000           60.81944               63.57500
## 17      62.88608 70.92208           64.65823               69.58228
## 18      67.99206 74.80488           61.96825               74.40476
## 19      64.31250 64.93750           62.37500               65.00000
## 20      66.82759 69.69231           62.27586               67.72414
## 21      64.75000 66.16549           59.17262               61.83929
## 22      65.75691 69.48137           67.80387               65.92541
## 23      61.71336 67.35857           62.08795               62.32899
## 24      64.38973 67.75088           56.57704               63.79456
## 25      70.16279 71.41935           63.27132               71.20155
## 26      64.46970 64.72269           66.17424               62.25000
## 27      65.26726 66.69488           65.27416               64.34320
## 28      62.89946 66.88450           61.00000               63.74185
## 29      64.43966 66.01523           59.15517               62.05172
## 30      63.87097 66.23333           63.03226               65.61290
## 31      65.44444 68.36232           65.61438               65.97386
##    power_stamina power_strength
## 1       63.34194       64.34504
## 2       61.94667       64.93778
## 3       61.42701       64.40876
## 4       65.28571       67.43103
## 5       65.40809       65.56155
## 6       65.96667       66.43333
## 7       63.50459       68.93578
## 8       63.53179       66.32659
## 9       64.87097       69.19355
## 10      63.29639       64.58420
## 11      61.91002       65.51022
## 12      62.73795       66.56529
## 13      68.11321       68.32075
## 14      59.00000       64.64706
## 15      61.66883       60.75758
## 16      61.72500       62.02222
## 17      64.13924       64.00000
## 18      66.93651       70.50794
## 19      66.06250       71.81250
## 20      62.72414       61.24138
## 21      61.49107       65.61310
```

```
## 22      64.92818       64.55525
## 23      58.60586       63.38762
## 24      61.01208       62.55589
## 25      67.99225       71.65116
## 26      64.67424       70.94697
## 27      63.77515       64.42406
## 28      64.00543       66.72283
## 29      60.43103       64.27586
## 30      64.96774       68.38710
## 31      64.19608       66.39216
```

```
WC <- as.matrix(mydata)
WC
```

```
##       Country        Pos. movement_acceleration movement_agility
##  [1,] "Argentina"    "16" "64.72624"            "63.77169"
##  [2,] "Australia"    "28" "64.58667"            "61.82667"
##  [3,] "Belgium"      " 3" "63.96350"            "64.29562"
##  [4,] "Brazil"       " 6" "66.61330"            "65.51355"
##  [5,] "Colombia"     " 9" "66.65936"            "64.54637"
##  [6,] "Costa Rica"   "30" "69.76667"            "66.86667"
##  [7,] "Croatia"      " 2" "62.52294"            "60.29358"
##  [8,] "Denmark"      "11" "62.48844"            "61.94220"
##  [9,] "Egypt"        "31" "66.45161"            "64.83871"
## [10,] "England"      " 4" "65.63503"            "63.11268"
## [11,] "France"       " 1" "64.25051"            "62.63497"
## [12,] "Germany"      "23" "63.25855"            "62.49167"
## [13,] "Iceland"      "29" "64.66038"            "63.69811"
## [14,] "Iran"         "18" "66.76471"            "65.47059"
## [15,] "Japan"        "15" "61.75325"            "63.20346"
## [16,] "Mexico"       "12" "63.94167"            "63.46111"
## [17,] "Morocco"      "27" "70.78481"            "71.46835"
## [18,] "Nigeria"      "21" "73.43651"            "67.62698"
## [19,] "Panama"       "32" "65.06250"            "62.68750"
## [20,] "Peru"         "20" "68.34483"            "66.06897"
## [21,] "Poland"       "25" "61.78274"            "61.75000"
## [22,] "Portugal"     "13" "66.04144"            "66.86188"
## [23,] "Russia"       " 8" "62.38436"            "60.49837"
## [24,] "Saudi Arabia" "26" "63.66465"            "62.66767"
## [25,] "Senegal"      "17" "68.93798"            "64.45736"
## [26,] "Serbia"       "22" "61.66667"            "59.77273"
## [27,] "Spain"        "10" "64.09862"            "64.20020"
## [28,] "Sweden"       " 7" "62.91033"            "62.41304"
## [29,] "Switzerland"  "14" "61.74138"            "59.41810"
## [30,] "Tunisia"      "24" "65.58065"            "65.58065"
## [31,] "Uruguay"      " 5" "65.59477"            "63.51634"
##       movement_balance power_jumping pace       movement_reactions
##  [1,] "65.18182"       "65.09194"    "68.01508" "63.82851"
##  [2,] "62.63111"       "63.51556"    "68.67692" "57.04889"
##  [3,] "63.68978"       "66.68613"    "68.15880" "63.82117"
##  [4,] "64.11823"       "65.18103"    "68.81541" "68.01108"
##  [5,] "64.96796"       "66.01349"    "69.55741" "61.73524"
##  [6,] "65.50000"       "69.06667"    "73.29630" "65.70000"
##  [7,] "58.24771"       "62.31193"    "66.38776" "63.72477"
##  [8,] "62.23988"       "64.78035"    "67.08525" "60.13006"
```

