










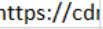

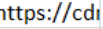

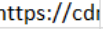





















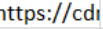



















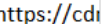
Data Cleaning

STAGE 1 - CONVERSIONS

```
# IMPORT BY USING THE SUITABLE ENCODING  
fifa = read.csv("raw_downloaded_data.csv",fileEncoding="UTF-8-  
BOM")
```

```
#LIBRARY TO PLAY WITH STRINGS  
library("stringr")
```

```
#TO PREVENT SCIENTIFIC NOTATION  
options(scipen = 999)
```

SI No	ID	Name	Age	Photo	Nationality	Flag	Overall	Potential	Club	Club Logo	Value	Wage	Special	Preferred	International	Weak Foot	Skill Moves	Work Rate	Body Type	Real Face	Position	Jersey Number
0	158023	L. Messi	31	https://cdn.football-data.com/players/158023.jpg	Argentina		94	94	FC Barcelona		€110.5M	€565K	2202	Left	5	4	4	Medium/High	Lean	Yes	RF	10
1	20801	Cristiano Ronaldo	33	https://cdn.football-data.com/players/20801.jpg	Portugal		94	94	Juventus		€77M	€405K	2228	Right	5	4	5	High/Low	Normal	Yes	ST	7
2	190871	Neymar Jr	26	https://cdn.football-data.com/players/190871.jpg	Brazil		92	93	Paris Saint-Germain		€118.5M	€290K	2143	Right	5	5	5	High/Medium	Lean	Yes	LW	10
3	193080	De Gea	27	https://cdn.football-data.com/players/193080.jpg	Spain		91	93	Manchester United		€72M	€260K	1471	Right	4	3	1	Medium/High	Lean	Yes	GK	1
4	192985	K. De Bruyne	27	https://cdn.football-data.com/players/192985.jpg	Belgium		91	92	Manchester City		€102M	€355K	2281	Right	4	5	4	High/High	Normal	Yes	RCM	7
5	183277	E. Hazard	27	https://cdn.football-data.com/players/183277.jpg	Belgium		91	91	Chelsea		€93M	€340K	2142	Right	4	4	4	High/Medium	Normal	Yes	LF	10
6	177003	L. Modrić	32	https://cdn.football-data.com/players/177003.jpg	Croatia		91	91	Real Madrid		€67M	€420K	2280	Right	4	4	4	High/High	Lean	Yes	RCM	10
7	176580	L. Suárez	31	https://cdn.football-data.com/players/176580.jpg	Uruguay		91	91	FC Barcelona		€80M	€455K	2346	Right	5	4	3	High/Medium	Normal	Yes	RS	9
8	155862	Sergio Reguilón	32	https://cdn.football-data.com/players/155862.jpg	Spain		91	91	Real Madrid		€51M	€380K	2201	Right	4	3	3	High/Medium	Normal	Yes	RCB	15
9	200389	J. Oblak	25	https://cdn.football-data.com/players/200389.jpg	Slovenia		90	93	Atlético Madrid		€68M	€94K	1331	Right	3	3	1	Medium/High	Normal	Yes	GK	1
10	188545	R. Lewandowski	29	https://cdn.football-data.com/players/188545.jpg	Poland		90	90	FC Bayern Munich		€77M	€205K	2152	Right	4	4	4	High/Medium	Normal	Yes	ST	9
11	182521	T. Kroos	28	https://cdn.football-data.com/players/182521.jpg	Germany		90	90	Real Madrid		€76.5M	€355K	2190	Right	4	5	3	Medium/High	Normal	Yes	LCM	8
12	182493	D. Godín	32	https://cdn.football-data.com/players/182493.jpg	Uruguay		90	90	Atlético Madrid		€44M	€125K	1946	Right	3	3	2	Medium/High	Lean	Yes	CB	10
13	168542	David Silva	32	https://cdn.football-data.com/players/168542.jpg	Spain		90	90	Manchester City		€60M	€285K	2115	Left	4	2	4	High/Medium	Normal	Yes	LCM	21
14	215914	N. Kanté	27	https://cdn.football-data.com/players/215914.jpg	France		89	90	Chelsea		€63M	€225K	2189	Right	3	3	2	Medium/High	Lean	Yes	LDM	13
15	211110	P. Dybala	24	https://cdn.football-data.com/players/211110.jpg	Argentina		89	94	Juventus		€89M	€205K	2092	Left	3	3	4	High/Medium	Normal	Yes	LF	21
16	202126	H. Kane	24	https://cdn.football-data.com/players/202126.jpg	England		89	91	Tottenham Hotspur		€83.5M	€205K	2165	Right	3	4	3	High/High	Normal	Yes	ST	9
17	194765	A. Griezmann	27	https://cdn.football-data.com/players/194765.jpg	France		89	90	Atlético Madrid		€78M	€145K	2246	Left	4	3	4	High/High	Lean	Yes	CAM	7
18	192448	M. ter Stegen	26	https://cdn.football-data.com/players/192448.jpg	Germany		89	92	FC Barcelona		€58M	€240K	1328	Right	3	4	1	Medium/High	Normal	Yes	GK	22
19	192119	T. Courtois	26	https://cdn.football-data.com/players/192119.jpg	Belgium		89	90	Real Madrid		€53.5M	€240K	1311	Left	4	2	1	Medium/High	Courtois	Yes	GK	1
20	189511	Sergio Busquets	29	https://cdn.football-data.com/players/189511.jpg	Spain		89	89	FC Barcelona		€51.5M	€315K	2065	Right	4	3	3	Medium/High	Lean	Yes	CDM	5
21	179813	E. Cavani	31	https://cdn.football-data.com/players/179813.jpg	Uruguay		89	89	Paris Saint-Germain		€60M	€200K	2161	Right	4	4	3	High/High	Lean	Yes	LS	21
22	167495	M. Neuer	32	https://cdn.football-data.com/players/167495.jpg	Germany		89	89	FC Bayern Munich		€38M	€130K	1473	Right	5	4	1	Medium/High	Normal	Yes	GK	1
23	153079	S. Agüero	30	https://cdn.football-data.com/players/153079.jpg	Argentina		89	89	Manchester City		€64.5M	€300K	2107	Right	4	4	4	High/Medium	Stocky	Yes	ST	10
24	138956	G. Chiellini	33	https://cdn.football-data.com/players/138956.jpg	Italy		89	89	Juventus		€27M	€215K	1841	Left	4	3	2	Medium/High	Normal	Yes	LCB	3
25	231747	K. Mbappé	19	https://cdn.football-data.com/players/231747.jpg	France		88	95	Paris Saint-Germain		€81M	€100K	2118	Right	3	4	5	High/Medium	Lean	Yes	RM	10
26	209331	M. Salah	26	https://cdn.football-data.com/players/209331.jpg	Egypt		88	89	Liverpool		€69.5M	€255K	2146	Left	3	3	4	High/Medium	PLAYER_BODY	Yes	RM	10
27	200145	Casemiro	26	https://cdn.football-data.com/players/200145.jpg	Brazil		88	90	Real Madrid		€59.5M	€285K	2170	Right	3	3	2	Medium/High	Normal	Yes	CDM	14

```
#REMOVE "€" FROM THE CURRENCY COLUMNS  
fifa$Release.Clause = lapply(fifa$Release.Clause,  
function(x){gsub("€", "", x)})  
fifa$Value = lapply(fifa$Value, function(x){gsub("€", "", x)})  
fifa$Wage = lapply(fifa$Wage, function(x){gsub("€", "", x)})
```

```

#CONVERT CURRENCY(FROM 'K' AND 'M') TO NUMBERS
fifa$Value = lapply(fifa$Value, function(i) {
  if(isTRUE(str_detect(i, "K"))){
    a= strsplit(as.character(i[[1]][1]), "[[:upper:]]")
    b = as.double(a[[1]][1])
    c = b*1000
    return(c)
  } else if (isTRUE(str_detect(i, "M"))){
    a= strsplit(as.character(i[[1]][1]), "[[:upper:]]")
    b = as.double(a[[1]][1])
    c = b*1000000
    return(c)
  } else{
    return(i)
  }
})
fifa$Wage = lapply(fifa$Wage, function(i) {
  if(isTRUE(str_detect(i, "K"))){
    a= strsplit(as.character(i[[1]][1]), "[[:upper:]]")
    b = as.double(a[[1]][1])
    c = b*1000
    return(c)
  } else if (isTRUE(str_detect(i, "M"))){
    a= strsplit(as.character(i[[1]][1]), "[[:upper:]]")
    b = as.double(a[[1]][1])
    c = b*1000000
    return(c)
  } else{
    return(i)
  }
})
fifa$Release.Clause = lapply(fifa$Release.Clause, function(i) {
  if(isTRUE(str_detect(i, "K"))){
    a= strsplit(as.character(i[[1]][1]), "[[:upper:]]")
    b = as.double(a[[1]][1])
    c = b*1000
    return(c)
  } else if (isTRUE(str_detect(i, "M"))){
    a= strsplit(as.character(i[[1]][1]), "[[:upper:]]")
    b = as.double(a[[1]][1])
    c = b*1000000
    return(c)
  } else{
    return(i)
  }
})
}

```

Value
€110.5M
€77M
€118.5M
€72M
€102M
€93M
€67M
€80M
€51M

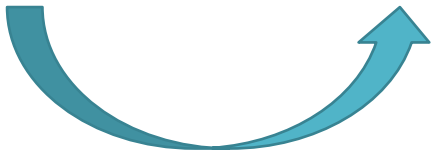
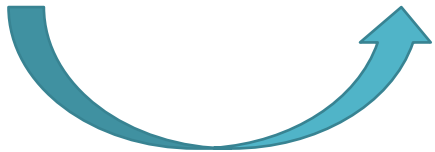
Value
110500000
77000000
118500000
72000000
102000000
93000000
67000000
80000000
51000000

Wage
€565K
€405K
€290K
€260K
€355K
€340K
€420K
€455K
€380K

Wage
565000
405000
290000
260000
355000
340000
420000
455000
380000

Release Clause
€226.5M
€127.1M
€228.1M
€138.6M
€196.4M
€172.1M
€137.4M
€164M
€104.6M

Release.Clause
226500000
127100000
228100000
138600000
196400000
172100000
137400000
164000000
104600000



```
#CONVERT HEIGHTS FROM INCHES TO CENTIMETERS
fifa$Height = lapply(fifa$Height, function(i) {
  a = strsplit(as.character(i), "[[:punct:]]")[[1]][1]
  b = strsplit(as.character(i), "[[:punct:]]")[[1]][2]
  return (as.integer(a)*30.48 + as.integer(b)*2.54)
})
```

Height
5'7
6'2
5'9
6'4
5'11
5'8
5'8
6'0
6'0

Height
170.18
187.96
175.26
193.04
180.34
172.72
172.72
182.88
182.88




```
#CONVERT WEIGHTS FROM LBS TO KG
fifa$Weight = lapply(fifa$Weight, function(i) {
  a= strsplit(as.character(i[[1]][1]), "[[:lower:]]")
  b = as.double(a[[1]][1])
  c = round(b*0.45359237, digits=2)
  return(c)
})
```

Weight
159lbs
183lbs
150lbs
168lbs
154lbs
163lbs
146lbs
190lbs
181lbs

Weight
72.12
83.01
68.04
76.2
69.85
73.94
66.22
86.18
82.1



```
#CONVERT LIST(EVERY CELL) TO NUMERIC
fifa$Value = unlist(lapply(fifa$Value, as.numeric))
fifa$Wage = unlist(lapply(fifa$Wage, as.numeric))
fifa$Height = unlist(lapply(fifa$Height, as.numeric))
fifa$Weight = unlist(lapply(fifa$Weight, as.numeric))
fifa$Release.Clause = unlist(lapply(fifa$Release.Clause, as.numeric))
)
```

```
#WRITE THE CLEANED DATA INTO A NEW FILE
write.csv(fifa, "0_raw_downloaded_data.csv", row.names = FALSE)
```

Data Cleaning

STAGE 2 – DELETIONS AND REPLACEMENT

DELETING THE UNECESSARY ROWS

```
fifa <- fifa[, -  
c(2,5,7,11,14,16,17,18,19,21,24,25,26,29,30,31,32,33,34,35,36,  
37,38,39,40,41,42,43,44,45,46,47,48,49,50,51,52,53,54)]
```

Sl.No	Name	Age	Nationality	Overall	Potential	Club	Value	Wage	Preferred.	Body.Type	Position	Jersey.No	Nat Height	Weight	Crossing	Finishing	HeadingAv	ShortPass	Volleys	Dribbling	Curve	FKAccurac	LongPass	BallContr	Accelerati	SprintSpeed
0	L. Messi	31	Argentina	94	94	FC Barcelo	1.1E+08	565000	Left	Messi	RF	10	170.18	72.12	84	95	70	90	86	97	93	94	87	96	91	86
1	Cristiano R	33	Portugal	94	94	Juventus	7.7E+07	405000	Right	C. Ronald	ST	7	187.96	83.01	84	94	89	81	87	88	81	76	77	94	89	91
2	Neymar Jr	26	Brazil	92	93	Paris Saint	1.2E+08	290000	Right	Neymar	LW	10	175.26	68.04	79	87	62	84	84	96	88	87	78	95	94	90
3	De Gea	27	Spain	91	93	Manchest	7.2E+07	260000	Right	Lean	GK	1	193.04	76.2	17	13	21	50	13	18	21	19	51	42	57	58
4	K. De Bruy	27	Belgium	91	92	Manchest	1E+08	355000	Right	Normal	RCM	7	180.34	69.85	93	82	55	92	82	86	85	83	91	91	78	76
5	E. Hazard	27	Belgium	91	91	Chelsea	9.3E+07	340000	Right	Normal	LF	10	172.72	73.94	81	84	61	89	80	95	83	79	83	94	94	88
6	L. Modric	32	Croatia	91	91	Real Madr	6.7E+07	420000	Right	Lean	RCM	10	172.72	66.22	86	72	55	93	76	90	85	78	88	93	80	72
7	L. Suárez	31	Uruguay	91	91	FC Barcelo	8E+07	455000	Right	Normal	RS	9	182.88	86.18	77	93	77	82	88	87	86	84	64	90	86	75
8	Sergio Rar	32	Spain	91	91	Real Madr	5.1E+07	380000	Right	Normal	RCB	15	182.88	82.1	66	60	91	78	66	63	74	72	77	84	76	75
9	J. Oblak	25	Slovenia	90	93	Atlético M	6.8E+07	94000	Right	Normal	GK	1	187.96	87.09	13	11	15	29	13	12	13	14	26	16	43	60
10	R. Lewand	29	Poland	90	90	FC Bayern	7.7E+07	205000	Right	Normal	ST	9	182.88	79.83	62	91	85	83	89	85	77	86	65	89	77	78
11	T. Kroos	28	Germany	90	90	Real Madr	7.7E+07	355000	Right	Normal	LCM	8	182.88	76.2	88	76	54	92	82	81	86	84	93	90	64	62
12	D. Godín	32	Uruguay	90	90	Atlético M	4.4E+07	125000	Right	Lean	CB	10	187.96	78.02	55	42	92	79	47	53	49	51	70	76	68	68
13	David Silv	32	Spain	90	90	Manchest	6E+07	285000	Left	Normal	LCM	21	172.72	67.13	84	76	54	93	82	89	82	77	87	94	70	64
14	N. Kanté	27	France	89	90	Chelsea	6.3E+07	225000	Right	Lean	LDM	13	167.64	72.12	68	65	54	86	56	79	49	49	81	80	82	78
15	P. Dybala	24	Argentina	89	94	Juventus	8.9E+07	205000	Left	Normal	LF	21	177.8	74.84	82	84	68	87	88	92	88	88	75	92	87	83
16	H. Kane	24	England	89	91	Tottenhan	8.4E+07	205000	Right	Normal	ST	9	187.96	88.9	75	94	85	80	84	80	78	68	82	84	68	72
17	A. Griezma	27	France	89	90	Atlético M	7.8E+07	145000	Left	Lean	CAM	7	175.26	73.03	82	90	84	83	87	88	84	78	76	90	88	85
18	M. ter Ste	26	Germany	89	92	FC Barcelo	5.8E+07	240000	Right	Normal	GK	22	187.96	84.82	15	14	11	36	14	17	18	12	42	18	38	50
19	T. Courtoi	26	Belgium	89	90	Real Madr	5.4E+07	240000	Left	Courtois	GK	1	198.12	96.16	14	14	13	33	12	13	19	20	35	23	46	52
20	Sergio Bus	29	Spain	89	89	FC Barcelo	5.2E+07	315000	Right	Lean	CDM	5	187.96	76.2	62	67	68	89	44	80	66	68	82	88	50	52
21	E. Cavani	31	Uruguay	89	89	Paris Saint	6E+07	200000	Right	Lean	LS	21	185.42	77.11	70	89	89	78	90	80	77	76	52	82	75	76
22	M. Neuer	32	Germany	89	89	FC Bayern	3.8E+07	130000	Right	Normal	GK	1	193.04	92.08	15	13	25	55	11	30	14	11	59	48	54	60
23	S. Agüero	30	Argentina	89	89	Manchest	6.5E+07	300000	Right	Stocky	ST	10	172.72	69.85	70	93	77	81	85	89	82	73	64	89	88	80
24	G. Chiellini	33	Italy	89	89	Juventus	2.7E+07	215000	Left	Normal	LCB	3	187.96	84.82	58	33	83	59	45	58	60	31	59	57	63	75
25	K. Mbappé	19	France	88	95	Paris Saint	8.1E+07	100000	Right	Lean	RM	10	177.8	73.03	77	88	77	82	78	90	77	63	73	91	96	96
26	M. Salah	26	Egypt	88	89	Liverpool	7E+07	255000	Left	PLAYER_B	RM	10	175.26	71.21	78	90	59	82	73	89	83	60	72	88	94	91
27	Casemiro	26	Brazil	88	90	Real Madr	6E+07	285000	Right	Normal	CDM	14	185.42	83.91	52	59	76	85	53	69	59	74	82	78	59	65
28	J. Rodríguez	26	Colombia	88	89	FC Bayern	7E+07	315000	Left	Normal	LAM	10	180.34	78.02	90	83	62	89	90	85	89	86	83	90	73	67
29	L. Insigne	27	Italy	88	88	Napoli	6.2E+07	165000	Right	Normal	LW	10	162.56	58.97	86	77	56	85	74	90	87	77	78	93	94	86
30	Isco	26	Spain	88	91	Real Madr	7.4E+07	315000	Right	Normal	LW	22	175.26	78.93	75	79	55	89	65	94	88	76	83	95	75	69
31	C. Eriksen	26	Denmark	88	91	Tottenhan	7.4E+07	205000	Right	Lean	CAM	10	180.34	76.2	88	80	52	91	77	84	86	87	88	91	75	73
32	Coutinho	26	Brazil	88	89	FC Barcelo	7E+07	340000	Right	Normal	LW	7	172.72	68.04	79	79	48	88	75	91	91	86	83	92	89	75
33	P. Aubame	29	Gabon	88	88	Arsenal	5.9E+07	265000	Right	Lean	LM	14	187.96	79.83	77	88	79	77	86	79	80	74	64	82	93	95

```
#CHECK FOR THE CLASS
sapply(colnames(fifa), function(x) class(fifa[[x]]))
```

```
##          Sl.No          Name          Age          Nationality
##          "integer"        "factor"      "integer"      "factor"
##          Overall          Potential      Club          Value
##          "integer"        "integer"      "factor"        "integer"
##          Wage Preferred.Foot Body.Type Position
##          "integer"        "factor"      "factor"        "factor"
## Jersey.Number Height Weight Crossing
##          "integer"        "numeric"    "numeric"      "integer"
## Finishing HeadingAccuracy ShortPassing Volleys
##          "integer"        "integer"    "integer"      "integer"
## Dribbling Curve FKAccuracy LongPassing
##          "integer"        "integer"    "integer"      "integer"
## BallControl Acceleration SprintSpeed Agility
##          "integer"        "integer"    "integer"      "integer"
## Reactions Balance ShotPower Jumping
##          "integer"        "integer"    "integer"      "integer"
## Stamina Strength LongShots Aggression
##          "integer"        "integer"    "integer"      "integer"
## Interceptions Positioning Vision Penalties
##          "integer"        "integer"    "integer"      "integer"
## Composure Marking StandingTackle SlidingTackle
##          "integer"        "integer"    "integer"      "integer"
## GKDividing GKHandling GKKicking GKPositioning
##          "integer"        "integer"    "integer"      "integer"
## GKReflexes Release.Clause
##          "integer"        "integer"
```

