

Data Analytics

IPL Data Analysis – Assignment - 2

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```
> library(tidyr)
> library(dplyr)
> library(ggplot2)
> library(knitr)
>
> batsmen <- read.csv("C:/Users/Ashish/Desktop/R2/batsmen.csv")
> batsmen
>
> ##-----Descriptive statistics-----##
> #---Minimum-----#
> min(batsmen$Mat)
[1] 50
> min(batsmen$Inns)
[1] 50
> min(batsmen$NO)
[1] 2
> min(batsmen$Runs)
[1] 1441
>
> min(batsmen$HS)
[1] 48
> min(batsmen$Ave)
[1] 20.72
>
> #---Maximum-----#
> max(batsmen$Mat)
[1] 193
> max(batsmen$Inns)
[1] 189
> max(batsmen$NO)
[1] 65
> max(batsmen$Runs)
[1] 5412
> max(batsmen$HS)
[1] 177
> max(batsmen$Ave)
[1] 43.17
> max(batsmen$BF)
[1] 4112
>
> #---Mean-----#
> mean(batsmen$Mat)
[1] 113.96
> mean(batsmen$Inns)
[1] 105.98
> mean(batsmen$NO)
[1] 17.7
> mean(batsmen$Runs)
[1] 2722.6
> mean(batsmen$HS)
[1] 111.98
> mean(batsmen$Ave)
[1] 30.819
>
> #---Variance-----#
> var(batsmen$Mat)
[1] 1687.713
> var(batsmen$Inns)
[1] 1487.163
> var(batsmen$NO)
```

```

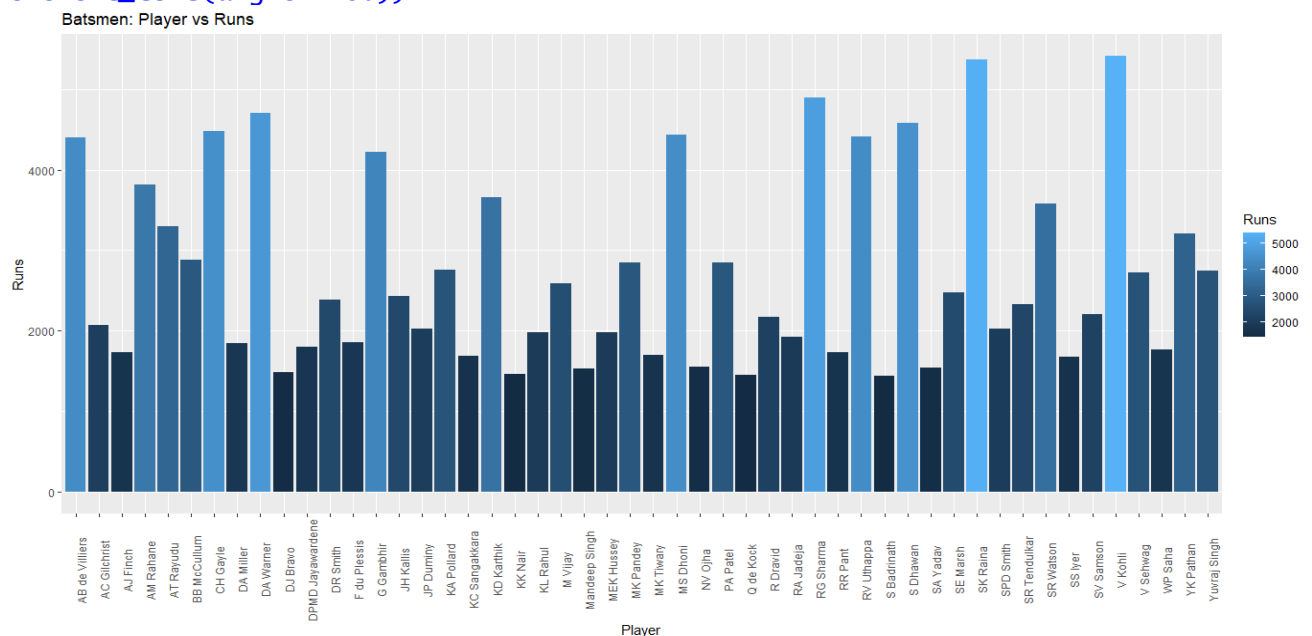
[1] 169.0306
> var(batsmen$Runs)
[1] 1363186
> var(batsmen$HS)
[1] 697.7751
> var(batsmen$Ave)
[1] 33.42009
>
> #---Standard Deviation-----#
> sd(batsmen$Mat)
[1] 41.08178
> sd(batsmen$Inns)
[1] 38.56375
> sd(batsmen$NO)
[1] 13.00118
> sd(batsmen$Runs)
[1] 1167.556
> sd(batsmen$HS)
[1] 26.41543
>
> ##-----Bowlers-----##
>
> #---Taking bowlers data-----#
> bowler<-read.csv("C:/Users/Ashish/Desktop/R2/bowler.csv")
>
> #---Find Minimum-----#
> min(bowler$Mat)
[1] 45
> min(bowler$Inns)
[1] 45
> min(bowler$Overs)
[1] 163.3
> min(bowler$Mdns)
[1] 0
> min(bowler$Runs)
[1] 1193
> min(bowler$Wkts)
[1] 47
>
> #---Find Maximum-----#
> max(bowler$Mat)
[1] 170
> max(bowler$Inns)
[1] 157
> max(bowler$Overs)
[1] 562.2
> max(bowler$Mdns)
[1] 14
> max(bowler$Runs)
[1] 4072
> max(bowler$Wkts)
[1] 170
>
> #---Find Mean-----#
> mean(bowler$Mat)
[1] 91.59184
> mean(bowler$Inns)
[1] 88.02041
> mean(bowler$Overs)
[1] 305.8163
> mean(bowler$Mdns)
[1] 3.265306
> mean(bowler$Runs)
[1] 2363.02
> mean(bowler$Wkts)
[1] 88.16327
>
> #---Find Variance-----#
> var(bowler$Mat)

```