```
##  [9,] "66.38710"       "62.48387"    "69.60714" "64.54839"
## [10,] "64.34476"       "64.61727"    "68.47531" "57.72750"
## [11,] "64.07975"       "64.91002"    "67.48786" "61.82209"
## [12,] "62.08852"       "65.21472"    "67.31225" "61.91762"
## [13,] "64.45283"       "67.15094"    "67.34694" "62.33962"
## [14,] "62.94118"       "63.52941"    "75.14286" "65.70588"
## [15,] "66.04545"       "63.63853"    "66.12285" "58.69481"
## [16,] "66.55000"       "64.75000"    "67.70000" "60.81944"
## [17,] "68.08861"       "62.88608"    "70.92208" "64.65823"
## [18,] "65.85714"       "67.99206"    "74.80488" "61.96825"
## [19,] "61.31250"       "64.31250"    "64.93750" "62.37500"
## [20,] "68.65517"       "66.82759"    "69.69231" "62.27586"
## [21,] "61.95536"       "64.75000"    "66.16549" "59.17262"
## [22,] "65.83149"       "65.75691"    "69.48137" "67.80387"
## [23,] "61.89902"       "61.71336"    "67.35857" "62.08795"
## [24,] "65.25680"       "64.38973"    "67.75088" "56.57704"
## [25,] "61.67442"       "70.16279"    "71.41935" "63.27132"
## [26,] "58.78788"       "64.46970"    "64.72269" "66.17424"
## [27,] "64.67949"       "65.26726"    "66.69488" "65.27416"
## [28,] "61.20380"       "62.89946"    "66.88450" "61.00000"
## [29,] "62.32759"       "64.43966"    "66.01523" "59.15517"
## [30,] "63.54839"       "63.87097"    "66.23333" "63.03226"
## [31,] "64.46405"       "65.44444"    "68.36232" "65.61438"
##       movement_sprint_speed power_stamina power_strength
##  [1,] "64.80269"            "63.34194"    "64.34504"
##  [2,] "65.40000"            "61.94667"    "64.93778"
##  [3,] "64.03285"            "61.42701"    "64.40876"
##  [4,] "66.93719"            "65.28571"    "67.43103"
##  [5,] "66.58685"            "65.40809"    "65.56155"
##  [6,] "70.60000"            "65.96667"    "66.43333"
##  [7,] "63.19266"            "63.50459"    "68.93578"
##  [8,] "63.98266"            "63.53179"    "66.32659"
##  [9,] "67.32258"            "64.87097"    "69.19355"
## [10,] "65.41825"            "63.29639"    "64.58420"
## [11,] "64.27198"            "61.91002"    "65.51022"
## [12,] "63.93076"            "62.73795"    "66.56529"
## [13,] "66.26415"            "68.11321"    "68.32075"
## [14,] "67.35294"            "59.00000"    "64.64706"
## [15,] "61.72944"            "61.66883"    "60.75758"
## [16,] "63.57500"            "61.72500"    "62.02222"
## [17,] "69.58228"            "64.13924"    "64.00000"
## [18,] "74.40476"            "66.93651"    "70.50794"
## [19,] "65.00000"            "66.06250"    "71.81250"
## [20,] "67.72414"            "62.72414"    "61.24138"
## [21,] "61.83929"            "61.49107"    "65.61310"
## [22,] "65.92541"            "64.92818"    "64.55525"
## [23,] "62.32899"            "58.60586"    "63.38762"
## [24,] "63.79456"            "61.01208"    "62.55589"
## [25,] "71.20155"            "67.99225"    "71.65116"
## [26,] "62.25000"            "64.67424"    "70.94697"
## [27,] "64.34320"            "63.77515"    "64.42406"
## [28,] "63.74185"            "64.00543"    "66.72283"
## [29,] "62.05172"            "60.43103"    "64.27586"
## [30,] "65.61290"            "64.96774"    "68.38710"
```

```
## [31,] "65.97386"            "64.19608"    "66.39216"
```

```
p <- ncol(WC)
p
```

```
## [1] 11
```

```
lmresult <- lm(Pos. ~ movement_acceleration + movement_agility + movement_balance + power_jumping + pac
summary(lmresult)
```

```
##
## Call:
## lm(formula = Pos. ~ movement_acceleration + movement_agility +
##     movement_balance + power_jumping + pace + movement_reactions +
##     movement_sprint_speed + power_stamina + power_strength, data = mydata)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -16.1838  -6.5726   0.4969   6.1387  15.4344
##
## Coefficients:
##                         Estimate Std. Error t value Pr(>|t|)
## (Intercept)           -254.2144   182.9783  -1.389   0.1793
## movement_acceleration   -2.9839     4.6063  -0.648   0.5241
## movement_agility         2.5126     2.0162   1.246   0.2264
## movement_balance         2.5643     1.7786   1.442   0.1641
## power_jumping            0.1725     1.3992   0.123   0.9031
## pace                     0.1780     2.5536   0.070   0.9451
## movement_reactions      -1.4002     0.8017  -1.746   0.0954 .
## movement_sprint_speed    0.9872     5.9344   0.166   0.8695
## power_stamina           -1.5677     2.1670  -0.723   0.4774
## power_strength           3.6390     1.8374   1.981   0.0609 .
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 9.265 on 21 degrees of freedom
## Multiple R-squared:  0.3377, Adjusted R-squared:  0.05387
## F-statistic:  1.19 on 9 and 21 DF,  p-value: 0.3512
```