#REPLACING CATEGORICAL MISSING VALUE

```
for (j in which(fifa$Name == '')) {  
  fifa$Name[j] <- fifa$Name[j-1]  
}  
for (j in which(fifa$Nationality == '')) {  
  fifa$Nationality[j] <- fifa$Nationality[j-1]  
}  
for (j in which(fifa$Club == '')) {  
  fifa$Club[j] <- fifa$Club[j-1]  
}  
for (j in which(fifa$Preferred.Foot == '')) {  
  fifa$Preferred.Foot[j] <- fifa$Preferred.Foot[j-1]  
}  
for (j in which(fifa$Body.Type == '')) {  
  fifa$Body.Type[j] <- fifa$Body.Type[j-1]  
}  
for (j in which(fifa$Position == '')) {  
  fifa$Position[j] <- fifa$Position[j-1]  
}
```


#BEFORE REPLACING CATEGORICAL MISSING VALUE

13225	M. Baude	28	Germany	62	62	FC Energie	240000	1000	Right	Normal	RB		25	177.8	76.2035	51	33	47	49	36	52	42	30	48	51	67	67
13226	L. Moneta	24	Poland	62	66	Zaglebie L	400000	2000	Left	Normal	LM		77	172.72	69.8532	61	48	52	63	45	63	54	39	58	60	72	71
13227	S. Hyodo	32	Japan	62	62	Hokkaido	230000	1000	Right	Normal	CM		6	172.72	68.0388	63	54	45	69	51	58	66	39	60	62	70	70
13228	S. Økland	25	Norway	62	66	Kristiansu	375000	1000	Right	Normal	CM		10	177.8	68.0388	57	39	40	64	48	62	38	59	61	71	63	52
13229	L. Sapela	35	Poland	62	62	Miedz Leg	70000	1000	Left	Normal	GK		1	185.42	81.193	12	14	14	38	13	15	11	15	31	23	34	24
13230	J. Tell	21	France	62	71	US Orléan	475000	4000	Right	Normal	LM		11	185.42	73.9355	59	69	73	63	63	64	51	41	48	66	67	63
13231	A. Altuna	26	Argentina	62	65	San Martin	325000	2000	Right	Normal	CDM		5	182.88	73.9355	46	30	48	65	28	57	40	35	58	65	56	59
13232	A. Rizzo	21	Italy	62	72	Cittadella	500000	1000	Left	Normal	LM		26	175.26	69.8532	61	42	51	59	41	63	55	50	57	58	80	78
13233	L. Thomas	19	England	62	76	Coventry C	650000	3000	Right	Lean	RM		23	167.64	66.2244	50	49	45	52	38	68	35	32	35	67	81	83
13234	R. Schlege	21	Argentina	62	74	Racing Clu	475000	2000	Right	Normal	CB		14	185.42	82.1002	33	27	54	34	33	31	35	29	35	38	48	60
13235	D. Montoy	22	Colombia	62	69	Itagüí Leo	350000	1000	Right	Normal	LB		26	180.34	71.2139	48	24	51	49	21	42	20	28	41	51	74	70
13236	J. McNulty	33	Scotland	62	62	Rochdale	120000	1000				NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
13237	J. Barrera	29	Nicaragua	62	62	Boyacá Ch	300000	1000				NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
13238	J. Stead	35	England	62	62	Notts Cou	140000	3000				NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
13239	A. Sempri	20	Italy	62	72	Brescia	425000	1000				NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
13240	R. Bingham	24	England	62	66	Hamilton J	400000	1000				NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
13241	K. Dankow	21	Poland	62	72	Slask Wro	425000	1000				NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
13242	I. Colman	23	Argentina	62	70	Club Atlét	450000	2000				NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
13243	M. Feeney	19	England	62	78	Everton	600000	5000				NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
13244	R. Minor	30	Denmark	62	62	Hobro IK	230000	2000				NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
13245	Klauss	21	Brazil	62	69	HJK Helsin	425000	1000				NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
13246	I. Sissoko	22	France	62	68	AS Béziers	425000	2000				NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
13247	F. Hart	28	Austria	62	62	SV Matter	240000	3000				NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
13248	L. McCullo	24	Northern I	62	69	Tranmere	375000	2000				NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
13249	Li Yunqiu	27	China PR	62	62	Shanghai G	250000	3000				NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
13250	F. Garcia	29	Paraguay	62	62	Itagüí Leo	300000	1000				NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
13251	R. Haemh	34	Belgium	62	62	NAC Breda	150000	2000				NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
13252	E. Binaku	22	Albania	62	70	Malmö FF	375000	1000				NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
13253	G. Miller	31	Scotland	62	62	Carlisle U	200000	2000				NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
13254	A. Aidonis	17	Germany	62	82	VfB Stuttg	550000	2000				NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
13255	L. Sowah	25	Germany	62	65	Hamilton J	325000	1000				NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
13256	R. Deacon	26	England	62	62	Dundee FC	325000	1000				NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
13257	Jang Hyun	25	Korea Rep	62	65	Suwon Sar	375000	2000				NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
13258	A. Al Malk	23	Saudi Ara	62	67	Al Wehda	350000	3000				NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
13259	E. Guerrer	27	Chile	62	65	CD Palesti	300000	1000				NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

#AFTER REPLACING CATEGORICAL MISSING VALUE

13224	L. Dennis	25	England	62	65	Portsmouth	375000	2000	Right	Lean	CAM	18	185.42	68.946	57	56	38	59	36	64	49	35	52	61	82	82
13225	M. Baude	28	Germany	62	62	FC Energie	240000	1000	Right	Normal	RB	25	177.8	76.2035	51	33	47	49	36	52	42	30	48	51	67	67
13226	L. Moneta	24	Poland	62	66	Zaglebie L	400000	2000	Left	Normal	LM	77	172.72	69.8532	61	48	52	63	45	63	54	39	58	60	72	71
13227	S. Hyodo	32	Japan	62	62	Hokkaido	230000	1000	Right	Normal	CM	6	172.72	68.0388	63	54	45	69	51	58	66	39	60	62	70	70
13228	S. Økland	25	Norway	62	66	Kristiansu	375000	1000	Right	Normal	CM	10	177.8	68.0388	57	39	40	64	48	62	38	59	61	71	63	52
13229	L. Sapela	35	Poland	62	62	Miedz Leg	70000	1000	Left	Normal	GK	1	185.42	81.193	12	14	14	38	13	15	11	15	31	23	34	24
13230	J. Tell	21	France	62	71	US Orléan	475000	4000	Right	Normal	LM	11	185.42	73.9355	59	69	73	63	63	64	51	41	48	66	67	63
13231	A. Altuna	26	Argentina	62	65	San Martín	325000	2000	Right	Normal	CDM	5	182.88	73.9355	46	30	48	65	28	57	40	35	58	65	56	59
13232	A. Rizzo	21	Italy	62	72	Cittadella	500000	1000	Left	Normal	LM	26	175.26	69.8532	61	42	51	59	41	63	55	50	57	58	80	78
13233	L. Thomas	19	England	62	76	Coventry C	650000	3000	Right	Lean	RM	23	167.64	66.2244	50	49	45	52	38	68	35	32	35	67	81	83
13234	R. Schlege	21	Argentina	62	74	Racing Clu	475000	2000	Right	Normal	CB	14	185.42	82.1002	33	27	54	34	33	31	35	29	35	38	48	60
13235	D. Montoy	22	Colombia	62	69	Itagüí Leo	350000	1000	Right	Normal	LB	26	180.34	71.2139	48	24	51	49	21	42	20	28	41	51	74	70
13236	J. McNulty	33	Scotland	62	62	Rochdale	120000	1000	Right	Normal	LB	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
13237	J. Barrera	29	Nicaragua	62	62	Boyacá Ch	300000	1000	Right	Normal	LB	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
13238	J. Stead	35	England	62	62	Notts Cou	140000	3000	Right	Normal	LB	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
13239	A. Sempri	20	Italy	62	72	Brescia	425000	1000	Right	Normal	LB	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
13240	R. Bingham	24	England	62	66	Hamilton J	400000	1000	Right	Normal	LB	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
13241	K. Dankow	21	Poland	62	72	Slask Wro	425000	1000	Right	Normal	LB	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
13242	I. Colman	23	Argentina	62	70	Club Atlét	450000	2000	Right	Normal	LB	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
13243	M. Feeney	19	England	62	78	Everton	600000	5000	Right	Normal	LB	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
13244	R. Minor	30	Denmark	62	62	Hobro IK	230000	2000	Right	Normal	LB	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
13245	Klauss	21	Brazil	62	69	HJK Helsin	425000	1000	Right	Normal	LB	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
13246	I. Sissoko	22	France	62	68	AS Béziers	425000	2000	Right	Normal	LB	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
13247	F. Hart	28	Austria	62	62	SV Matters	240000	3000	Right	Normal	LB	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
13248	L. McCullo	24	Northern I	62	69	Tranmere	375000	2000	Right	Normal	LB	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
13249	Li Yunqiu	27	China PR	62	62	Shanghai G	250000	3000	Right	Normal	LB	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
13250	F. Garcia	29	Paraguay	62	62	Itagüí Leo	300000	1000	Right	Normal	LB	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
13251	R. Haemh	34	Belgium	62	62	NAC Breda	150000	2000	Right	Normal	LB	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
13252	E. Binaku	22	Albania	62	70	Malmö FF	375000	1000	Right	Normal	LB	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
13253	G. Miller	31	Scotland	62	62	Carlisle U	200000	2000	Right	Normal	LB	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
13254	A. Aidonis	17	Germany	62	82	VfB Stuttg	550000	2000	Right	Normal	LB	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
13255	L. Sowah	25	Germany	62	65	Hamilton J	325000	1000	Right	Normal	LB	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
13256	R. Deacon	26	England	62	62	Dundee FC	325000	1000	Right	Normal	LB	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
13257	Jang Hyun	25	Korea Rep	62	65	Suwon Sar	375000	2000	Right	Normal	LB	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
13258	A. Al Malk	23	Saudi Arab	62	67	Al Wehda	350000	3000	Right	Normal	LB	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

#REPLACING NUMERICAL MISSING VALUES

```
for(i in c(8,9, 14:50))
{
  m <- mean(fifa[,i], na.rm = TRUE)
  fifa[is.na(fifa[,i]), i] <- m
  fifa[[i]] = lapply(fifa[[i]], function(x){replace(x,x==0,m)})
  fifa[[i]] = unlist(lapply(fifa[[i]], as.numeric))
}
for(i in c(3,5,6,13))
{
  m=as.integer(mean(fifa[,i], na.rm = TRUE))
  fifa[is.na(fifa[,i]), i] <- m
  fifa[[i]] = lapply(fifa[[i]], function(x){replace(x,x==0,m)})
  fifa[[i]] = unlist(lapply(fifa[[i]], as.numeric))
}
```

#BEFORE REPLACING NUMERICAL MISSING VALUE

13224	L. Dennis	25	England	62	65	Portsmouth	375000	2000	Right	Lean	CAM	18	185.42	68.946	57	56	38	59	36	64	49	35	52	61	82	82
13225	M. Baude	28	Germany	62	62	FC Energie	240000	1000	Right	Normal	RB	25	177.8	76.2035	51	33	47	49	36	52	42	30	48	51	67	67
13226	L. Moneta	24	Poland	62	66	Zaglebie L	400000	2000	Left	Normal	LM	77	172.72	69.8532	61	48	52	63	45	63	54	39	58	60	72	71
13227	S. Hyodo	32	Japan	62	62	Hokkaido	230000	1000	Right	Normal	CM	6	172.72	68.0388	63	54	45	69	51	58	66	39	60	62	70	70
13228	S. Økland	25	Norway	62	66	Kristiansu	375000	1000	Right	Normal	CM	10	177.8	68.0388	57	39	40	64	48	62	38	59	61	71	63	52
13229	L. Sapela	35	Poland	62	62	Miedz Leg	70000	1000	Left	Normal	GK	1	185.42	81.193	12	14	14	38	13	15	11	15	31	23	34	24
13230	J. Tell	21	France	62	71	US Orléan	475000	4000	Right	Normal	LM	11	185.42	73.9355	59	69	73	63	63	64	51	41	48	66	67	63
13231	A. Altuna	26	Argentina	62	65	San Martín	325000	2000	Right	Normal	CDM	5	182.88	73.9355	46	30	48	65	28	57	40	35	58	65	56	59
13232	A. Rizzo	21	Italy	62	72	Cittadella	500000	1000	Left	Normal	LM	26	175.26	69.8532	61	42	51	59	41	63	55	50	57	58	80	78
13233	L. Thomas	19	England	62	76	Coventry C	650000	3000	Right	Lean	RM	23	167.64	66.2244	50	49	45	52	38	68	35	32	35	67	81	83
13234	R. Schlegel	21	Argentina	62	74	Racing Clu	475000	2000	Right	Normal	CB	14	185.42	82.1002	33	27	54	34	33	31	35	29	35	38	48	60
13235	D. Montoy	22	Colombia	62	69	Itagüí Leo	350000	1000	Right	Normal	LB	26	180.34	71.2139	48	24	51	49	21	42	20	28	41	51	74	70
13236	J. McNulty	33	Scotland	62	62	Rochdale	120000	1000	Right	Normal	LB	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
13237	J. Barrera	29	Nicaragua	62	62	Boyacá Ch	300000	1000	Right	Normal	LB	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
13238	J. Stead	35	England	62	62	Notts Cou	140000	3000	Right	Normal	LB	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
13239	A. Sempirio	20	Italy	62	72	Brescia	425000	1000	Right	Normal	LB	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
13240	R. Bingham	24	England	62	66	Hamilton J	400000	1000	Right	Normal	LB	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
13241	K. Dankowski	21	Poland	62	72	Slask Wro	425000	1000	Right	Normal	LB	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
13242	I. Colman	23	Argentina	62	70	Club Atlét	450000	2000	Right	Normal	LB	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
13243	M. Feeney	19	England	62	78	Everton	600000	5000	Right	Normal	LB	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
13244	R. Minor	30	Denmark	62	62	Hobro IK	230000	2000	Right	Normal	LB	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
13245	Klauss	21	Brazil	62	69	HJK Helsin	425000	1000	Right	Normal	LB	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
13246	I. Sissoko	22	France	62	68	AS Béziers	425000	2000	Right	Normal	LB	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
13247	F. Hart	28	Austria	62	62	SV Matters	240000	3000	Right	Normal	LB	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
13248	L. McCulloch	24	Northern I	62	69	Tranmere	375000	2000	Right	Normal	LB	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
13249	Li Yunqiu	27	China PR	62	62	Shanghai G	250000	3000	Right	Normal	LB	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
13250	F. Garcia	29	Paraguay	62	62	Itagüí Leo	300000	1000	Right	Normal	LB	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
13251	R. Haemh	34	Belgium	62	62	NAC Breda	150000	2000	Right	Normal	LB	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
13252	E. Binaku	22	Albania	62	70	Malmö FF	375000	1000	Right	Normal	LB	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
13253	G. Miller	31	Scotland	62	62	Carlisle U	200000	2000	Right	Normal	LB	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
13254	A. Aidonis	17	Germany	62	82	VfB Stuttg	550000	2000	Right	Normal	LB	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
13255	L. Sowah	25	Germany	62	65	Hamilton J	325000	1000	Right	Normal	LB	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
13256	R. Deacon	26	England	62	62	Dundee FC	325000	1000	Right	Normal	LB	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
13257	Jang Hyun	25	Korea Rep	62	65	Suwon Sar	375000	2000	Right	Normal	LB	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
13258	A. Al Malk	23	Saudi Arab	62	67	Al Wehda	350000	3000	Right	Normal	LB	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