```

[1] 1037.163
> var(bowler$Inns)
[1] 841.1037
> var(bowler$Overs)
[1] 10362.76
> var(bowler$Mdns)
[1] 8.365646
> var(bowler$Runs)
[1] 530165.7
> var(bowler$Wkts)
[1] 936.0978
>
> #---Find Standard Deviation-----#
> sd(bowler$Mat)
[1] 32.20502
> sd(bowler$Inns)
[1] 29.00179
> sd(bowler$Overs)
[1] 101.7976
> sd(bowler$Mdns)
[1] 2.892343
> sd(bowler$Runs)
[1] 728.1248
> sd(bowler$Wkts)
[1] 30.59572
>
> #---Bar Plot of Batsmen vs Runs
> ggplot(batsmen) + geom_bar(aes(Runs,Player, fill = Runs), stat = 'identity')
+ coord_flip()+ labs(title="Batsmen: Player vs Runs") + theme(axis.text.x =
  element_text(angle = 90))

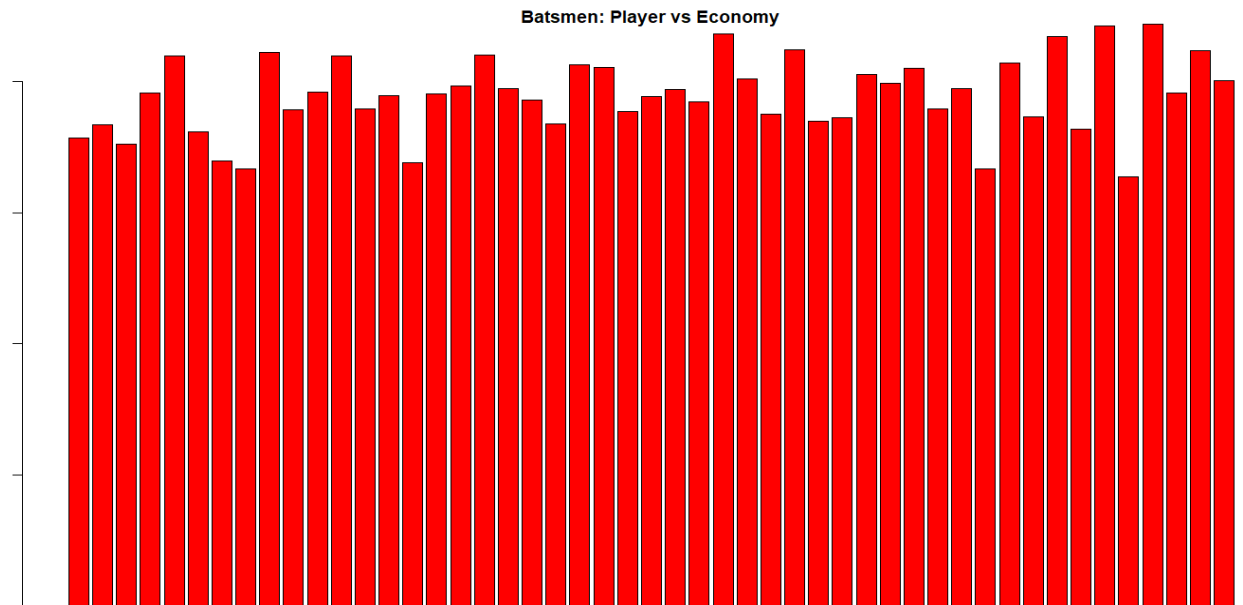
```



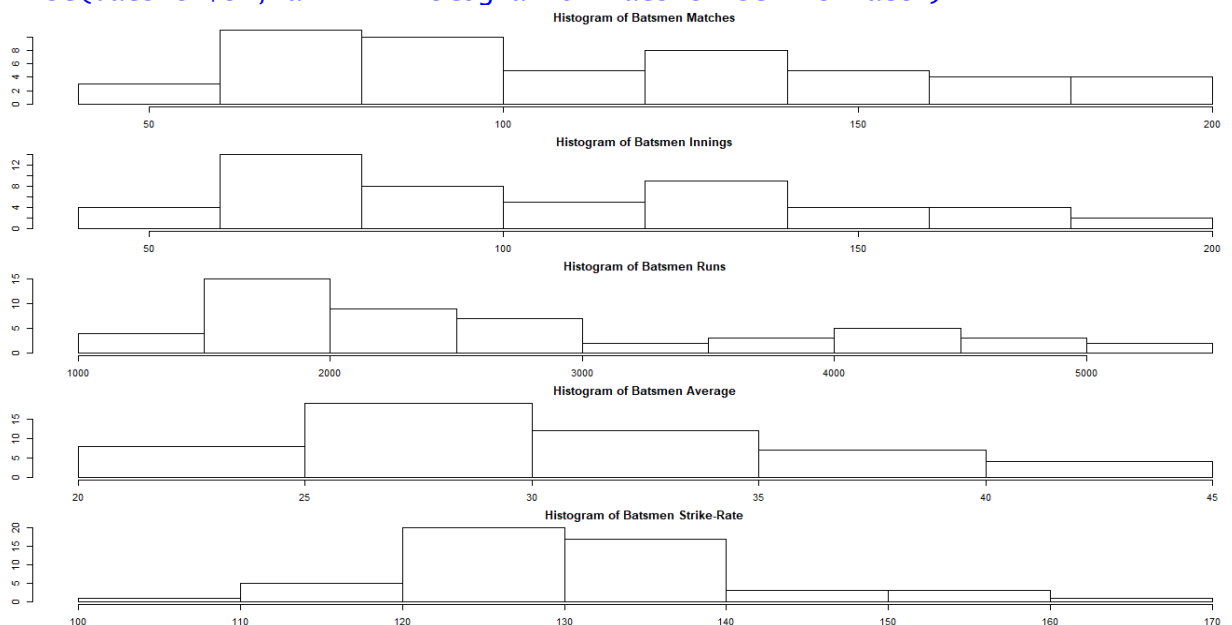
```