#AFTER REPLACING NUMERICAL MISSING VALUE

13223	P. Hellquist	27	Sweden	62	63	IF Bromma	350000	1000	Right	Normal	LW	13	182.88	73.03	58	58	53	62	51	53	59	61	56	62	70	73
13224	L. Dennis	25	England	62	65	Portsmouth	375000	2000	Right	Lean	CAM	18	185.42	68.95	57	56	38	59	36	64	49	35	52	61	82	82
13225	M. Baude	28	Germany	62	62	FC Energie	240000	1000	Right	Normal	RB	25	177.8	76.2	51	33	47	49	36	52	42	30	48	51	67	67
13226	L. Moneta	24	Poland	62	66	Zagłębie L	400000	2000	Left	Normal	LM	77	172.72	69.85	61	48	52	63	45	63	54	39	58	60	72	71
13227	S. Hyodo	32	Japan	62	62	Hokkaido	230000	1000	Right	Normal	CM	6	172.72	68.04	63	54	45	69	51	58	66	39	60	62	70	70
13228	S. Økland	25	Norway	62	66	Kristiansund	375000	1000	Right	Normal	CM	10	177.8	68.04	57	39	40	64	48	62	38	59	61	71	63	52
13229	L. Sapela	35	Poland	62	62	Miedź Leg	70000	1000	Left	Normal	GK	1	185.42	81.19	12	14	14	38	13	15	11	15	31	23	34	24
13230	J. Tell	21	France	62	71	US Orléans	475000	4000	Right	Normal	LM	11	185.42	73.94	59	69	73	63	63	64	51	41	48	66	67	63
13231	A. Altuna	26	Argentina	62	65	San Martín	325000	2000	Right	Normal	CDM	5	182.88	73.94	46	30	48	65	28	57	40	35	58	65	56	59
13232	A. Rizzo	21	Italy	62	72	Cittadella	500000	1000	Left	Normal	LM	26	175.26	69.85	61	42	51	59	41	63	55	50	57	58	80	78
13233	L. Thomas	19	England	62	76	Coventry City	650000	3000	Right	Lean	RM	23	167.64	66.22	50	49	45	52	38	68	35	32	35	67	81	83
13234	R. Schlegel	21	Argentina	62	74	Racing Club	475000	2000	Right	Normal	CB	14	185.42	82.1	33	27	54	34	33	31	35	29	35	38	48	60
13235	D. Montoya	22	Colombia	62	69	Itagüí Leones	350000	1000	Right	Normal	LB	26	180.34	71.21	48	24	51	49	21	42	20	28	41	51	74	70
13236	J. McNulty	33	Scotland	62	62	Rochdale	120000	1000	Right	Normal	LB	19	181.257	75.2854	49.7363	45.553	52.3004	58.6889	42.9111	55.3733	47.1728	42.8647	52.7139	58.3721	64.6158	64.7292
13237	J. Barrera	29	Nicaragua	62	62	Boyacá Chorrillo	300000	1000	Right	Normal	LB	19	181.257	75.2854	49.7363	45.553	52.3004	58.6889	42.9111	55.3733	47.1728	42.8647	52.7139	58.3721	64.6158	64.7292
13238	J. Stead	35	England	62	62	Notts County	140000	3000	Right	Normal	LB	19	181.257	75.2854	49.7363	45.553	52.3004	58.6889	42.9111	55.3733	47.1728	42.8647	52.7139	58.3721	64.6158	64.7292
13239	A. Semprini	20	Italy	62	72	Brescia	425000	1000	Right	Normal	LB	19	181.257	75.2854	49.7363	45.553	52.3004	58.6889	42.9111	55.3733	47.1728	42.8647	52.7139	58.3721	64.6158	64.7292
13240	R. Bingham	24	England	62	66	Hamilton Academical	400000	1000	Right	Normal	LB	19	181.257	75.2854	49.7363	45.553	52.3004	58.6889	42.9111	55.3733	47.1728	42.8647	52.7139	58.3721	64.6158	64.7292
13241	K. Dankowski	21	Poland	62	72	Slask Wrocław	425000	1000	Right	Normal	LB	19	181.257	75.2854	49.7363	45.553	52.3004	58.6889	42.9111	55.3733	47.1728	42.8647	52.7139	58.3721	64.6158	64.7292
13242	I. Colman	23	Argentina	62	70	Club Atlético Tucumán	450000	2000	Right	Normal	LB	19	181.257	75.2854	49.7363	45.553	52.3004	58.6889	42.9111	55.3733	47.1728	42.8647	52.7139	58.3721	64.6158	64.7292
13243	M. Feeney	19	England	62	78	Everton	600000	5000	Right	Normal	LB	19	181.257	75.2854	49.7363	45.553	52.3004	58.6889	42.9111	55.3733	47.1728	42.8647	52.7139	58.3721	64.6158	64.7292
13244	R. Minor	30	Denmark	62	62	Hobro IK	230000	2000	Right	Normal	LB	19	181.257	75.2854	49.7363	45.553	52.3004	58.6889	42.9111	55.3733	47.1728	42.8647	52.7139	58.3721	64.6158	64.7292
13245	Klauss	21	Brazil	62	69	HJK Helsinki	425000	1000	Right	Normal	LB	19	181.257	75.2854	49.7363	45.553	52.3004	58.6889	42.9111	55.3733	47.1728	42.8647	52.7139	58.3721	64.6158	64.7292
13246	I. Sissoko	22	France	62	68	AS Béziers	425000	2000	Right	Normal	LB	19	181.257	75.2854	49.7363	45.553	52.3004	58.6889	42.9111	55.3733	47.1728	42.8647	52.7139	58.3721	64.6158	64.7292
13247	F. Hart	28	Austria	62	62	SV Mattersburg	240000	3000	Right	Normal	LB	19	181.257	75.2854	49.7363	45.553	52.3004	58.6889	42.9111	55.3733	47.1728	42.8647	52.7139	58.3721	64.6158	64.7292
13248	L. McCulloch	24	Northern Ireland	62	69	Tranmere Rovers	375000	2000	Right	Normal	LB	19	181.257	75.2854	49.7363	45.553	52.3004	58.6889	42.9111	55.3733	47.1728	42.8647	52.7139	58.3721	64.6158	64.7292
13249	Li Yunqiu	27	China PR	62	62	Shanghai Shenhua	250000	3000	Right	Normal	LB	19	181.257	75.2854	49.7363	45.553	52.3004	58.6889	42.9111	55.3733	47.1728	42.8647	52.7139	58.3721	64.6158	64.7292
13250	F. García	29	Paraguay	62	62	Itagüí Leones	300000	1000	Right	Normal	LB	19	181.257	75.2854	49.7363	45.553	52.3004	58.6889	42.9111	55.3733	47.1728	42.8647	52.7139	58.3721	64.6158	64.7292
13251	R. Haemhøi	34	Belgium	62	62	NAC Breda	150000	2000	Right	Normal	LB	19	181.257	75.2854	49.7363	45.553	52.3004	58.6889	42.9111	55.3733	47.1728	42.8647	52.7139	58.3721	64.6158	64.7292
13252	E. Binaku	22	Albania	62	70	Malmö FF	375000	1000	Right	Normal	LB	19	181.257	75.2854	49.7363	45.553	52.3004	58.6889	42.9111	55.3733	47.1728	42.8647	52.7139	58.3721	64.6158	64.7292
13253	G. Miller	31	Scotland	62	62	Carlisle United	200000	2000	Right	Normal	LB	19	181.257	75.2854	49.7363	45.553	52.3004	58.6889	42.9111	55.3733	47.1728	42.8647	52.7139	58.3721	64.6158	64.7292
13254	A. Aidonis	17	Germany	62	82	VfB Stuttgart	550000	2000	Right	Normal	LB	19	181.257	75.2854	49.7363	45.553	52.3004	58.6889	42.9111	55.3733	47.1728	42.8647	52.7139	58.3721	64.6158	64.7292
13255	L. Sowah	25	Germany	62	65	Hamilton Academical	325000	1000	Right	Normal	LB	19	181.257	75.2854	49.7363	45.553	52.3004	58.6889	42.9111	55.3733	47.1728	42.8647	52.7139	58.3721	64.6158	64.7292
13256	R. Deacon	26	England	62	62	Dundee FC	325000	1000	Right	Normal	LB	19	181.257	75.2854	49.7363	45.553	52.3004	58.6889	42.9111	55.3733	47.1728	42.8647	52.7139	58.3721	64.6158	64.7292
13257	Jang Hyun	25	Korea Rep	62	65	Suwon Samsung	375000	2000	Right	Normal	LB	19	181.257	75.2854	49.7363	45.553	52.3004	58.6889	42.9111	55.3733	47.1728	42.8647	52.7139	58.3721	64.6158	64.7292

```
#CHECK IF THERE IS ANY MISSING VALUES
print(any(is.na(fifa)))
## [1] FALSE

#VIEW THE CLEANED DATA
View(fifa)

#WRITE THE CLEANED DATA INTO A NEW FILE
write.csv(fifa, "1_cleaned_data.csv", row.names = FALSE)
```

Normalization

Normalization, Standardization

```
# IMPORT THE DATASET
fifa = read.csv( "1_cleaned_data.csv")

#SELECTS NUMERICAL COLUMNS ONLY
library("dplyr")

##
## Attaching package: 'dplyr'
## The following objects are masked from 'package:stats':
##
##      filter, lag
## The following objects are masked from 'package:base':
##
##      intersect, setdiff, setequal, union

numfifa = select_if(fifa, is.numeric)
```


#NORMALIZE FUNTION USING MIN-MAX VALUES

```
normalize <- function(x){  
  return ((x-min(x))/(max(x)-min(x)))  
}
```

#NORMALIZING THE DATA USING USER-DEFINED NORMALIZED FUNCTIONS

((x-min)/range)

```
mmfifa <- as.data.frame(lapply(numfifa, normalize))  
write.csv(mmfifa, "2_minmax.csv", row.names = FALSE)
```

Sl..No.	Age	Overall	Potential	Value	Wage	Jersey.No	Height.in.	Weight.in.	Crossing	Finishing	HeadingA	ShortPass	Volleys	Dribbling	Curve	FKAccurac	LongPass	BallContrc	Accelerati	SprintSpee	Agility	Reactions	Balance	ShotPower	Jumping	Stamina	Stre
0	0.51724	1	0.97872	0.93249	1	0.09184	0.3	0.36842	0.89773	1	0.73333	0.96512	0.95349	1	0.98864	1	0.92857	1	0.92941	0.88095	0.93902	0.98667	0.9875	0.89247	0.6625	0.71429	
5.49E-05	0.58621	1	0.97872	0.64979	0.71681	0.06122	0.65	0.54887	0.89773	0.98925	0.94444	0.86047	0.96512	0.90323	0.85227	0.8022	0.80952	0.97802	0.90588	0.94048	0.89024	1	0.675	1	0.90476		
0.00011	0.34483	0.95833	0.95745	1	0.51327	0.09184	0.4	0.30075	0.84091	0.91398	0.64444	0.89535	0.93023	0.98925	0.93182	0.92308	0.82143	0.98901	0.96471	0.92857	1	0.97333	0.85	0.83871	0.575	0.82143	
0.00016	0.37931	0.9375	0.95745	0.60759	0.46018	0	0.75	0.43609	0.13636	0.11828	0.18889	0.5	0.10465	0.15054	0.17045	0.17582	0.5	0.40659	0.52941	0.54762	0.56098	0.92	0.3375	0.31183	0.65	0.36905	0
0.00022	0.37931	0.9375	0.93617	0.86076	0.62832	0.06122	0.5	0.33083	1	0.86022	0.56667	0.98837	0.90698	0.88172	0.89773	0.87912	0.97619	0.94505	0.77647	0.7619	0.79268	0.93333	0.7625	0.95699	0.6	0.92857	
0.00027	0.37931	0.9375	0.91489	0.78481	0.60177	0.09184	0.35	0.3985	0.86364	0.88172	0.63333	0.95349	0.88372	0.97849	0.875	0.83516	0.88095	0.97802	0.96471	0.90476	0.9878	0.92	0.975	0.86022	0.5125	0.84524	0
0.00033	0.55172	0.9375	0.91489	0.5654	0.74336	0.09184	0.35	0.27068	0.92045	0.75269	0.56667	1	0.83721	0.92473	0.89773	0.82418	0.94048	0.96703	0.8	0.71429	0.96341	0.92	0.975	0.82796	0.6625	0.91667	0
0.00038	0.51724	0.9375	0.91489	0.67511	0.80531	0.08163	0.55	0.6015	0.81818	0.97849	0.81111	0.87209	0.97674	0.89247	0.90909	0.89011	0.65476	0.93407	0.87059	0.75	0.82927	0.94667	0.8375	0.90323	0.675	0.92857	
0.00044	0.55172	0.9375	0.91489	0.43038	0.67257	0.14286	0.55	0.53383	0.69318	0.62366	0.96667	0.82558	0.72093	0.63441	0.77273	0.75824	0.80952	0.86813	0.75294	0.75	0.78049	0.85333	0.625	0.82796	0.975	0.85714	
0.00049	0.31034	0.91667	0.95745	0.57384	0.16637	0	0.65	0.61654	0.09091	0.09677	0.12222	0.25581	0.10465	0.08602	0.07955	0.12088	0.20238	0.12088	0.36471	0.57143	0.64634	0.86667	0.4125	0.21505	0.7625	0.34524	0
0.00055	0.44828	0.91667	0.89362	0.64979	0.36283	0.08163	0.55	0.49624	0.64773	0.95699	0.9	0.88372	0.98837	0.87097	0.80682	0.91209	0.66667	0.92308	0.76471	0.78571	0.78049	0.92	0.775	0.92473	0.8625	0.78571	0
0.0006	0.41379	0.91667	0.89362	0.64557	0.62832	0.07143	0.55	0.43609	0.94318	0.7957	0.55556	0.98837	0.90698	0.82796	0.90909	0.89011	1	0.93407	0.61176	0.59524	0.68293	0.90667	0.6875	0.91398	0.1875	0.75	
0.00066	0.55172	0.91667	0.89362	0.37131	0.22124	0.09184	0.65	0.46617	0.56818	0.43011	0.97778	0.83721	0.5	0.52688	0.48864	0.52747	0.72619	0.78022	0.65882	0.66667	0.53659	0.85333	0.475	0.69892	0.95	0.64286	0
0.00071	0.55172	0.91667	0.89362	0.50633	0.50442	0.20408	0.35	0.28571	0.89773	0.7957	0.55556	1	0.90698	0.91398	0.86364	0.81319	0.92857	0.97802	0.68235	0.61905	0.95122	0.92	0.925	0.75269	0.6125	0.78571	0
0.00077	0.37931	0.89583	0.89362	0.53165	0.39823	0.12245	0.25	0.36842	0.71591	0.67742	0.55556	0.9186	0.60465	0.80645	0.48864	0.50549	0.85714	0.82418	0.82353	0.78571	0.82927	0.96	0.95	0.74194	0.775	1	0
0.00082	0.27586	0.89583	0.97872	0.75105	0.36283	0.20408	0.45	0.41353	0.875	0.88172	0.71111	0.93023	0.97674	0.94624	0.93182	0.93407	0.78571	0.95604	0.88235	0.84524	0.93902	0.86667	0.8625	0.86022	0.75	0.80952	
0.00088	0.27586	0.89583	0.91489	0.70464	0.36283	0.08163	0.65	0.64662	0.79545	0.98925	0.9	0.84884	0.93023	0.8172	0.81818	0.71429	0.86905	0.86813	0.65882	0.71429	0.69512	0.93333	0.6875	0.92473	0.7875	0.91667	0
0.00093	0.37931	0.89583	0.89362	0.65823	0.25664	0.06122	0.4	0.38346	0.875	0.94624	0.88889	0.88372	0.96512	0.90323	0.88636	0.82418	0.79762	0.93407	0.89412	0.86905	0.92683	0.92	0.8	0.83871	0.9375	0.84524	0
0.00099	0.34483	0.89583	0.93617	0.48945	0.42478	0.21429	0.65	0.57895	0.11364	0.12903	0.07778	0.33721	0.11628	0.13978	0.13636	0.0989	0.39286	0.14286	0.30588	0.45238	0.28049	0.85333	0.3375	0.21505	0.8	0.27381	
0.00104	0.34483	0.89583	0.89362	0.45148	0.42478	0	0.85	0.76692	0.10227	0.12903	0.1	0.30233	0.09302	0.09677	0.14773	0.18681	0.30952	0.1978	0.4	0.47619	0.57317	0.84	0.3625	0.36559	0.6625	0.30952	0
0.0011	0.44828	0.89583	0.87234	0.4346	0.55752	0.04082	0.65	0.43609	0.64773	0.69892	0.71111	0.95349	0.46512	0.8172	0.68182	0.71429	0.86905	0.91209	0.44706	0.47619	0.63415	0.88	0.45	0.63441	0.6375	0.88095	
0.00115	0.51724	0.89583	0.87234	0.50633	0.35398	0.20408	0.6	0.45113	0.73864	0.93548	0.94444	0.82558	1	0.8172	0.80682	0.8022	0.5119	0.84615	0.74118	0.7619	0.76829	0.93333	0.5375	0.91398	0.9125	0.95238	0
0.00121	0.55172	0.89583	0.87234	0.32068	0.23009	0	0.75	0.69925	0.11364	0.11828	0.23333	0.55814	0.0814	0.27957	0.09091	0.08791	0.59524	0.47253	0.49412	0.57143	0.45122	0.84	0.2375	0.24731	0.775	0.36905	0
0.00126	0.48276	0.89583	0.87234	0.5443	0.53097	0.09184	0.35	0.33083	0.73864	0.97849	0.81111	0.86047	0.94186	0.91398	0.86364	0.76923	0.65476	0.92308	0.89412	0.80952	0.87805	0.92	0.9375	0.92473	0.825	0.7619	
0.00132	0.58621	0.89583	0.87234	0.22785	0.38053	0.02041	0.65	0.57895	0.60227	0.33333	0.87778	0.60465	0.47674	0.58065	0.61364	0.30769	0.59524	0.57143	0.6	0.75	0.4878	0.81333	0.4875	0.8172	0.925	0.63095	
0.00137	0.10345	0.875	1	0.68354	0.17699	0.09184	0.45	0.38346	0.81818	0.92473	0.81111	0.87209	0.86047	0.92473	0.80682	0.65934	0.7619	0.94505	0.98824	1	0.95122	0.88	0.8375	0.82796	0.75	0.84524	
0.00143	0.34483	0.875	0.87234	0.5865	0.45133	0.09184	0.4	0.35338	0.82955	0.94624	0.61111	0.87209	0.80233	0.91398	0.875	0.62637	0.75	0.91209	0.96471	0.94048	0.93902	0.93333	0.9	0.80645	0.6625	0.85714	0
0.00148	0.34483	0.875	0.89362	0.50211	0.50442	0.13265	0.6	0.56391	0.53409	0.6129	0.8	0.90698	0.56977	0.69892	0.60227	0.78022	0.86905	0.8022	0.55294	0.63095	0.58537	0.84	0.625	0.90323	0.9125	0.89286	
0.00154	0.34483	0.875	0.87234	0.5865	0.55752	0.09184	0.5	0.46617	0.96591	0.87097	0.64444	0.95349	1	0.87097	0.94318	0.91209	0.88095	0.93407	0.71765	0.65476	0.84146	0.85333	0.75	0.90323	0.4875	0.69048	0
0.00159	0.37931	0.875	0.85106	0.52321	0.29204	0.09184	0.15	0.15038	0.92045	0.80645	0.57778	0.90698	0.81395	0.92473	0.92045	0.81319	0.82143	0.96703	0.96471	0.88095	0.97561	0.82667	0.9625	0.78495	0.475	0.75	0
0.00165	0.34483	0.875	0.91489	0.62025	0.55752	0.21429	0.4	0.4812	0.79545	0.82796	0.56667	0.95349	0.7093	0.96774	0.93182	0.8022	0.88095	0.98901	0.74118	0.67857	0.89024	0.74667	0.925	0.72043	0.6125	0.69048	
0.0017	0.34483	0.875	0.91489	0.62025	0.36283	0.09184	0.5	0.43609	0.94318	0.83871	0.53333	0.97674	0.84884	0.86022	0.90909	0.92308	0.94048	0.94505	0.74118	0.72619	0.79268	0.89333	0.8125	0.88172	0.4375	0.95238	0
0.00176	0.34483	0.875	0.87234	0.5865	0.60177	0.06122	0.35	0.30075	0.84091	0.82796	0.48889	0.94186	0.82558	0.93548	0.96591	0.91209	0.88095	0.95604	0.90588	0.75	0.95122	0.82667	0.9625	0.87097	0.55	0.79762	
0.00181	0.44828	0.875	0.85106	0.49789	0.46903	0.13265	0.65	0.49624	0.81818	0.92473	0.83333	0.81395	0.95349	0.80645	0.84091	0.78022	0.65476	0.84615	0.95294	0.9881	0.7561	0.88	0.675	0.86022	0.8	0.7619	0

```
#STANDARDIZATION ((x-mean)/sd)
library("clusterSim")
## Loading required package: cluster
## Loading required package: MASS
##
## Attaching package: 'MASS'
## The following object is masked from 'package:dplyr':
##
##      select

sfifa = data.Normalization(numfifa, type="n1", normalization
= "column")
write.csv(sfifa, "2_standard.csv", row.names = FALSE)
```


Sl.No.	Age	Overall	Potential	Value	Wage	Jersey.Nu	Height.in.	Weight.in.	Crossing	Finishing	HeadingA	ShortPass	Volleys	Dribbling	Curve	FKAccurac	LongPass	BallContr	Accelerati	SprintSpee	Agility	Reactions	Balance	ShotPower	Jumping	Stamina	Strength
-1.73187	1.2586	4.01807	3.6979	19.3186	25.2397	-0.59957	-1.64831	-0.44809	1.8684	2.53593	1.01987	2.13326	2.43861	2.20441	2.49474	2.92957	2.24007	2.25842	1.76996	1.45411	1.86475	3.68536	2.19853	1.71593	0.24646	0.55306	-0.5
-1.73168	1.68686	4.01807	3.6979	13.3312	17.9669	-0.78806	0.99756	1.0932	1.8684	2.48464	2.11467	1.52008	2.49521	1.7278	1.84148	1.89834	1.58673	2.13838	1.63579	1.79592	1.59346	3.79649	0.4273	2.29685	2.53419	1.56118	1.0
-1.73149	0.18795	3.7286	3.53494	20.7485	12.7396	-0.59957	-0.89235	-1.02607	1.59575	2.12564	0.5589	1.72448	2.32542	2.15146	2.22255	2.52853	1.65206	2.1984	1.97121	1.72756	2.20387	3.57423	1.41919	1.42547	-0.34666	1.12013	-1.3
-1.7313	0.40208	3.58386	3.53494	12.4376	11.3759	-1.16503	1.75352	0.12989	-1.78511	-1.6695	-1.80356	-0.59199	-1.69281	-1.97917	-1.42479	-1.36723	-0.11198	-0.98265	-0.5109	-0.46002	-0.23777	3.12972	-1.48563	-1.42103	0.16173	-1.27415	-0.1
-1.73111	0.40208	3.58386	3.37199	17.7995	15.6941	-0.78806	-0.13639	-0.76919	2.35917	1.86921	0.15555	2.26953	2.21223	1.62189	2.05923	2.29937	2.50141	1.95832	0.89787	0.77049	1.05087	3.24085	0.92324	2.06448	-0.1772	1.6872	0.7
-1.73092	0.40208	3.58386	3.20903	16.1909	15.0123	-0.59957	-1.27033	-0.19121	1.70481	1.97178	0.50128	2.06513	2.09905	2.0985	1.95036	2.07021	1.97874	2.13838	1.97121	1.59084	2.13604	3.12972	2.12768	1.54165	-0.77031	1.24615	0.0
-1.73073	1.47273	3.58386	3.20903	11.5439	18.6487	-0.59957	-1.27033	-1.28295	1.97746	1.35635	0.15555	2.33766	1.87267	1.83372	2.05923	2.01292	2.30541	2.07836	1.03203	0.49705	2.0004	3.12972	2.12768	1.36738	0.24646	1.62419	-0.5
-1.73054	1.2586	3.58386	3.20903	13.8674	20.2396	-0.6624	0.24159	1.54274	1.48669	2.43335	1.42322	1.58821	2.5518	1.67485	2.11367	2.35666	0.73737	1.8983	1.43454	0.70213	1.25434	3.35197	1.34834	1.77402	0.33119	1.6872	1.4
-1.73035	1.47273	3.58386	3.20903	8.68429	16.8305	-0.28543	0.24159	0.96476	0.88686	0.74093	2.22991	1.31569	1.30672	0.40388	1.46042	1.66918	1.58673	1.53818	0.7637	0.70213	0.98305	2.57407	0.1439	1.36738	2.36473	1.30915	1.4
-1.73016	-0.02618	3.43913	3.53494	11.7227	3.83041	-1.16503	0.99756	1.67118	-2.00323	-1.77207	-2.14929	-2.02274	-1.69281	-2.29691	-1.8603	-1.65368	-1.74535	-2.54316	-1.45008	-0.32329	0.23699	2.6852	-1.06053	-1.94386	0.9243	-1.40017	1.0
-1.72997	0.83034	3.43913	3.04608	13.3312	8.8759	-0.6624	0.24159	0.64366	0.66874	2.33078	1.88419	1.65634	2.6084	1.56893	1.62373	2.47124	0.80271	1.83828	0.83078	0.90722	0.98305	3.12972	0.99409	1.89021	1.60215	0.93111	1.4
-1.72978	0.61621	3.43913	3.04608	13.2419	15.6941	-0.72523	0.24159	0.12989	2.08652	1.5615	0.09793	2.26953	2.21223	1.3571	2.11367	2.35666	2.63208	1.8983	-0.04131	-0.18657	0.44046	3.01859	0.49815	1.83211	-2.97332	0.74209	0
-1.72959	1.47273	3.43913	3.04608	7.43319	5.23951	-0.59957	0.99756	0.38678	0.28703	-0.18222	2.28753	1.38382	0.23141	-0.12568	0.09947	0.46607	1.12938	1.05802	0.22702	0.2236	-0.37342	2.57407	-0.70629	0.67028	2.19527	0.17502	1.8
-1.7294	1.47273	3.43913	3.04608	10.2928	12.5123	0.09155	-1.27033	-1.15451	1.8684	1.5615	0.09793	2.33766	2.21223	1.78076	1.89592	1.95563	2.24007	2.13838	0.36119	-0.04985	1.93257	3.12972	1.84428	0.96074	-0.09247	0.93111	-1.0
-1.7292	0.40208	3.29439	3.04608	10.829	9.785	-0.41109	-2.02629	-0.44809	0.99592	0.99735	0.09793	1.86074	0.74077	1.25119	0.09947	0.35149	1.84807	1.2981	1.1662	0.90722	1.25434	3.4631	1.98598	0.90264	1.00903	2.06524	0.8
-1.72901	-0.24031	3.29439	3.6979	15.476	8.8759	0.09155	-0.51437	-0.06277	1.75934	1.97178	0.90463	1.92887	2.5518	1.93963	2.22255	2.58583	1.45606	2.01834	1.50162	1.24903	1.86475	2.6852	1.49004	1.54165	0.83957	1.05712	-0.0
-1.72882	-0.24031	3.29439	3.20903	14.493	8.8759	-0.6624	0.99756	1.92806	1.37763	2.48464	1.88419	1.45195	2.32542	1.30415	1.67817	1.44001	1.9134	1.53818	0.22702	0.49705	0.50829	3.24085	0.49815	1.89021	1.09376	1.62419	1.4
-1.72863	0.40208	3.29439	3.04608	13.51	6.14861	-0.78806	-0.89235	-0.31965	1.75934	2.2795	1.82656	1.65634	2.49521	1.7278	2.0048	2.01292	1.52139	1.8983	1.56871	1.38575	1.79693	3.12972	1.13579	1.42547	2.11054	1.24615	-0.2
-1.72844	0.18795	3.29439	3.37199	9.93539	10.4668	0.15438	0.99756	1.35008	-1.89417	-1.61822	-2.37977	-1.54582	-1.63622	-2.03213	-1.58811	-1.76826	-0.69999	-2.42312	-1.7855	-1.00691	-1.7977	2.57407	-1.48563	-1.94386	1.1785	-1.77821	1.0
-1.72825	0.18795	3.29439	3.04608	9.13111	10.4668	-1.16503	2.50948	2.95559	-1.9487	-1.61822	-2.26453	-1.75022	-1.74941	-2.24395	-1.53367	-1.30993	-1.15733	-2.12303	-1.24883	-0.87019	-0.16995	2.46294	-1.34393	-1.13057	0.24646	-1.58919	0.3
-1.72806	0.83034	3.29439	2.88312	8.77365	13.8759	-0.91372	0.99756	0.12989	0.66874	1.09993	0.90463	2.06513	0.06163	1.30415	1.02491	1.44001	1.9134	1.77826	-0.98049	-0.87019	0.16917	2.79633	-0.84799	0.32173	0.07699	1.43517	0.9
-1.72787	1.2586	3.29439	2.88312	10.2928	8.64863	0.09155	0.61957	0.25833	1.10498	2.22821	2.11467	1.31569	2.66499	1.30415	1.62373	1.89834	-0.04664	1.41814	0.69661	0.77049	0.91522	3.24085	-0.35204	1.83211	1.94107	1.81321	1.0
-1.72768	1.47273	3.29439	2.88312	6.36081	5.46678	-1.16503	1.75352	2.37761	-1.89417	-1.6695	-1.57308	-0.25133	-1.806	-1.34369	-1.80586	-1.82555	0.4107	-0.62253	-0.71215	-0.32329	-0.84818	2.46294	-2.05242	-1.76958	1.00903	-1.27415	1.1
-1.72749	1.04447	3.29439	2.88312	11.0971	13.1941	-0.59957	-1.27033	-0.76919	1.10498	2.43335	1.42322	1.52008	2.38202	1.78076	1.89592	1.72647	0.73737	1.83828	1.56871	1.04394	1.52563	3.12972	1.91513	1.89021	1.34796	0.80509	0
-1.7273	1.68686	3.29439	2.88312	4.3948	9.33045	-1.03938	0.99756	1.35008	0.45062	-0.64379	1.76894	0.0212	0.11822	0.1391	0.69829	-0.67974	0.4107	-0.08235	-0.1084	0.70213	-0.64471	2.24068	-0.63544	1.30929	2.0258	0.11201	1.8
-1.72711	-1.31096	3.14966	3.86085	14.0461	4.10314	-0.59957	-0.51437	-0.31965	1.48669	2.17693	1.42322	1.58821	1.98586	1.83372	1.62373	1.15356	1.32539	1.95832	2.10538	2.13773	1.93257	2.79633	1.34834	1.36738	0.83957	1.24615	0.4
-1.72692	0.18795	3.14966	2.88312	11.9908	11.1486	-0.59957	-0.89235	-0.57653	1.54122	2.2795	0.38604	1.58821	1.70288	1.78076	1.95036	0.98169	1.26005	1.77826	1.97121	1.79592	1.86475	3.24085	1.70259	1.2512	0.24646	1.30915	0.3
-1.72673	0.18795	3.14966	3.04608	10.2035	12.5123	-0.34826	0.61957	1.22164	0.12344	0.68964	1.3656	1.79261	0.57098	0.72162	0.64385	1.78376	1.9134	1.17806	-0.37673	0.01852	-0.10212	2.46294	0.1439	1.77402	1.94107	1.49818	1.8
-1.72654	0.18795	3.14966	2.88312	11.9908	13.8759	-0.59957	-0.13639	0.38678	2.19558	1.9205	0.5589	2.06513	2.66499	1.56893	2.27699	2.47124	1.97874	1.8983	0.56245	0.15524	1.32216	2.57407	0.8524	1.77402	-0.93978	0.42705	0.2
-1.72635	0.40208	3.14966	2.72017	10.6503	7.05771	-0.59957	-2.78226	-2.31048	1.97746	1.61278	0.21317	1.79261	1.75948	1.83372	2.16811	1.95563	1.65206	2.07836	1.97121	1.45411	2.06822	2.35181	2.05683	1.13501	-1.02451	0.74209	-1
-1.72616	0.18795	3.14966	3.20903	12.7057	13.8759	0.15438	-0.89235	0.51522	1.37763	1.71535	0.15555	2.06513	1.25012	2.04554	2.22255	1.89834	1.97874	2.1984	0.69661	0.29196	1.59346	1.68504	1.84428	0.78646	-0.09247	0.42705	-0.5
-1.72597	0.18795	3.14966	3.20903	12.7057	8.8759	-0.59957	-0.13639	0.12989	2.08652	1.76664	-0.01731	2.20139	1.92926	1.51598	2.11367	2.52853	2.30541	1.95832	0.69661	0.56541	1.05087	2.90746	1.20664	1.65784	-1.2787	1.81321	-0.5
-1.72578	0.18795	3.14966	2.88312	11.9908	15.0123	-0.78806	-1.27033	-1.02607	1.59575	1.71535	-0.24779	1.997	1.81607	1.88667	2.38586	2.47124	1.97874	2.01834	1.63579	0.70213	1.93257	2.35181	2.05683	1.59975	-0.51612	0.99412	-0
-1.72559	0.83034	3.14966	2.72017	10.1141	11.6032	-0.34826	0.99756	0.64366	1.48669	2.17693	1.53846	1.24756	2.43861	1.25119	1.78704	1.78376	0.73737	1.41814	1.90413	2.06937	0.8474	2.79633	0.4273	1.54165	1.1785	0.80509	0.8

```
#NORMALIZATION ((x-mean)/sqrt(sum((x-mean)^2)))  
nfifa = data.Normalization(numfifa, type="n12", normalization  
= "column")  
write.csv(nfifa, "2_norm.csv", row.names = FALSE)
```