>
>
>
> #---Bar Plot of Batsmen: Player vs Economy
> barplot(bowler$Econ,col = "red", pch = 19, main = "Batsmen: Player vs Economy",
  xlab = "Player", ylab = "Economy")

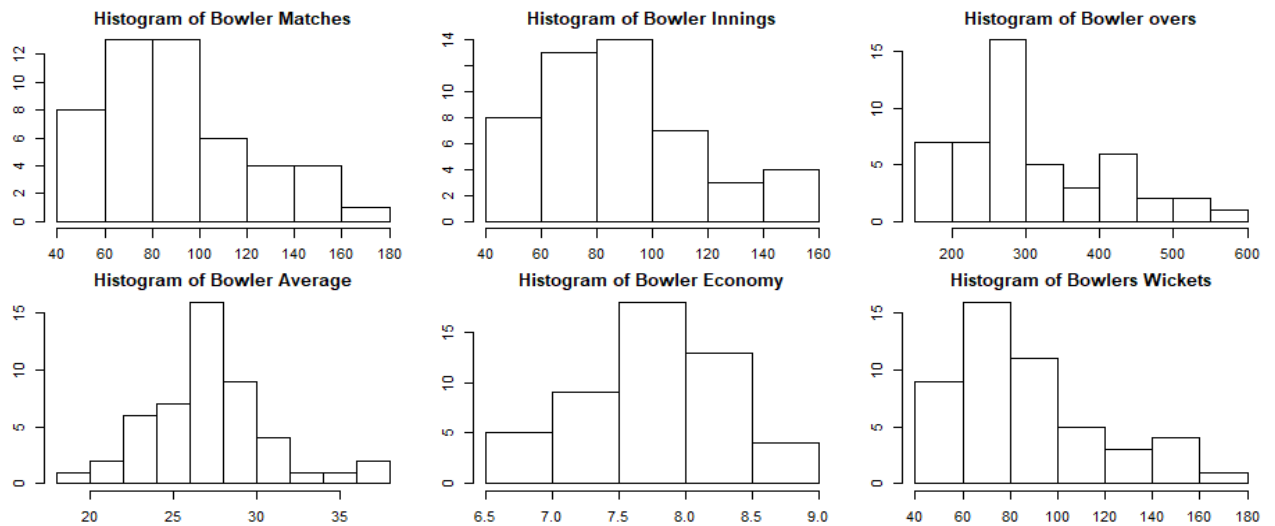
```



```
>
> #---Histogram for Batsmen
> par(mfrow = c(5, 1))
> par(mar = rep(2, 4))
> hist(batsmen$Mat,main = "Histogram of Batsmen Matches")
> hist(batsmen$Inns,main = "Histogram of Batsmen Innings")
> hist(batsmen$Runs,main = "Histogram of Batsmen Runs")
> hist(batsmen$Ave,main = "Histogram of Batsmen Average")
> hist(batsmen$SR,main = "Histogram of Batsmen Strike-Rate")
```

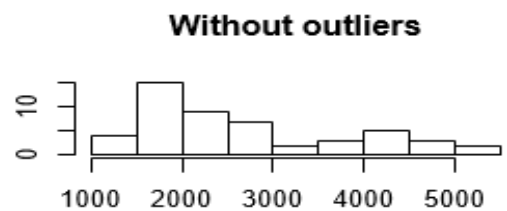
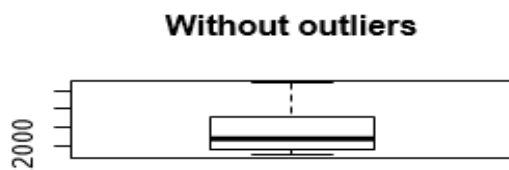
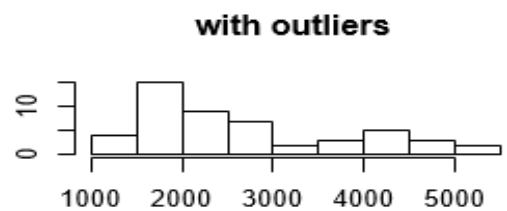
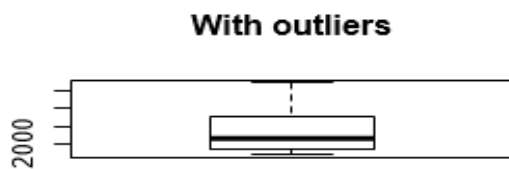


```
>
> #---Histogram for Bowlers Data
> par(mfrow = c(3, 3))
> par(mar = rep(2, 4))
> hist(bowler$Mat,main = "Histogram of Bowler Matches")
> hist(bowler$Inns,main = "Histogram of Bowler Innings")
> hist(bowler$Overs,main = "Histogram of Bowler overs")
> hist(bowler$Ave,,main = "Histogram of Bowler Average")
> hist(bowler$Econ,main = "Histogram of Bowler Economy")
> hist(bowler$wkts,main = "Histogram of Bowlers Wickets")
```



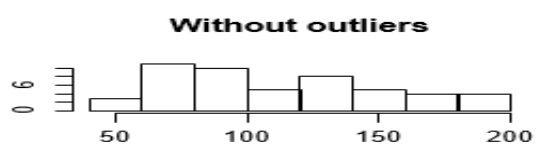
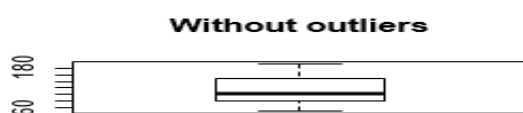
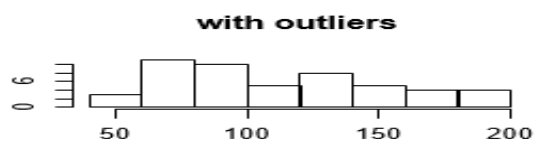
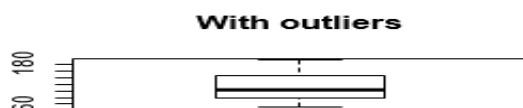
```
>
> #---Detecting Outliers from Batsmen
> outlierKD(batsmen,Runs)
```

Outlier Check