Sl..No.	Age	Overall	Potential	Value	Wage	Jersey.Nur	Height.in.	Weight.in.	Crossing	Finishing	HeadingA	ShortPass	Volleys	Dribbling	Curve	FKAccurac	LongPass	BallContr	Accelerati	SprintSpec	Agility	Reactions	Balance	ShotPower	Jumping	Stamina	Stre
-0.01284	0.00933	0.02978	0.02741	0.14318	0.18706	-0.00444	-0.01222	-0.00332	0.01385	0.01879	0.00756	0.01581	0.01807	0.01634	0.01849	0.02171	0.0166	0.01674	0.01312	0.01078	0.01382	0.02731	0.01629	0.01272	0.00183	0.0041	-0.0
-0.01283	0.0125	0.02978	0.02741	0.0988	0.13316	-0.00584	0.00739	0.0081	0.01385	0.01841	0.01567	0.01127	0.01849	0.01281	0.01365	0.01407	0.01176	0.01585	0.01212	0.01331	0.01181	0.02814	0.00317	0.01702	0.01878	0.01157	0.0
-0.01283	0.00139	0.02763	0.0262	0.15378	0.09442	-0.00444	-0.00661	-0.0076	0.01183	0.01575	0.00414	0.01278	0.01723	0.01595	0.01647	0.01874	0.01224	0.01629	0.01461	0.0128	0.01633	0.02649	0.01052	0.01056	-0.00257	0.0083	-0.0
-0.01283	0.00298	0.02656	0.0262	0.09218	0.08431	-0.00863	0.013	0.00096	-0.01323	-0.01237	-0.01337	-0.00439	-0.01255	-0.01467	-0.01056	-0.01013	-0.00083	-0.00728	-0.00379	-0.00341	-0.00176	0.0232	-0.01101	-0.01053	0.0012	-0.00944	-0.0
-0.01283	0.00298	0.02656	0.02499	0.13192	0.11632	-0.00584	-0.00101	-0.0057	0.01748	0.01385	0.00115	0.01682	0.0164	0.01202	0.01526	0.01704	0.01854	0.01451	0.00665	0.00571	0.00779	0.02402	0.00684	0.0153	-0.00131	0.0125	0.0
-0.01283	0.00298	0.02656	0.02378	0.12	0.11126	-0.00444	-0.00942	-0.00142	0.01264	0.01461	0.00372	0.01531	0.01556	0.01555	0.01446	0.01534	0.01467	0.01585	0.01461	0.01179	0.01583	0.0232	0.01577	0.01143	-0.00571	0.00924	0.0
-0.01283	0.01092	0.02656	0.02378	0.08556	0.13821	-0.00444	-0.00942	-0.00951	0.01466	0.01005	0.00115	0.01733	0.01388	0.01359	0.01526	0.01492	0.01709	0.0154	0.00765	0.00368	0.01483	0.0232	0.01577	0.01013	0.00183	0.01204	-0.0
-0.01283	0.00933	0.02656	0.02378	0.10278	0.15001	-0.00491	0.00179	0.01143	0.01102	0.01803	0.01055	0.01177	0.01891	0.01241	0.01567	0.01747	0.00547	0.01407	0.01063	0.0052	0.0093	0.02484	0.00999	0.01315	0.00245	0.0125	0.0
-0.01282	0.01092	0.02656	0.02378	0.06436	0.12474	-0.00212	0.00179	0.00715	0.00657	0.00549	0.01653	0.00975	0.00968	0.00299	0.01082	0.01237	0.01176	0.0114	0.00566	0.0052	0.00729	0.01908	0.00107	0.01013	0.01753	0.0097	0.0
-0.01282	-0.00019	0.02549	0.0262	0.08688	0.02839	-0.00863	0.00739	0.01239	-0.01485	-0.01313	-0.01593	-0.01499	-0.01255	-0.01702	-0.01379	-0.01226	-0.01294	-0.01885	-0.01075	-0.0024	0.00176	0.0199	-0.00786	-0.01441	0.00685	-0.01038	0.0
-0.01282	0.00615	0.02549	0.02258	0.0988	0.06578	-0.00491	0.00179	0.00477	0.00496	0.01727	0.01396	0.01228	0.01933	0.01163	0.01203	0.01832	0.00595	0.01362	0.00616	0.00672	0.00729	0.0232	0.00737	0.01401	0.01187	0.0069	0.0
-0.01282	0.00457	0.02549	0.02258	0.09814	0.11632	-0.00538	0.00179	0.00096	0.01546	0.01157	0.00073	0.01682	0.0164	0.01006	0.01567	0.01747	0.01951	0.01407	-0.00031	-0.00138	0.00326	0.02237	0.00369	0.01358	-0.02204	0.0055	0.0
-0.01282	0.01092	0.02549	0.02258	0.05509	0.03883	-0.00444	0.00739	0.00287	0.00213	-0.00135	0.01695	0.01026	0.00172	-0.00093	0.00074	0.00345	0.00837	0.00784	0.00168	0.00166	-0.00277	0.01908	-0.00523	0.00497	0.01627	0.0013	0.0
-0.01282	0.01092	0.02549	0.02258	0.07629	0.09273	0.00068	-0.00942	-0.00856	0.01385	0.01157	0.00073	0.01733	0.0164	0.0132	0.01405	0.01449	0.0166	0.01585	0.00268	-0.00037	0.01432	0.0232	0.01367	0.00712	-0.00069	0.0069	-0.0
-0.01282	0.00298	0.02442	0.02258	0.08026	0.07252	-0.00305	-0.01502	-0.00332	0.00738	0.00739	0.00073	0.01379	0.00549	0.00927	0.00074	0.00261	0.0137	0.00962	0.00864	0.00672	0.0093	0.02567	0.01472	0.00669	0.00748	0.01531	0.0
-0.01281	-0.00178	0.02442	0.02741	0.1147	0.06578	0.00068	-0.00381	-0.00047	0.01304	0.01461	0.0067	0.0143	0.01891	0.01438	0.01647	0.01916	0.01079	0.01496	0.01113	0.00926	0.01382	0.0199	0.01104	0.01143	0.00622	0.00783	-0.0
-0.01281	-0.00178	0.02442	0.02378	0.10741	0.06578	-0.00491	0.00739	0.01429	0.01021	0.01841	0.01396	0.01076	0.01723	0.00967	0.01244	0.01067	0.01418	0.0114	0.00168	0.00368	0.00377	0.02402	0.00369	0.01401	0.00811	0.01204	0.0
-0.01281	0.00298	0.02442	0.02258	0.10013	0.04557	-0.00584	-0.00661	-0.00237	0.01304	0.01689	0.01354	0.01228	0.01849	0.01281	0.01486	0.01492	0.01128	0.01407	0.01163	0.01027	0.01332	0.0232	0.00842	0.01056	0.01564	0.00924	-0.0
-0.01281	0.00139	0.02442	0.02499	0.07364	0.07757	0.00114	0.00739	0.01001	-0.01404	-0.01199	-0.01764	-0.01146	-0.01213	-0.01506	-0.01177	-0.01311	-0.00519	-0.01796	-0.01323	-0.00746	-0.01332	0.01908	-0.01101	-0.01441	0.00873	-0.01318	0.0
-0.01281	0.00139	0.02442	0.02258	0.06767	0.07757	-0.00863	0.0186	0.02191	-0.01444	-0.01199	-0.01678	-0.01297	-0.01297	-0.01663	-0.01137	-0.00971	-0.00858	-0.01573	-0.00926	-0.00645	-0.00126	0.01825	-0.00996	-0.00838	0.00183	-0.01178	0.0
-0.01281	0.00615	0.02442	0.02137	0.06503	0.10284	-0.00677	0.00739	0.00096	0.00496	0.00815	0.0067	0.01531	0.00046	0.00967	0.0076	0.01067	0.01418	0.01318	-0.00727	-0.00645	0.00125	0.02072	-0.00628	0.00238	0.00057	0.01064	0.0
-0.01281	0.00933	0.02442	0.02137	0.07629	0.0641	0.00068	0.00459	0.00191	0.00819	0.01651	0.01567	0.00975	0.01975	0.00967	0.01203	0.01407	-0.00035	0.01051	0.00516	0.00571	0.00678	0.02402	-0.00261	0.01358	0.01439	0.01344	0.0
-0.0128	0.01092	0.02442	0.02137	0.04714	0.04052	-0.00863	0.013	0.01762	-0.01404	-0.01237	-0.01166	-0.00186	-0.01339	-0.00996	-0.01338	-0.01353	0.00304	-0.00461	-0.00528	-0.0024	-0.00629	0.01825	-0.01521	-0.01312	0.00748	-0.00944	0.0
-0.0128	0.00774	0.02442	0.02137	0.08225	0.09779	-0.00444	-0.00942	-0.0057	0.00819	0.01803	0.01055	0.01127	0.01765	0.0132	0.01405	0.0128	0.00547	0.01362	0.01163	0.00774	0.01131	0.0232	0.01419	0.01401	0.00999	0.00597	0.0
-0.0128	0.0125	0.02442	0.02137	0.03257	0.06915	-0.0077	0.00739	0.01001	0.00334	-0.00477	0.01311	0.00016	0.00088	0.00103	0.00518	-0.00504	0.00304	-0.00061	-0.0008	0.0052	-0.00478	0.01661	-0.00471	0.0097	0.01501	0.00083	0.0
-0.0128	-0.00972	0.02334	0.02861	0.1041	0.03041	-0.00444	-0.00381	-0.00237	0.01102	0.01613	0.01055	0.01177	0.01472	0.01359	0.01203	0.00855	0.00982	0.01451	0.0156	0.01584	0.01432	0.02072	0.00999	0.01013	0.00622	0.00924	0.0
-0.0128	0.00139	0.02334	0.02137	0.08887	0.08263	-0.00444	-0.00661	-0.00427	0.01142	0.01689	0.00286	0.01177	0.01262	0.0132	0.01446	0.00728	0.00934	0.01318	0.01461	0.01331	0.01382	0.02402	0.01262	0.00927	0.00183	0.0097	0.0
-0.0128	0.00139	0.02334	0.02258	0.07562	0.09273	-0.00258	0.00459	0.00905	0.00091	0.00511	0.01012	0.01329	0.00423	0.00535	0.00477	0.01322	0.01418	0.00873	-0.00279	0.00014	-0.00076	0.01825	0.00107	0.01315	0.01439	0.0111	0.0
-0.0128	0.00139	0.02334	0.02137	0.08887	0.10284	-0.00444	-0.00101	0.00287	0.01627	0.01423	0.00414	0.01531	0.01975	0.01163	0.01688	0.01832	0.01467	0.01407	0.00417	0.00115	0.0098	0.01908	0.00632	0.01315	-0.00697	0.00317	0.0
-0.01279	0.00298	0.02334	0.02016	0.07893	0.05231	-0.00444	-0.02062	-0.01712	0.01466	0.01195	0.00158	0.01329	0.01304	0.01359	0.01607	0.01449	0.01224	0.0154	0.01461	0.01078	0.01533	0.01743	0.01524	0.00841	-0.00759	0.0055	-0.0
-0.01279	0.00139	0.02334	0.02378	0.09417	0.10284	0.00114	-0.00661	0.00382	0.01021	0.01271	0.00115	0.01531	0.00927	0.01516	0.01647	0.01407	0.01467	0.01629	0.00516	0.00216	0.01181	0.01249	0.01367	0.00583	-0.00069	0.00317	-0.0
-0.01279	0.00139	0.02334	0.02378	0.09417	0.06578	-0.00444	-0.00101	0.00096	0.01546	0.01309	-0.00013	0.01632	0.0143	0.01124	0.01567	0.01874	0.01709	0.01451	0.00516	0.00419	0.00779	0.02155	0.00894	0.01229	-0.00948	0.01344	-0.0
-0.01279	0.00139	0.02334	0.02137	0.08887	0.11126	-0.00584	-0.00942	-0.0076	0.01183	0.01271	-0.00184	0.0148	0.01346	0.01398	0.01768	0.01832	0.01467	0.01496	0.01212	0.0052	0.01432	0.01743	0.01524	0.01186	-0.00383	0.00737	-0.0
-0.01279	0.00615	0.02334	0.02016	0.07496	0.086	-0.00258	0.00739	0.00477	0.01102	0.01613	0.0114	0.00925	0.01807	0.00927	0.01324	0.01322	0.00547	0.01051	0.01411	0.01534	0.00628	0.02072	0.00317	0.01143	0.00873	0.00597	0.0

```
#NORMALIZING THE DATA THROUGH NATURAL LOGARITHMS  
logfifa = as.data.frame(lapply(numfifa, log))  
write.csv(logfifa, "2_log.csv", row.names = FALSE)
```


Sl..No.	Age	Overall	Potential	Value	Wage	Jersey.Nu	Height.in.	Weight.in.	Crossing	Finishing	HeadingA	ShortPass	Volleys	Dribbling	Curve	FKAccurac	LongPass	BallContr	Accelerati	SprintSpee	Agility	Reactions	Balance	ShotPower	Jumping	Stamina	Stre
#NAME?	3.43399	4.54329	4.54329	18.5205	13.2446	2.30259	5.13686	4.27835	4.43082	4.55388	4.2485	4.49981	4.45435	4.57471	4.5326	4.54329	4.46591	4.56435	4.51086	4.45435	4.51086	4.55388	4.55388	4.44265	4.21951	4.27667	4.0
0	3.49651	4.54329	4.54329	18.1593	12.9116	1.94591	5.23623	4.41893	4.43082	4.54329	4.48864	4.39445	4.46591	4.47734	4.39445	4.33073	4.34381	4.54329	4.48864	4.51086	4.46591	4.56435	4.2485	4.55388	4.55388	4.47734	4.3
0.69315	3.2581	4.52179	4.5326	18.5904	12.5776	2.30259	5.16627	4.22008	4.36945	4.46591	4.12713	4.43082	4.43082	4.56435	4.47734	4.46591	4.35671	4.55388	4.54329	4.49981	4.56435	4.54329	4.43082	4.38203	4.11087	4.39445	3.8
1.09861	3.29584	4.51086	4.5326	18.0922	12.4684	0	5.2629	4.33341	2.83321	2.56495	3.04452	3.91202	2.56495	2.89037	3.04452	2.94444	3.93183	3.73767	4.04305	4.06044	4.09434	4.49981	3.7612	3.43399	4.20469	3.7612	4.1
1.38629	3.29584	4.51086	4.52179	18.4405	12.7799	1.94591	5.19484	4.2464	4.5326	4.40672	4.00733	4.52179	4.40672	4.45435	4.44265	4.41884	4.51086	4.51086	4.35671	4.33073	4.36945	4.51086	4.34381	4.51086	4.14313	4.49981	4.3
1.60944	3.29584	4.51086	4.51086	18.3481	12.7367	2.30259	5.15167	4.30319	4.39445	4.43082	4.11087	4.48864	4.38203	4.55388	4.41884	4.36945	4.41884	4.54329	4.54329	4.47734	4.55388	4.49981	4.54329	4.40672	4.02535	4.41884	4.1
1.79176	3.46574	4.51086	4.51086	18.0202	12.948	2.30259	5.15167	4.19305	4.45435	4.27667	4.00733	4.5326	4.33073	4.49981	4.44265	4.35671	4.47734	4.5326	4.38203	4.27667	4.5326	4.49981	4.54329	4.36945	4.21951	4.48864	4.0
1.94591	3.43399	4.51086	4.51086	18.1975	13.0281	2.19722	5.20883	4.45647	4.34381	4.5326	4.34381	4.40672	4.47734	4.46591	4.45435	4.43082	4.15888	4.49981	4.45435	4.31749	4.40672	4.52179	4.41884	4.45435	4.23411	4.49981	4.4
2.07944	3.46574	4.51086	4.51086	17.7473	12.8479	2.70805	5.20883	4.40794	4.18965	4.09434	4.51086	4.35671	4.18965	4.14313	4.30407	4.27667	4.34381	4.43082	4.33073	4.31749	4.35671	4.44265	4.18965	4.36945	4.5326	4.43082	4.4
2.19722	3.21888	4.49981	4.5326	18.035	11.4511	0	5.23623	4.46694	2.56495	2.3979	2.70805	3.3673	2.56495	2.48491	2.56495	2.63906	3.2581	2.77259	3.7612	4.09434	4.20469	4.45435	3.89182	3.09104	4.33073	3.71357	4.3
2.30259	3.3673	4.49981	4.49981	18.1593	12.2308	2.19722	5.20883	4.37993	4.12713	4.51086	4.44265	4.41884	4.48864	4.44265	4.34381	4.45435	4.17439	4.48864	4.34381	4.35671	4.35671	4.49981	4.35671	4.47734	4.43082	4.35671	4.4
2.3979	3.3322	4.49981	4.49981	18.1528	12.7799	2.07944	5.20883	4.33341	4.47734	4.33073	3.98898	4.52179	4.40672	4.39445	4.45435	4.43082	4.5326	4.49981	4.15888	4.12713	4.2485	4.48864	4.26268	4.46591	3.4012	4.31749	4.2
2.48491	3.46574	4.49981	4.49981	17.5997	11.7361	2.30259	5.23623	4.35694	4.00733	3.73767	4.52179	4.36945	3.85015	3.97029	3.89182	3.93183	4.2485	4.33073	4.21951	4.21951	4.06044	4.44265	3.98898	4.20469	4.51086	4.18965	4.4
2.56495	3.46574	4.49981	4.49981	17.9099	12.5602	3.04452	5.15167	4.20666	4.43082	4.33073	3.98898	4.5326	4.40672	4.48864	4.40672	4.34381	4.46591	4.54329	4.2485	4.15888	4.52179	4.49981	4.49981	4.27667	4.15888	4.35671	3.9
2.63906	3.29584	4.48864	4.49981	17.9586	12.3239	2.56495	5.12182	4.27835	4.21951	4.17439	3.98898	4.45435	4.02535	4.36945	3.89182	3.89182	4.39445	4.38203	4.40672	4.35671	4.40672	4.5326	4.52179	4.26268	4.34381	4.56435	4.3
2.70805	3.17805	4.48864	4.54329	18.3041	12.2308	3.04452	5.18066	4.31539	4.40672	4.43082	4.21951	4.46591	4.47734	4.52179	4.47734	4.47734	4.31749	4.52179	4.46591	4.41884	4.51086	4.45435	4.44265	4.40672	4.31749	4.38203	4.1
2.77259	3.17805	4.48864	4.51086	18.2404	12.2308	2.19722	5.23623	4.48756	4.31749	4.54329	4.44265	4.38203	4.43082	4.38203	4.35671	4.21951	4.40672	4.43082	4.21951	4.27667	4.26268	4.51086	4.26268	4.47734	4.35671	4.48864	4.4
2.83321	3.29584	4.48864	4.49981	18.1722	11.8845	1.94591	5.16627	4.29085	4.40672	4.49981	4.43082	4.41884	4.46591	4.47734	4.43082	4.35671	4.33073	4.49981	4.47734	4.44265	4.49981	4.49981	4.38203	4.38203	4.49981	4.41884	4.1
2.89037	3.2581	4.48864	4.52179	17.876	12.3884	3.09104	5.23623	4.44055	2.70805	2.63906	2.3979	3.58352	2.63906	2.83321	2.89037	2.48491	3.73767	2.89037	3.63759	3.91202	3.61092	4.44265	3.7612	3.09104	4.36945	3.55535	4.3
2.94444	3.2581	4.48864	4.49981	17.7952	12.3884	0	5.28887	4.56603	2.63906	2.63906	2.56495	3.49651	2.48491	2.56495	2.94444	2.99573	3.55535	3.13549	3.82864	3.95124	4.11087	4.43082	3.80666	3.58352	4.21951	3.63759	4
2.99573	3.3673	4.48864	4.48864	17.7571	12.6603	1.60944	5.23623	4.33341	4.12713	4.20469	4.21951	4.48864	3.78419	4.38203	4.18965	4.21951	4.40672	4.47734	3.91202	3.95124	4.18965	4.46591	3.95124	4.11087	4.18965	4.45435	4.3
3.04452	3.43399	4.48864	4.48864	17.9099	12.2061	3.04452	5.22262	4.34524	4.2485	4.48864	4.48864	4.35671	4.49981	4.38203	4.34381	4.33073	3.95124	4.40672	4.31749	4.33073	4.34381	4.51086	4.07754	4.46591	4.47734	4.52179	4.3
3.09104	3.46574	4.48864	4.48864	17.4531	11.7753	0	5.2629	4.52265	2.70805	2.56495	3.21888	4.00733	2.3979	3.4012	2.63906	2.3979	4.07754	3.8712	3.98898	4.09434	3.93183	4.43082	3.55535	3.21888	4.34381	3.7612	4.3
3.13549	3.4012	4.48864	4.48864	17.9822	12.6115	2.30259	5.15167	4.2464	4.2485	4.5326	4.34381	4.39445	4.44265	4.48864	4.40672	4.29046	4.15888	4.48864	4.47734	4.38203	4.45435	4.49981	4.51086	4.47734	4.39445	4.33073	4.2
3.17805	3.49651	4.48864	4.48864	17.1113	12.2784	1.09861	5.23623	4.44055	4.06044	3.49651	4.41884	4.07754	3.80666	4.06044	4.09434	3.43399	4.07754	4.04305	4.14313	4.31749	3.98898	4.40672	4.00733	4.35671	4.48864	4.17439	4.4
3.21888	2.94444	4.47734	4.55388	18.21	11.5129	2.30259	5.18066	4.29085	4.34381	4.47734	4.34381	4.40672	4.35671	4.49981	4.34381	4.14313	4.29046	4.51086	4.56435	4.56435	4.52179	4.46591	4.41884	4.36945	4.31749	4.41884	4.2
3.2581	3.2581	4.47734	4.48864	18.0568	12.449	2.30259	5.16627	4.26569	4.35671	4.49981	4.07754	4.40672	4.29046	4.48864	4.41884	4.09434	4.27667	4.47734	4.54329	4.51086	4.51086	4.51086	4.47734	4.34381	4.21951	4.43082	4
3.29584	3.2581	4.47734	4.49981	17.9015	12.5602	2.63906	5.22262	4.4298	3.95124	4.07754	4.33073	4.44265	3.97029	4.23411	4.07754	4.30407	4.40672	4.35671	4.07754	4.17439	4.12713	4.43082	4.18965	4.45435	4.47734	4.46591	4.4
3.3322	3.2581	4.47734	4.48864	18.0568	12.6603	2.30259	5.19484	4.35694	4.49981	4.41884	4.12713	4.48864	4.49981	4.44265	4.48864	4.45435	4.41884	4.49981	4.29046	4.20469	4.41884	4.44265	4.33073	4.45435	3.98898	4.2485	4.2
3.3673	3.29584	4.47734	4.47734	17.9426	12.0137	2.30259	5.09105	4.07698	4.45435	4.34381	4.02535	4.44265	4.30407	4.49981	4.46591	4.34381	4.35671	4.5326	4.54329	4.45435	4.54329	4.41884	4.5326	4.31749	3.97029	4.31749	3.7
3.4012	3.2581	4.47734	4.51086	18.1128	12.6603	3.09104	5.16627	4.3685	4.31749	4.36945	4.00733	4.48864	4.17439	4.54329	4.47734	4.33073	4.41884	4.55388	4.31749	4.23411	4.46591	4.34381	4.49981				

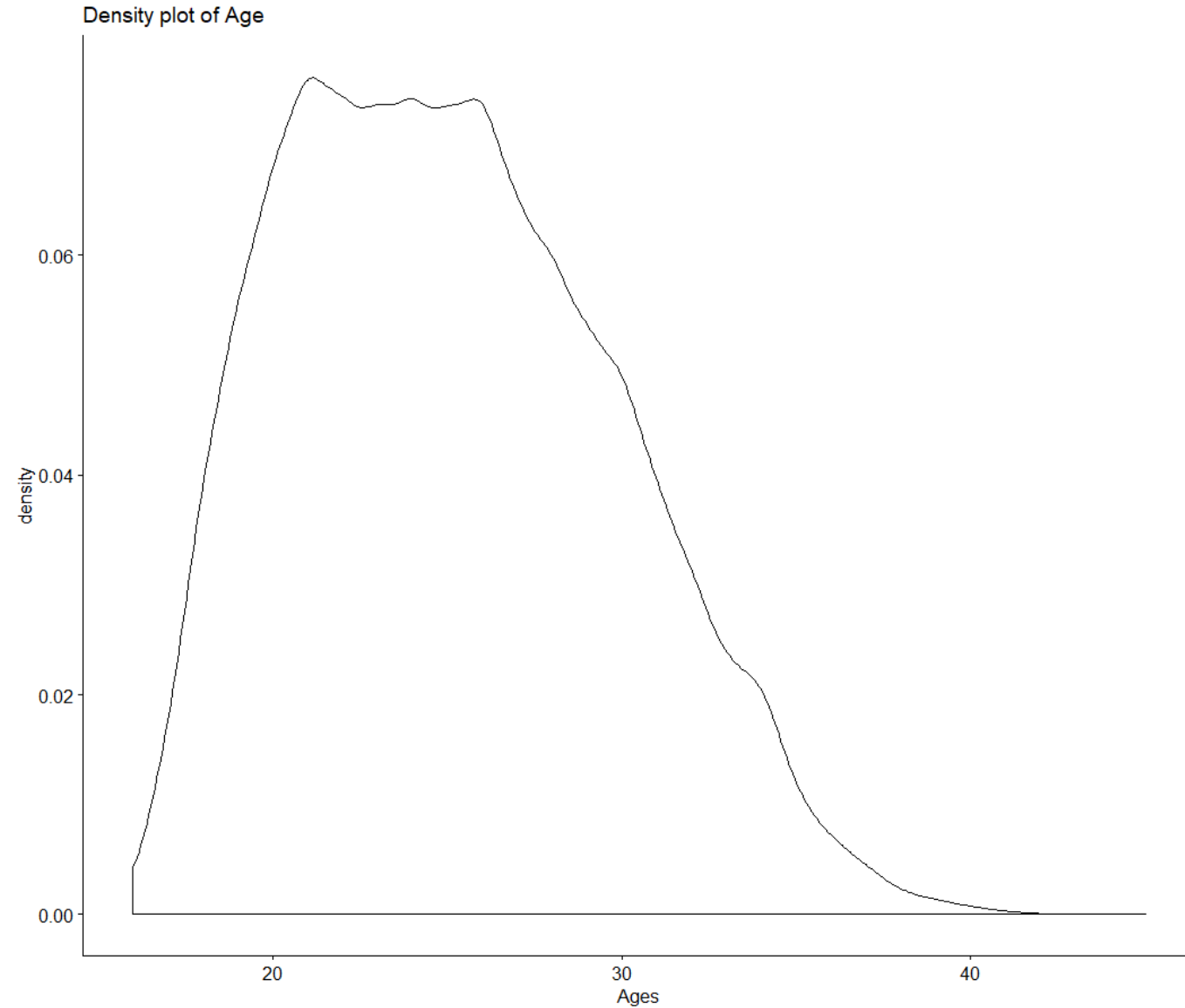
Normalization

Normality Test

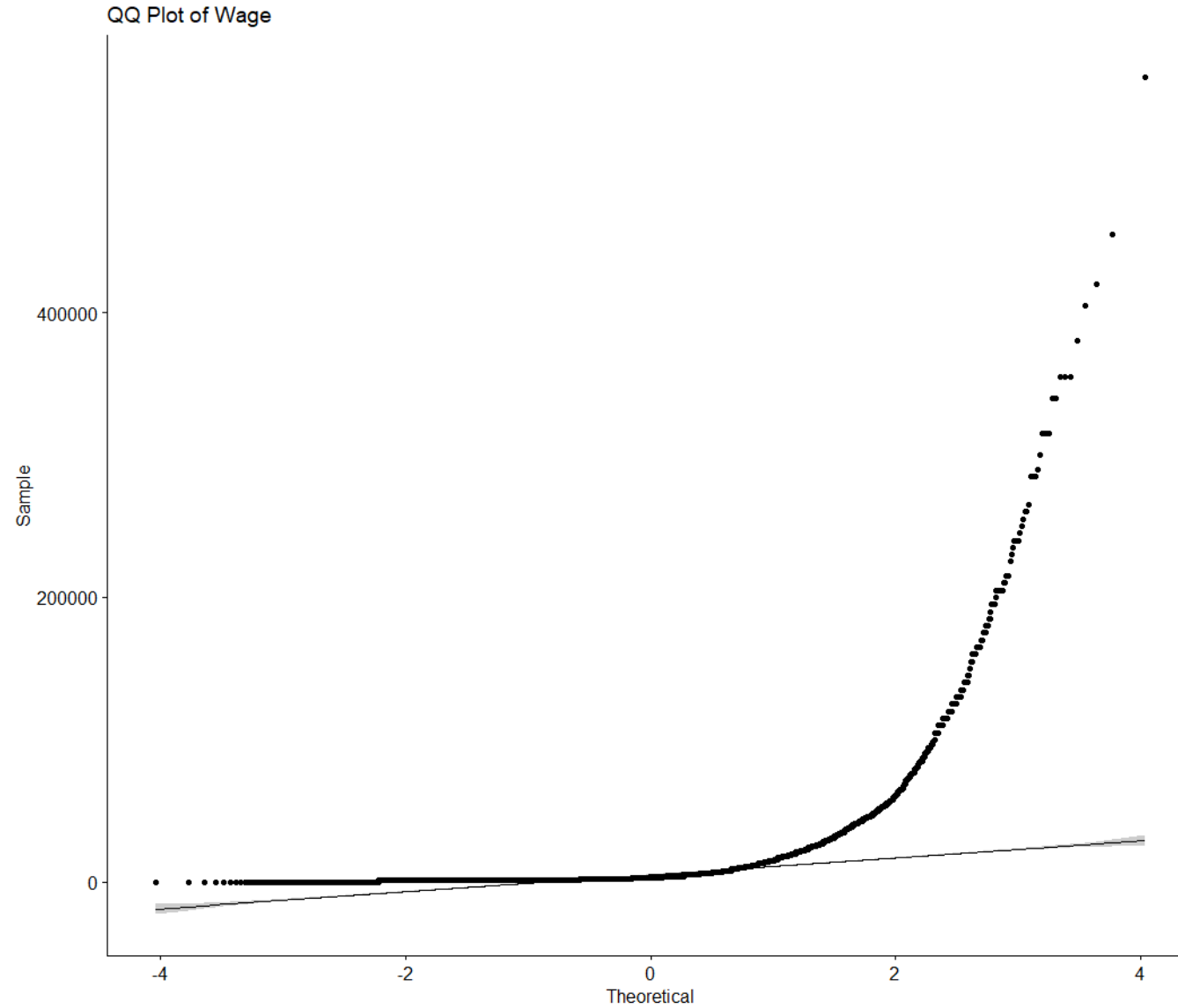
```
# This library is already loaded: library("dplyr")  
library("ggpubr")  
## Loading required package: ggplot2  
## Loading required package: magrittr
```

```
#DENSITY PLOT OF AGE
```

```
print(ggdensity(fifa$Age, main="Density plot of Age", xlab = "  
Ages"))
```



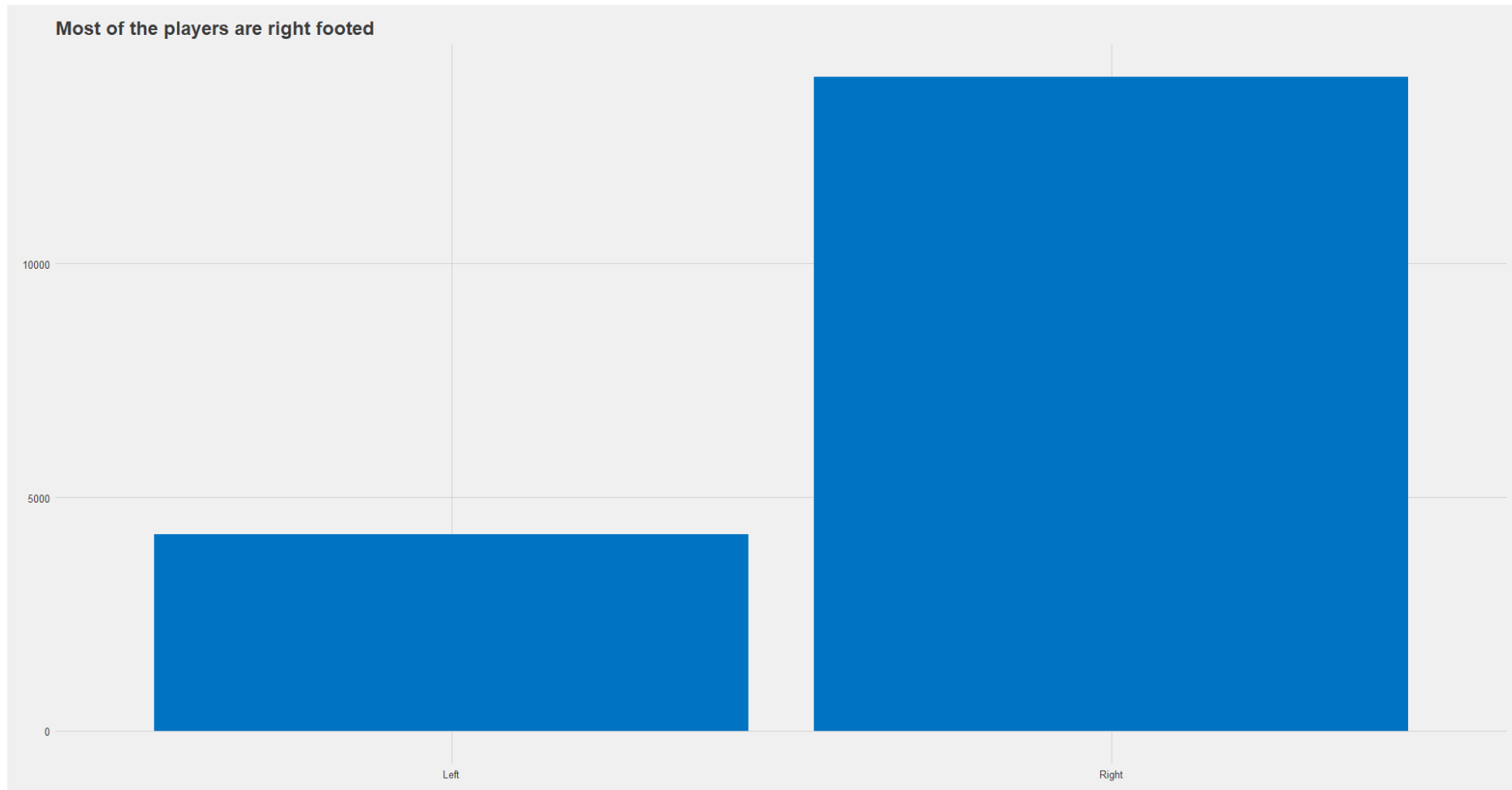
```
#QQ PLOT OF WAGE  
print(ggqqplot(fifa$Wage, main="QQ Plot of Wage"))
```



Graph Visualization

#FREQUENCY PLOT OF FOOT PREFERENCE

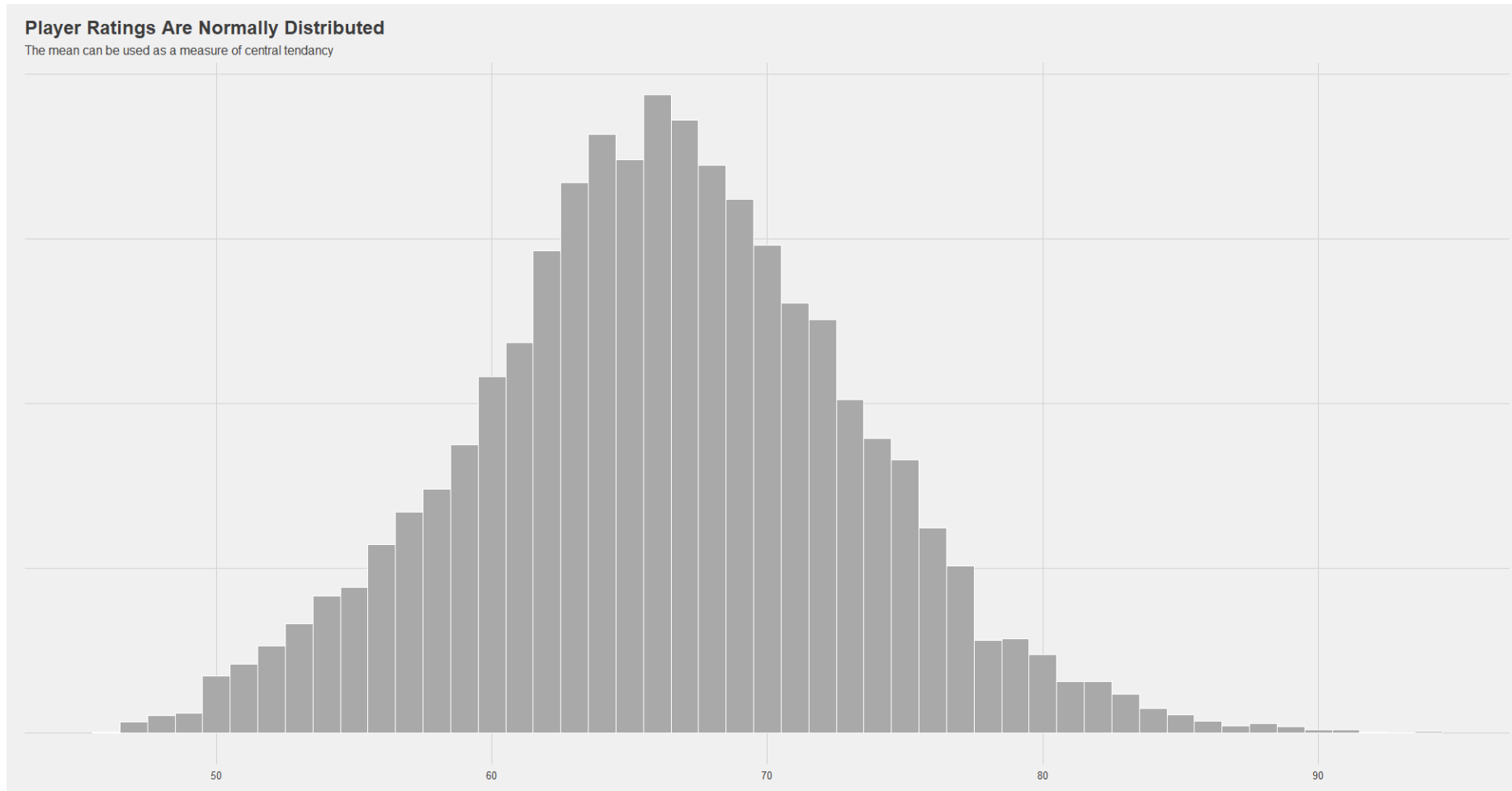
```
print(ggplot(fifa, aes(Preferred.Foot)) +geom_bar(fill = "#0073C2  
FF") + ggtitle("Most of the players are right footed") + theme_fi  
vethirtyeight())
```



```
#HISTOGRAM OF PLAYER RATING
```