```
>
>
> #---Detecting Outliers from Batsman Matches
> outlierKD(batsman, mat)
```

Outlier Check

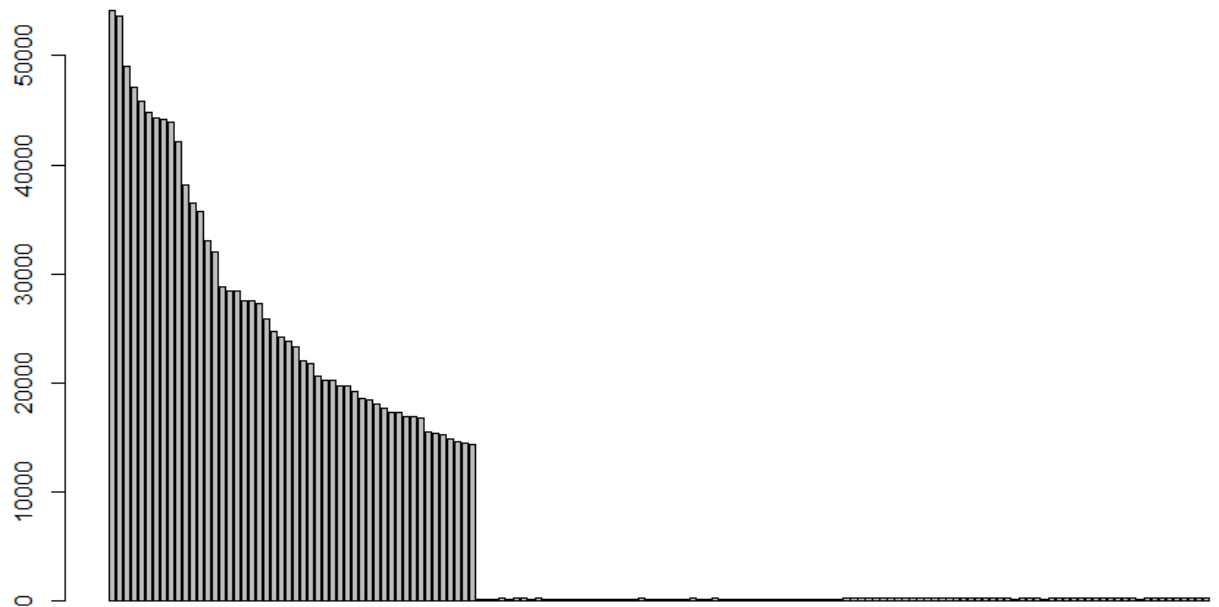