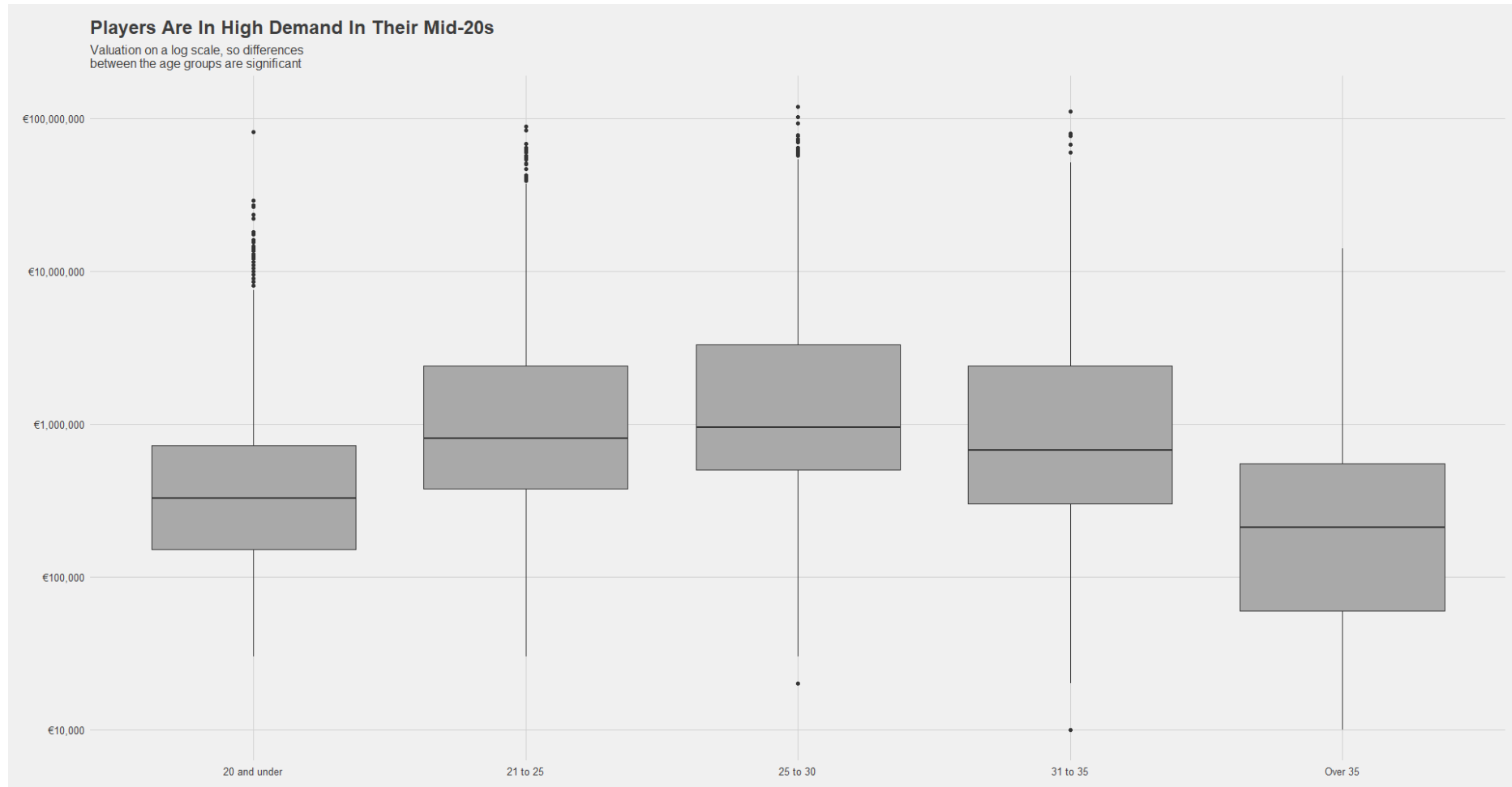
```
print(fifa %>%
```

```
  ggplot(aes(x= Overall)) + geom_histogram(color = "white", fill = "darkgrey", binwidth =  
1) + ggtitle("Player Ratings Are Normally Distributed", subtitle = "The mean can be used  
as a measure of central tendency") + theme_fivethirtyeight() + theme(axis.text.y = eleme  
nt_blank()))
```



#BOXPLOT OF AGE VS VALUE

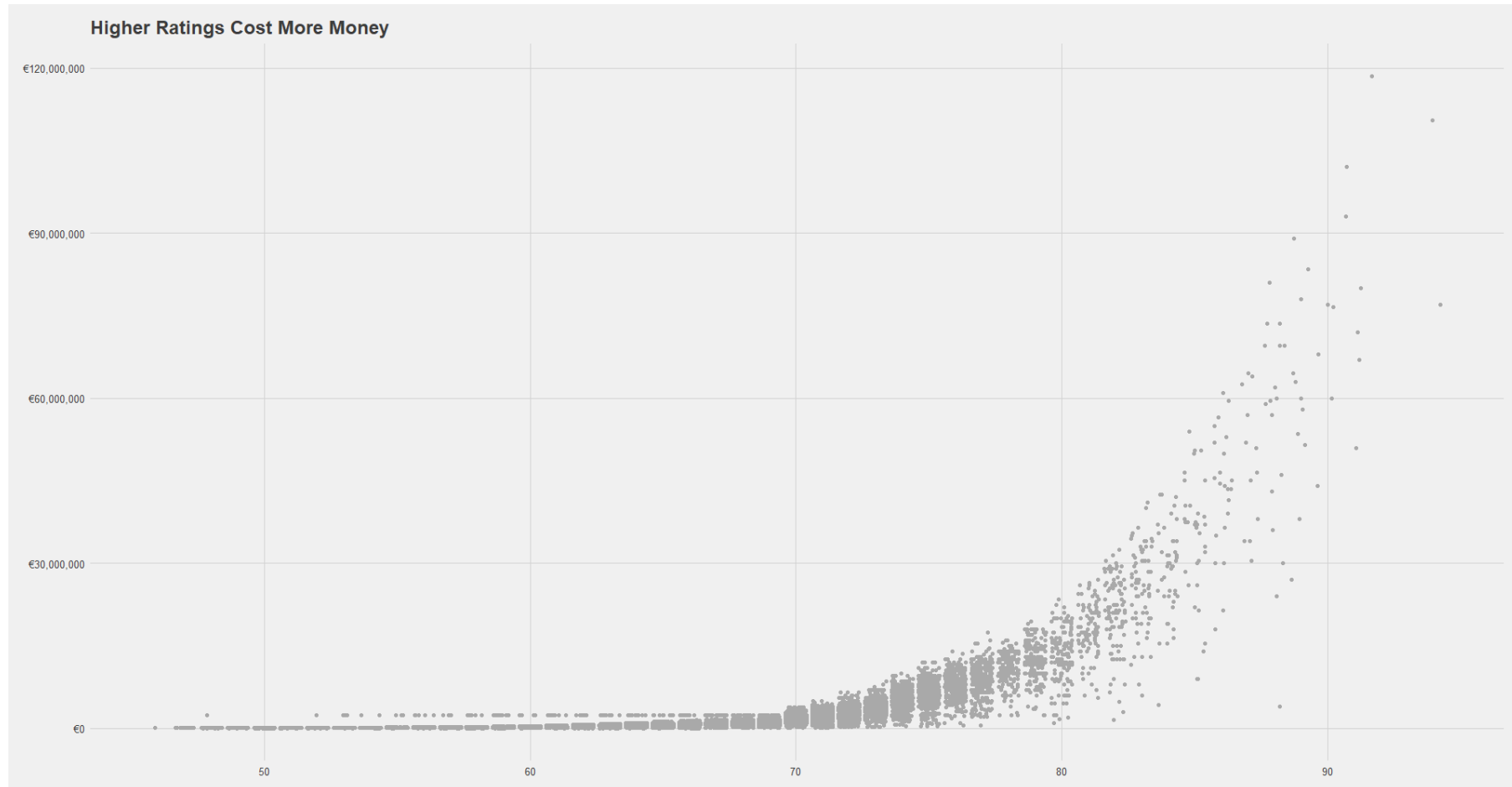
```
print(fifa %>%  
  ggplot(aes(x= AgeGroup, y= Value)) + geom_boxplot(fill = "darkgrey") +  
  scale_y_log10(labels = dollar_format(prefix = "€")) + ggtitle("Players Are In High Demand In  
Their Mid-20s", subtitle = "Valuation on a log scale, so differences \nbetween the age groups  
are significant") + theme_fivethirtyeight())
```



#SCATTERPLOT OF VALUE VS OVERALL RATING

```
print(fifa %>%
```

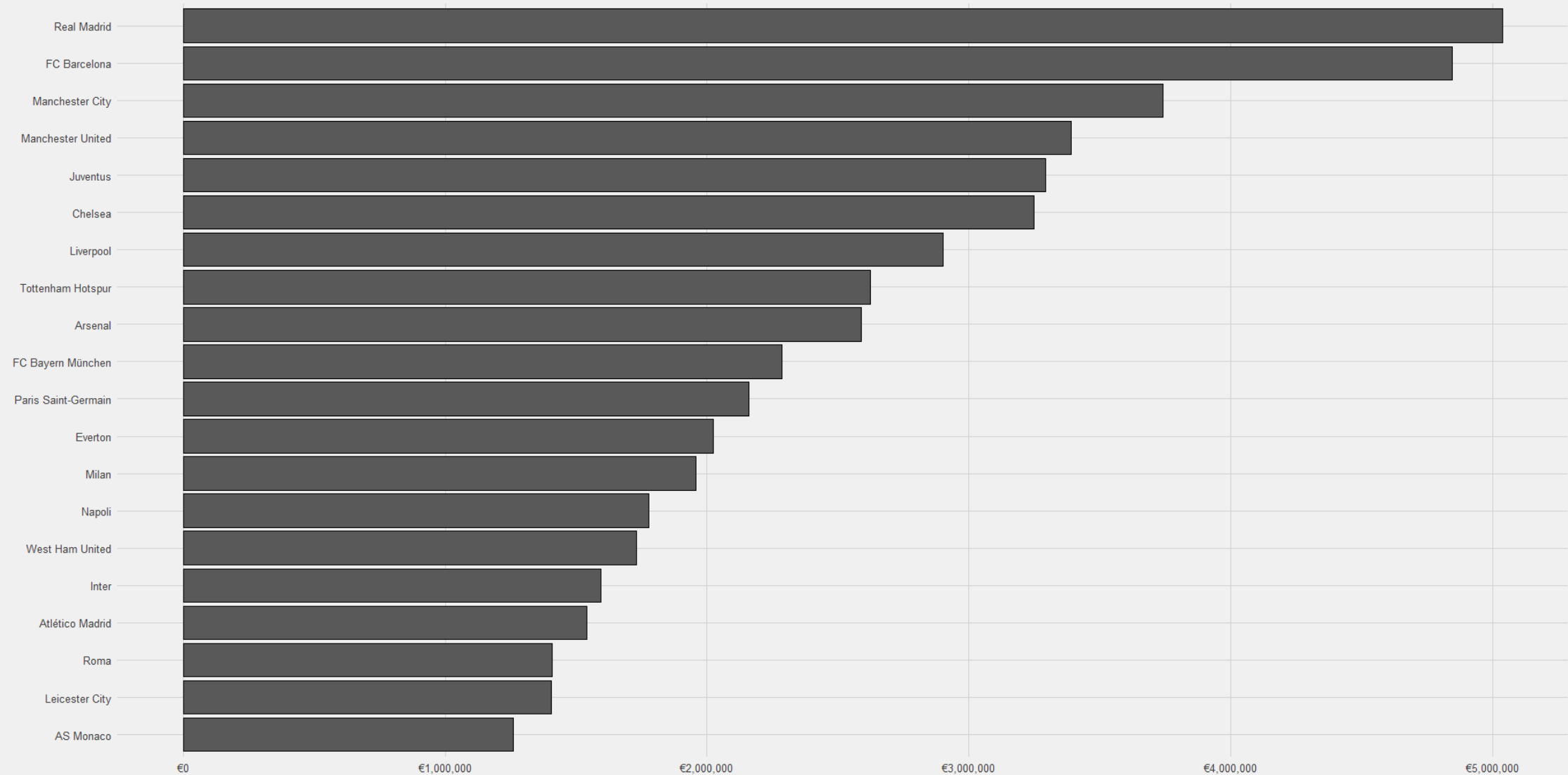
```
  ggplot(aes(x= Overall, y= Value)) + geom_point(position = "jitter", color = "darkgrey") + ggtitle("Higher Ratings Cost More Money") + scale_y_continuous(labels = dollar_format(prefix = "€")) + theme_fivethirtyeight())
```



FREQUENCY PLOT OF TEAM VS TOTAL WAGE

```
print(fifa %>%  
  group_by(Club) %>%  
  summarise(TotalWages = sum(Wage, na.rm = T),) %>%  
  arrange(desc(TotalWages)) %>% head(n= 20) %>%  
  ggplot(aes(x= reorder(Club, TotalWages), y= TotalWages)) +  
  geom_col(colour = "black") +  
  scale_y_continuous(labels = dollar_format(prefix = "€")) +  
  coord_flip() +  
  ggtitle("The 20 highest wage bills in FIFA19 and how much o  
ne rating point costs in wages") +  
  theme_fivethirtyeight() +  
  theme(legend.position = "none"))
```

The 20 highest wage bills in FIFA19 and how much one rating point costs in wages



Correlations & Simple Regression

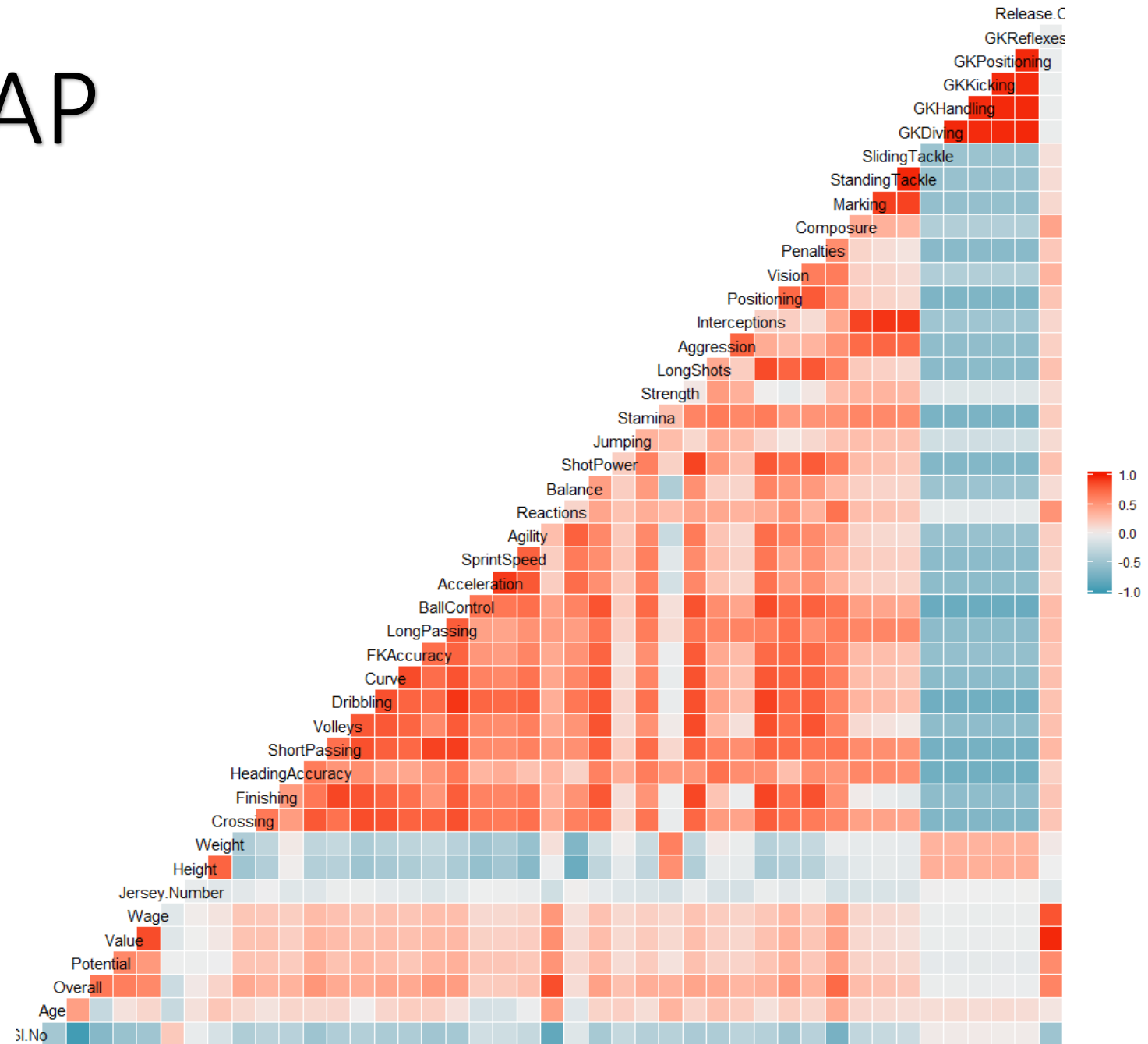
```
fifa = read.csv("1_cleaned_data.csv")
options(scipen = 999)
library("GGally")

## Loading required package: ggplot2
## Registered S3 method overwritten by 'GGally':
##   method from
##   +.gg      ggplot2

#HEAT MAP
print(ggcorr(fifa))

## Warning in ggcorr(fifa): data in column(s) 'Name', 'Nationality', 'Club',
## 'Preferred.Foot', 'Body.Type', 'Position' are not numeric and were ignored
```

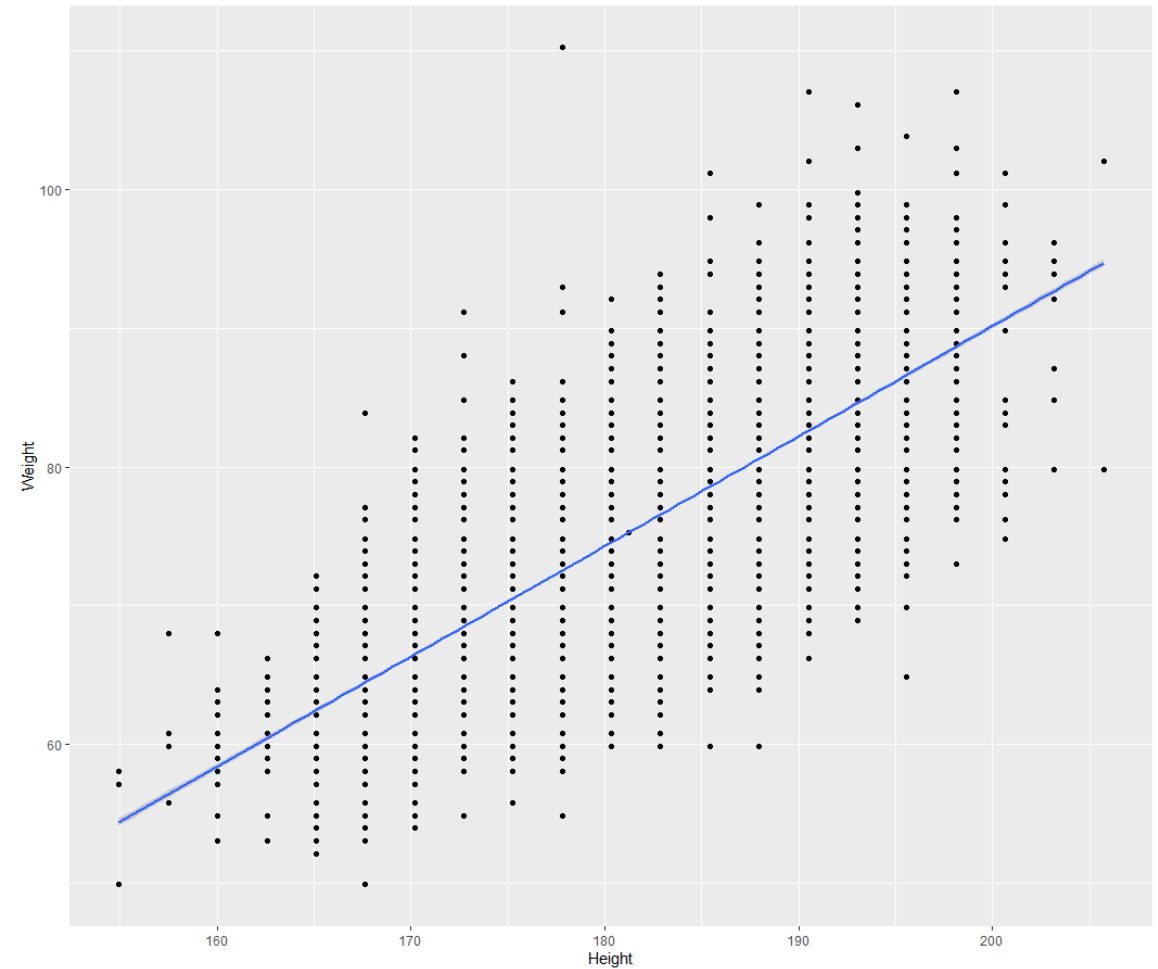
HEAT MAP



#SCATTER PLOT FOR HEIGHT VS WEIGHT

```
print(ggplot(fifa, aes(x=Height, y =Weight)) + geom_point() + geom_smooth(method = lm))
```

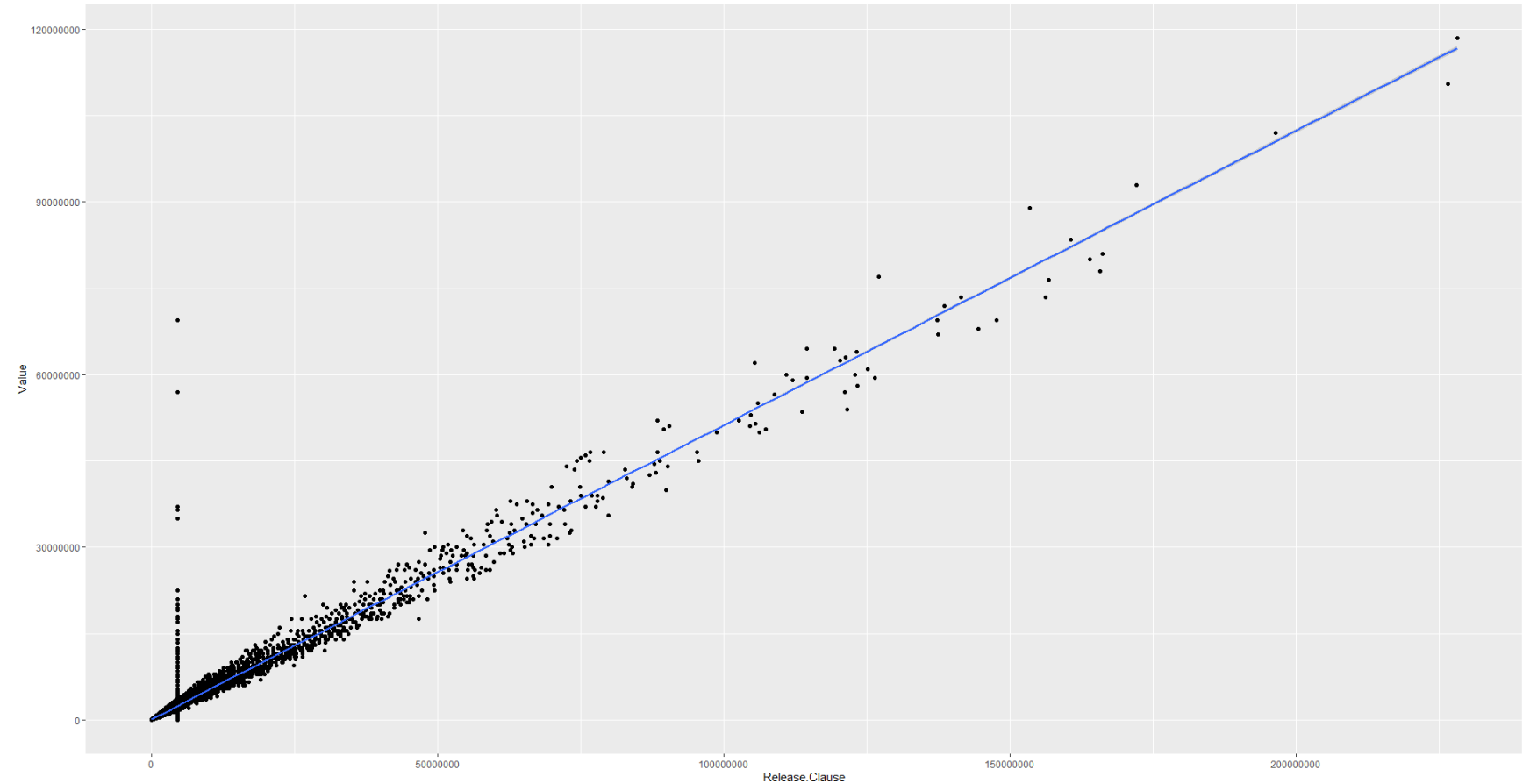
- Correlation:
 - Positive
 - Weak
 - Linear



#SCATTER PLOT

```
print(ggplot(fifa, aes(x=Release.Clause, y=Value)) + geom_jitter() + geom_smooth(
  method = lm))
```

- Correlation:
 - Positive
 - Strong
 - Linear

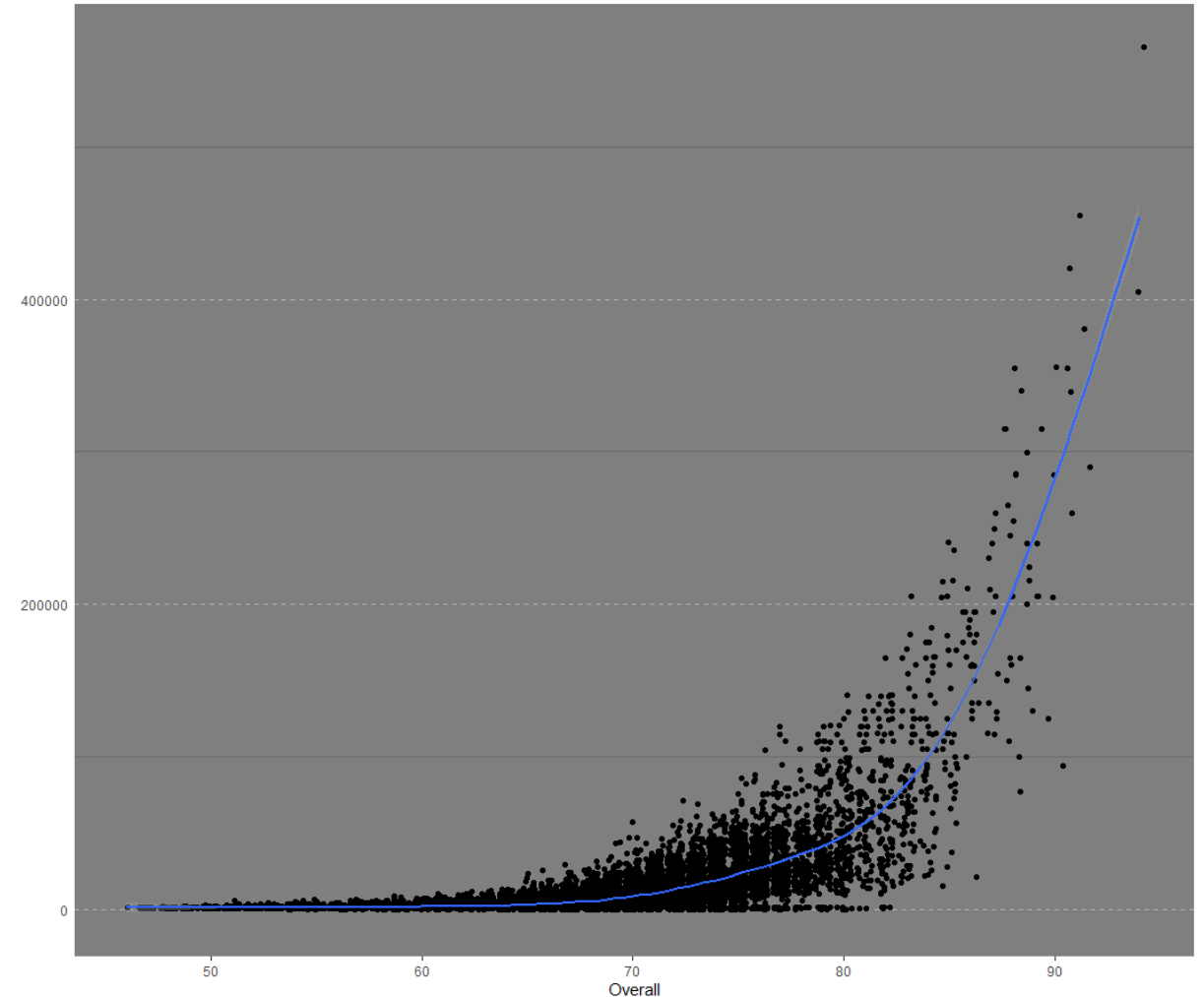


#SCATTER PLOT FOR OVERALL VS WAGE

```
print(ggplot(fifa, aes(x=Overall, y =Wage)) + geom_jitter()+geom_smooth()) +theme_cleveland  
( )
```

```
## `geom_smooth()` using method = 'gam' and formula 'y ~ s(x, bs = "cs")'
```

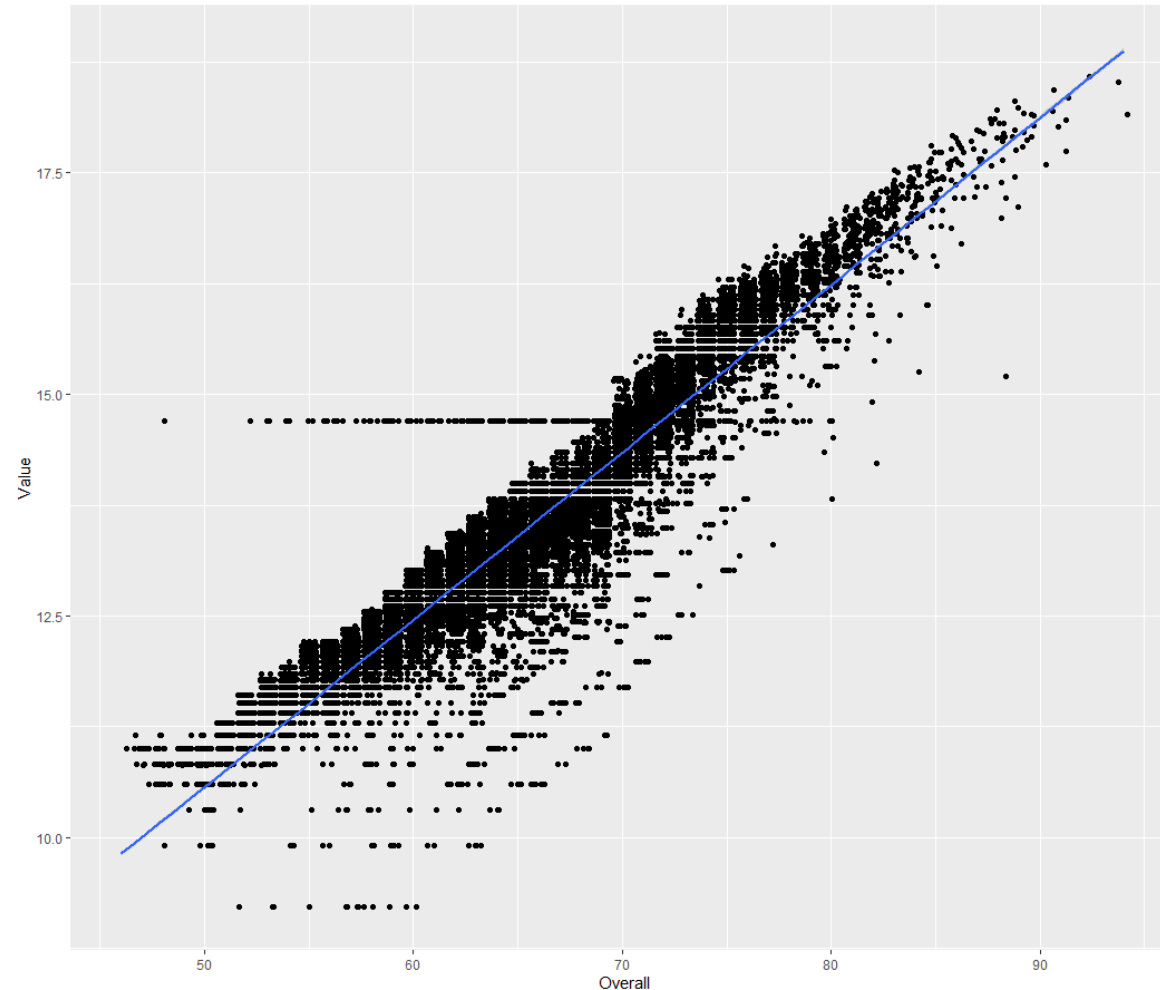
- Correlation:
 - Positive
 - Exponential



```
##CORRELATION
```

```
#SCATTER PLOT BETWEEN LOG(VALUE) VS OVERALL
```

```
print(ggplot(fifa, aes(x=Overall, y =unlist(lapply(lapply(fifa$Value, log), as.nu  
meric))))+ylab("Value") + geom_jitter()+geom_smooth(method = lm))
```



#PEARSON CORRELATION TEST

```
print(cor.test(unlist(lapply(lapply(fifa$Value, log), as.numeric)), fifa$Overall, method="pearson"))
```

```
##
```

```
## Pearson's product-moment correlation
```

```
##
```

```
## data: unlist(lapply(lapply(fifa$Value, log), as.numeric))  
and fifa$Overall
```

```
## t = 343.89, df = 18204, p-value < 0.00000000000000000022
```

```
## alternative hypothesis: true correlation is not equal to 0
```

```
## 95 percent confidence interval:
```

```
## 0.9289499 0.9328261
```

```
## sample estimates:
```

```
## cor
```

```
## 0.9309142
```

#CREATING THE TRAINING AND TEST DATA

```
set.seed(100)
trainingRows<-sample(1:nrow(fifa), 0.8*nrow(fifa))
trainingData<-fifa[trainingRows, ]
testData<-fifa[-trainingRows, ]
```

#FIT THE MODEL ON TRAINING DATA AND PREDICT ON TEST DATA

```
model = lm(log(Value)~Overall, data = trainingData)
predictedData = predict(model,testData)
predictedData = exp(predictedData)
```

#REVIEW DIAGNOSTIC MEASURES

summary(model)

```
##
## Call:
## lm(formula = log(Value) ~ Overall, data = trainingData)
##
## Residuals:
##      Min       10   Median       30      Max
## -3.2437 -0.2204  0.0497  0.3128  4.5086
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  1.117921   0.040926   27.32 <0.00000000000000002 ***
## Overall      0.188936   0.000614  307.69 <0.00000000000000002 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.5104 on 14562 degrees of freedom
## Multiple R-squared:  0.8667, Adjusted R-squared:  0.8667
## F-statistic: 9.467e+04 on 1 and 14562 DF,  p-value: < 0.00000000000000002
2
```

```

##CALCULATE PREDICTION ACCURACY AND ERROR RATES
diff = data.frame(cbind(actuals=testData$Value, predicted=predicted
Data))

#CORRELATION ACCURACY
correlation_accuracy<-cor(diff)
print(correlation_accuracy)

##           actuals predicted
## actuals    1.0000000  0.9395014
## predicted  0.9395014  1.0000000

#MIN-MAX ACCURACY CALCULATION
min_max_accuracy <-mean(apply(diff, 1, min)/apply(diff,1,max))
print(min_max_accuracy)

## [1] 0.7325135

```