```
>
```

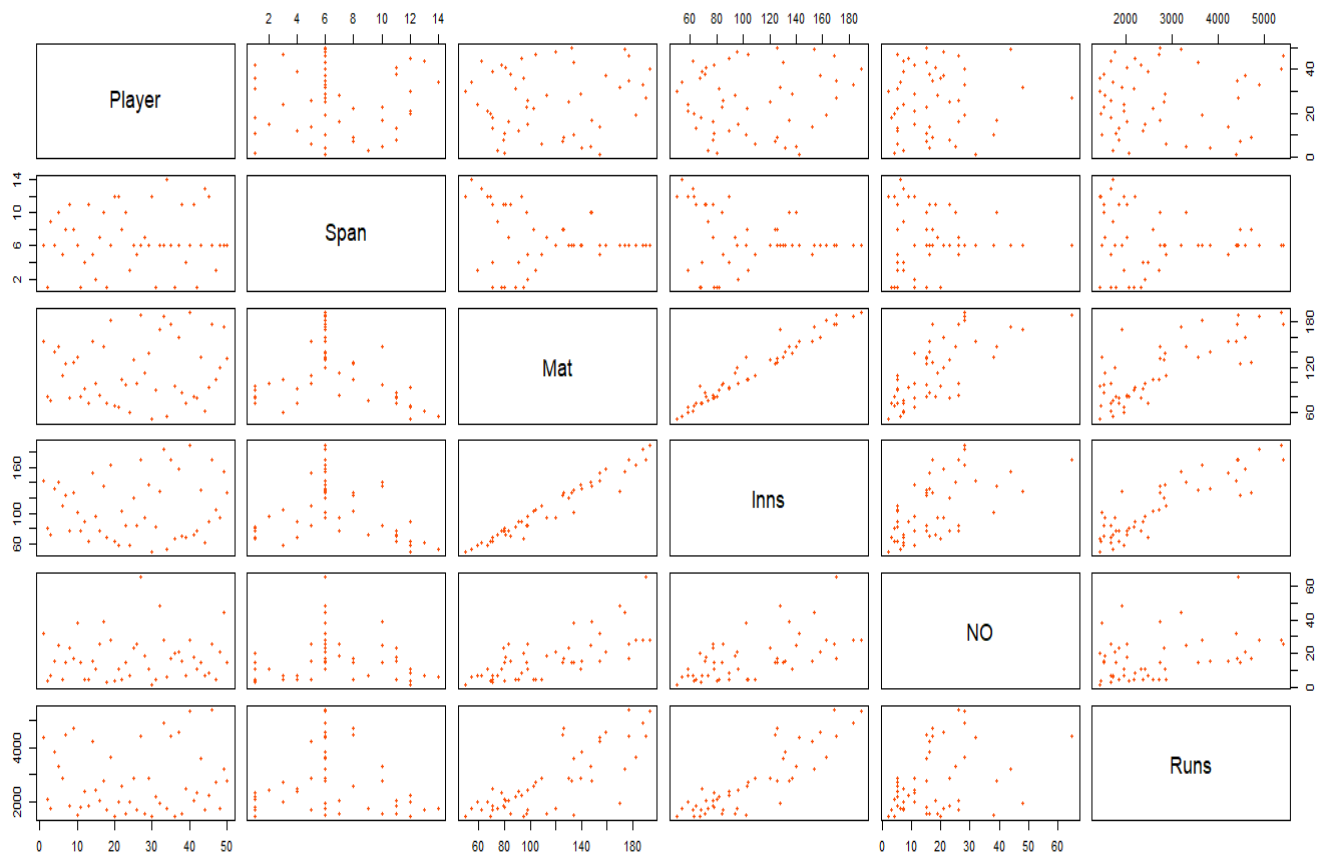
```

>
> data <- read.csv("C:/Users/Ashish/Desktop/R2/batsmen.csv")
> data
  X      Player      Span Mat Inns NO Runs HS Ave BF SR x100 x50 x0 x4s x6s
1 1      V Kohli 2008-2019 177 169 26 5412 113 37.84 4112 131.61 5 36 6 480 190
2 2      SK Raina 2008-2019 193 189 28 5368 100 33.34 3915 137.11 1 38 8 493 194
3 3      RG Sharma 2008-2019 188 183 28 4898 109 31.60 3744 130.82 1 36 12 431 194
4 4      DA Warner 2009-2019 126 126 17 4706 126 43.17 3305 142.39 4 44 7 458 181
5 5      S Dhawan 2008-2019 159 158 21 4579 95 33.42 3669 124.80 0 37 6 524 96
6 6      CH Gayle 2009-2019 125 124 15 4484 134 41.13 2969 151.02 6 28 7 368 326
7 7      MS Dhoni 2008-2019 190 170 65 4432 134 42.20 3215 137.85 0 23 3 297 209
8 8      RV Uthappa 2008-2019 177 170 17 4411 134 28.83 3380 130.50 0 24 7 435 156
9 9      AB de villiers 2008-2019 154 142 32 4395 133 39.95 2906 151.23 3 33 8 357 212
10 10      G Gambhir 2008-2018 154 152 16 4217 93 31.00 3404 123.88 0 36 12 492 59
11 11      AM Rahane 2008-2019 140 132 16 3820 102 32.93 3133 121.92 2 27 11 404 74
12 12      KD Karthik 2008-2019 182 163 28 3654 142 27.06 2815 129.80 0 18 8 357 101
13 13      SR Watson 2008-2019 134 130 15 3575 155 31.08 2562 139.53 4 19 7 343 177
14 14      AT Rayudu 2010-2019 147 140 25 3300 143 28.69 2620 125.95 1 18 12 278 120
15 15      YK Pathan 2008-2019 174 154 44 3204 100 29.12 2241 142.97 1 13 9 262 158
16 16      BB McCullum 2008-2018 109 109 5 2880 153 27.69 2186 131.74 2 13 6 293 130
17 17      PA Patel 2008-2019 139 137 11 2848 81 22.60 2358 120.78 0 13 13 365 49
18 18      MK Pandey 2008-2019 130 120 23 2843 109 29.30 2353 120.82 1 15 12 253 75
19 19      KA Pollard 2010-2019 148 135 39 2755 83 28.69 1877 146.77 0 14 3 181 176
20 20      Yuvraj Singh 2008-2019 132 126 15 2750 83 24.77 2120 129.71 0 13 4 217 149
21 21      V Sehwag 2008-2015 104 104 5 2728 122 27.55 1755 155.44 2 16 7 334 106
22 22      M Vijay 2009-2019 103 103 5 2587 127 26.39 2106 122.83 2 13 5 243 91
23 23      SE Marsh 2008-2017 71 69 7 2477 115 39.95 1866 132.74 1 20 1 266 78
24 24      JH Kallis 2008-2014 98 96 11 2427 98 28.55 2222 109.22 0 17 9 255 44
25 25      DR Smith 2008-2017 91 89 5 2385 57 28.39 1764 135.20 0 17 8 245 117
26 26      SR Tendulkar 2008-2013 78 78 11 2334 109 34.83 1948 119.81 1 13 4 295 29
> Bpoints<-((data$Runs*10)+(data$Ave*6)+(data$SR*2)+(data$Fours*9)+(data$Sixes*11)
+ (data$HF*9))
> Bpoints
numeric(0)
>
> data1 <- read.csv("C:/Users/Ashish/Desktop/R2/bowler.csv")
> data1
  X      Player      Span Mat Inns Overs Mdns Runs Wkts BBI Ave Econ SR X4 X5
1 1      SL Malinga 2009-2019 122 122 471.1 8 3366 170 5/13 19.80 7.14 16.6 6 1
2 2      A Mishra 2008-2019 147 147 516.5 6 3795 157 5/17 24.17 7.34 19.7 3 1
3 3      Harbhajan Singh 2008-2019 160 157 562.2 6 3967 150 5/18 26.44 7.05 22.4 1 1
4 4      PP Chawla 2008-2019 157 156 520.4 2 4072 150 4/17 27.14 7.82 20.8 2 0
5 5      DJ Bravo 2008-2019 134 131 430.5 2 3618 147 4/22 24.61 8.39 17.5 2 0
6 6      B Kumar 2011-2019 117 117 435.2 8 3154 133 5/19 23.71 7.24 19.6 2 1
7 7      R Ashwin 2009-2019 139 136 487.2 4 3309 125 4/34 26.47 6.79 23.3 1 0
8 8      SP Narine 2012-2019 110 109 426.1 3 2845 122 5/19 23.31 6.67 20.9 6 1
9 9      UT Yadav 2010-2019 119 118 413.2 3 3496 119 4/24 29.37 8.45 20.8 2 0
10 10      RA Jadeja 2008-2019 170 142 415.5 1 3152 108 5/16 29.18 7.57 23.1 3 1
11 11      A Nehra 2008-2017 88 88 318.0 2 2495 106 4/10 23.53 7.84 18.0 1 0
12 12      R Vinay Kumar 2008-2018 105 104 353.3 1 2966 105 4/40 28.24 8.39 20.2 1 0
13 13      Z Khan 2008-2017 100 99 366.4 5 2782 102 4/17 27.27 7.58 21.5 1 0
14 14      YS Chahal 2013-2019 84 83 297.5 3 2318 100 4/25 23.18 7.78 17.8 2 0
15 15      DW Steyn 2008-2019 92 92 351.0 7 2375 96 3/8 24.73 6.76 21.9 0 0
16 16      Sandeep Sharma 2013-2019 79 79 290.5 8 2272 95 4/20 23.91 7.81 18.3 2 0
17 17      SR Watson 2008-2019 134 105 338.1 3 2682 92 4/29 29.15 7.93 22.0 1 0
18 18      MM Sharma 2013-2019 85 85 288.2 0 2425 91 4/14 26.64 8.41 19.0 1 0
19 19      RP Singh 2008-2016 82 82 295.5 2 2338 90 4/22 25.97 7.90 19.7 2 0
> data1$bat = "Bpoints"
> data1[with(data1, order("bat")),]
  X      Player      Span Mat Inns Overs Mdns Runs Wkts BBI Ave Econ SR X4 X5
1 1      SL Malinga 2009-2019 122 122 471.1 8 3366 170 5/13 19.8 7.14 16.6 6 1
>
>
> rum1 <- data1[order(data1$bat, decreasing = TRUE),]
>
> poin <- c((data$Runs*10), (data$Ave*6), (data$SR*2), (data$Fours*9),
+ (data$Sixes*11), (data$HF*9))
> barplot(poin)

```



```
>
> pairs(data[,2:7], pch=20, col="#FC4E07")
```



```
> d <- data[-1,-1]
> head(d)
> head(d)
```

	Player	Span	Mat	Inns	NO	Runs	HS	Ave	BF	SR	x100	x50	x0	x4s	x6s
2	SK Raina	2008-2019	193	189	28	5368	100	33.34	3915	137.11	1	38	8	493	194
3	RG Sharma	2008-2019	188	183	28	4898	109	31.60	3744	130.82	1	36	12	431	194
4	DA Warner	2009-2019	126	126	17	4706	126	43.17	3305	142.39	4	44	7	458	181
5	S Dhawan	2008-2019	159	158	21	4579	95	33.42	3669	124.80	0	37	6	524	96
6	CH Gayle	2009-2019	125	124	15	4484	134	41.13	2969	151.02	6	28	7	368	326
7	MS Dhoni	2008-2019	190	170	65	4432	134	42.20	3215	137.85	0	23	3	297	209


```

> apply(d,class)
> apply(d, is.factor)
> cor(d[apply(d, function(x) !is.factor(x))])

```

	Mat	Inns	NO	Runs	HS	Ave	BF	SR	X100	X50	X0	X4s	X6s
Mat	1.00000000	0.97372898	0.716103945	0.7768569	-0.037657080	-0.05217007	0.7837939	0.09864145	0.05030012	0.5111430	0.54294842	0.63507524	0.5738863
Inns	0.97372898	1.00000000	0.596139247	0.8735667	0.010522015	0.01324838	0.8802588	0.14064814	0.12921883	0.6352992	0.58394761	0.75857387	0.6345901
NO	0.71610395	0.59613925	1.000000000	0.3518648	-0.006799745	0.12641245	0.3286376	0.11042030	-0.12661131	0.1187598	0.11051245	0.07950636	0.3816985
Runs	0.77685693	0.87356669	0.351864801	1.0000000	0.155661200	0.39461811	0.9800064	0.28809386	0.40686562	0.8984808	0.47128236	0.91501932	0.7497970
HS	-0.03765708	0.01052201	-0.006799745	0.1556612	1.000000000	0.36546632	0.1082631	0.27684009	0.36347604	0.1396613	-0.04444556	0.07743200	0.2419796
Ave	-0.05217007	0.01324838	0.126412447	0.3946181	0.365466318	1.00000000	0.3260018	0.38463657	0.43324019	0.5364206	-0.29775714	0.27229934	0.4100991
BF	0.78379387	0.88025881	0.328637556	0.9800064	0.108263094	0.32600178	1.0000000	0.10437215	0.30084052	0.8820391	0.52042883	0.93097834	0.6317378
SR	0.09864145	0.14064814	0.110420304	0.2880939	0.276840094	0.38463657	0.1043721	1.00000000	0.51213686	0.2592991	-0.11053522	0.14245096	0.6417008
X100	0.05030012	0.12921883	-0.126611312	0.4068656	0.363476036	0.43324019	0.3008405	0.51213686	1.00000000	0.3883694	0.10617692	0.33962846	0.6130998
X50	0.51114303	0.63529924	0.118759755	0.8984808	0.139661276	0.53642064	0.8820391	0.25929911	0.38836941	1.0000000	0.37475079	0.88279839	0.5993166
X0	0.54294842	0.58394761	0.110512451	0.4712824	-0.044445557	-0.29775714	0.5204288	-0.11053522	0.10617692	0.3747508	1.00000000	0.52820062	0.2109604
X4s	0.63507524	0.75857387	0.079506357	0.9150193	0.077432005	0.27229934	0.9309783	0.14245096	0.33962846	0.8827984	0.52820062	1.00000000	0.5000367
X6s	0.57388628	0.63459011	0.381698491	0.7497970	0.241979556	0.41009914	0.6317378	0.64170084	0.61309977	0.5993166	0.21096040	0.50003669	1.0000000

```

> d1 <- cor(d[apply(d, function(x) !is.factor(x))])
> head(d1)

```

	Mat	Inns	NO	Runs	HS	Ave	BF	SR	X100	X50	X0	X4s	X6s
Mat	1.00000000	0.97372898	0.716103945	0.7768569	-0.037657080	-0.05217007	0.7837939	0.09864145	0.05030012	0.5111430	0.54294842	0.63507524	0.5738863
Inns	0.97372898	1.00000000	0.596139247	0.8735667	0.010522015	0.01324838	0.8802588	0.14064814	0.12921883	0.6352992	0.58394761	0.75857387	0.6345901
NO	0.71610395	0.59613925	1.000000000	0.3518648	-0.006799745	0.12641245	0.3286376	0.11042030	-0.12661131	0.1187598	0.11051245	0.07950636	0.3816985
Runs	0.77685693	0.87356669	0.351864801	1.0000000	0.155661200	0.39461811	0.9800064	0.28809386	0.40686562	0.8984808	0.47128236	0.91501932	0.7497970
HS	-0.03765708	0.01052201	-0.006799745	0.1556612	1.000000000	0.36546632	0.1082631	0.27684009	0.36347604	0.1396613	-0.04444556	0.07743200	0.2419796
Ave	-0.05217007	0.01324838	0.126412447	0.3946181	0.365466318	1.00000000	0.3260018	0.38463657	0.43324019	0.5364206	-0.29775714	0.27229934	0.4100991

```

> d2 <- eigen(d1)$vectors
> head(d2)

```

	[,1]	[,2]	[,3]	[,4]	[,5]	[,6]	[,7]	[,8]	[,9]	[,10]	[,11]	[,12]
[1,]	-0.3236165	-0.28916408	-0.26377310	0.05655238	0.05365637	0.003344846	-0.1510791	0.160452619	-0.01621056	0.34382559	0.70275247	0.267762087
[2,]	-0.3544680	-0.24023895	-0.13961693	0.05853042	0.04029825	-0.083443462	-0.1811600	0.044276983	-0.14055695	0.24245749	-0.18315177	-0.794542086
[3,]	-0.1699259	-0.18618370	-0.67269201	-0.18141031	0.12650521	0.268445599	0.2391409	0.218592332	0.24382797	-0.35863879	-0.25205857	0.075630976
[4,]	-0.3894953	0.00513011	0.07545676	-0.09040291	-0.02533739	-0.043742549	-0.1017595	-0.041219466	-0.10073770	0.10810724	-0.28649494	0.373145334
[5,]	-0.0706364	0.34891663	-0.04053101	0.11961427	0.89094841	-0.216419799	-0.1007505	-0.028378129	0.06645783	-0.03077939	0.01834532	0.005789575
[6,]	-0.1435568	0.44827056	-0.03425628	-0.54828034	0.01519696	0.211350787	0.4150306	-0.009903298	-0.40839647	0.14798307	0.21664867	-0.153819434

```

>
> pc <- princomp(d1, cor = TRUE, scores = TRUE) #principal component
> pca <- prcomp(t(d1), scale = TRUE) #Principal Component Analysis
> pca$x

```

	PC1	PC2	PC3	PC4	PC5	PC6	PC7	PC8	PC9	PC10	PC11
Mat	-2.56684906	-1.4846008	0.8194534	0.07488672	0.2206746	0.04122129	0.147721002	-0.012866429	0.0175455883	0.0248070076	0.0174658070
Inns	-2.82094937	-0.6190094	0.5537946	0.13522242	0.3453668	-0.06292234	0.089675918	-0.034163687	-0.0009407881	0.0144457589	-0.0093155054
NO	0.23439143	-3.4609859	1.7148660	-0.89845352	-0.3160535	0.30879465	0.051424898	0.056628080	0.0100656631	-0.0210540406	-0.0052595424
Runs	-2.2599057	1.6172919	0.1668371	-0.21482570	0.3539533	-0.01559346	-0.032868633	0.046804607	-0.1361430930	-0.0142329270	0.0062159839
HS	4.40422409	-1.2840886	-1.3437992	-0.45098054	1.4983276	-0.21771757	-0.001601692	0.010847099	0.0090449122	-0.0011757817	0.0004989157
Ave	3.31728368	0.7719459	-0.2428290	-1.77969500	-0.8334690	0.18097454	-0.126096083	-0.084650737	-0.0227854450	0.0110841889	0.0040356453
BF	-2.54862504	0.9418418	-0.4094367	-0.43970674	0.1995777	0.05949903	0.011843644	-0.038228882	-0.0097787940	0.0115072495	-0.0172667396
SR	3.55202178	0.3947575	1.3781744	1.01506554	-0.5585404	-0.89686957	0.112498055	0.005935932	-0.0226681834	0.0041252215	-0.0032037162
X100	2.98746365	1.3746582	-0.4269536	1.25640595	-0.1904832	0.89992823	0.243720959	0.037428968	-0.0021132166	0.0039816511	-0.0013476603
X50	-1.27851947	1.7326415	-0.7569383	-0.64083808	-0.3483686	-0.22876783	-0.118974030	0.155847119	0.0682966473	0.0071617229	0.0008487770
X0	-1.06492228	-2.7283165	-1.9799298	1.32101177	-0.6160160	-0.01328293	-0.295983131	-0.014334123	-0.0215719860	-0.0009591312	0.0004529671
X4s	-2.01263649	0.9428468	-1.2538043	-0.12611338	-0.2545507	-0.25345449	0.284585071	-0.075941098	0.0541108191	-0.0284023602	0.0044334441
X6s	0.05710765	1.8010176	1.7805654	0.74802057	0.4995814	0.19819046	-0.365945978	-0.053306852	0.0569378760	-0.0112885597	0.0024416239

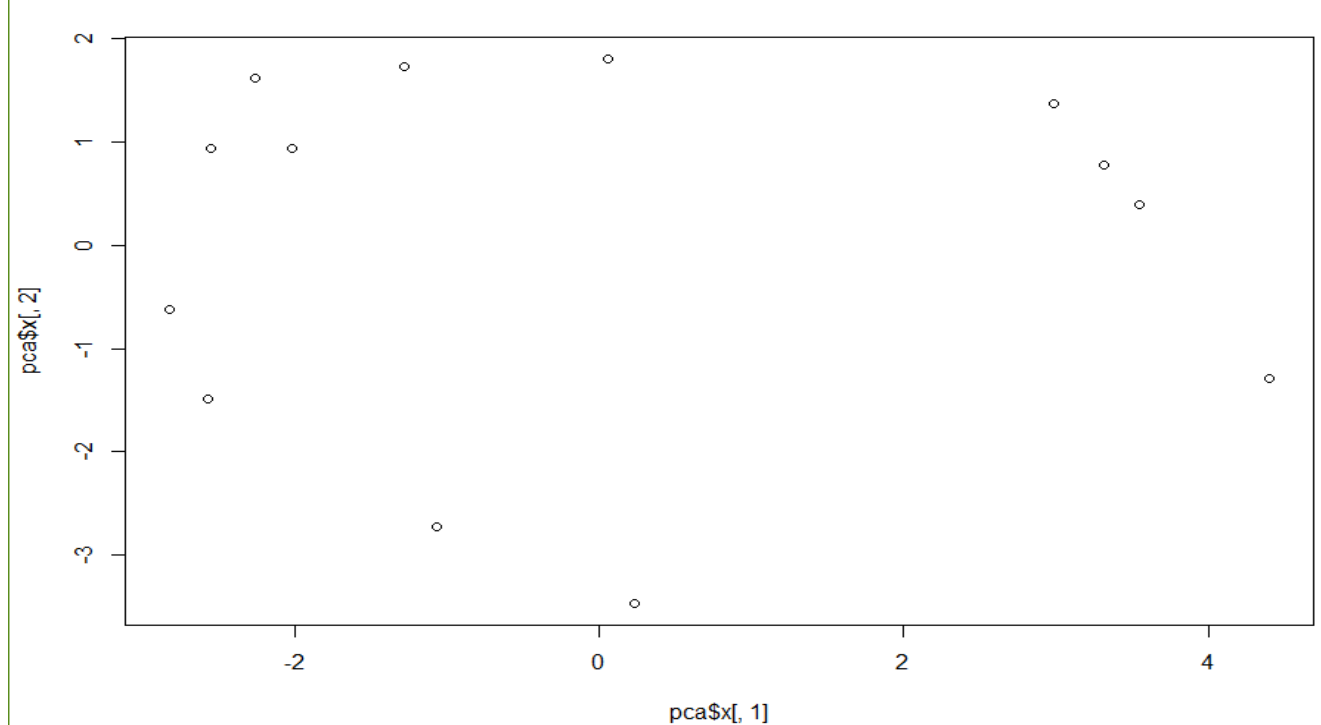
```

>
> PC12
> PC13

```

	PC12	PC13
Mat	2.022662e-03	6.626644e-16
Inns	-5.575436e-03	1.942890e-16
NO	5.792921e-04	7.355228e-16
Runs	-2.672468e-04	1.179612e-16
HS	4.213208e-05	7.771561e-16
Ave	-1.052004e-03	7.147061e-16
BF	4.361001e-03	1.491862e-16
SR	7.651880e-04	-2.914335e-16
X100	-2.477822e-04	-7.979728e-16
X50	-6.818266e-04	3.729655e-16
X0	6.156535e-05	-1.526557e-16
X4s	-1.736558e-04	2.949030e-17
X6s	1.661110e-04	-2.220446e-16


```
> plot(pca$x[,1], pca$x[,2])
```



```
> pca.var <- pca$sdev^2
```

```
> pca.var
```

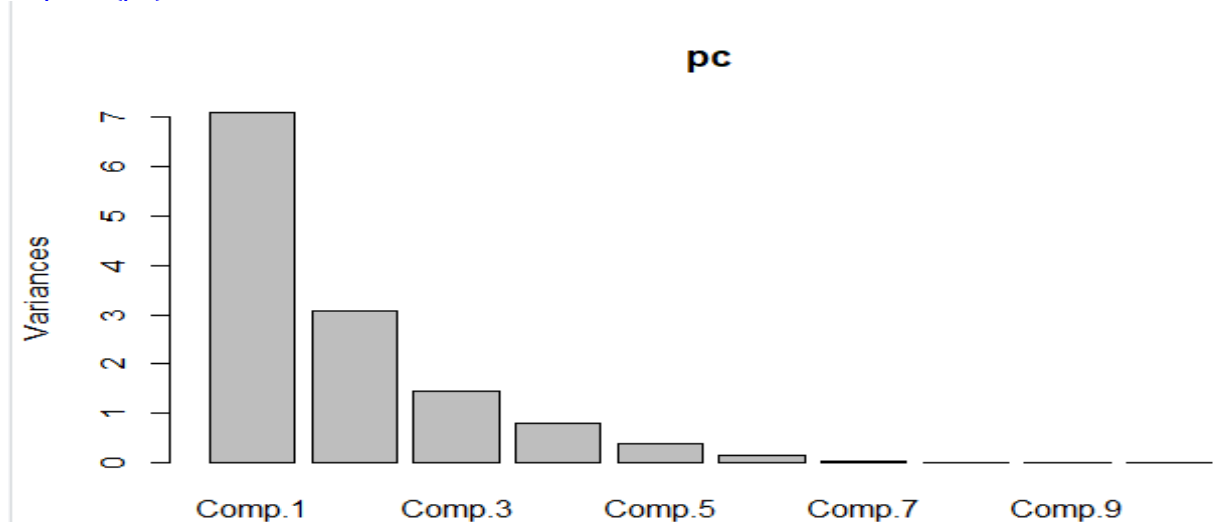
```
[1] 7.080871e+00 3.078085e+00 1.441364e+00 8.151167e-01 3.780084e-01
[6] 1.629354e-01 3.652941e-02 4.167799e-03 2.621633e-03 2.288151e-04
[11] 6.761937e-05 4.740317e-06 4.197255e-33
```

```
> summary(pc)
```

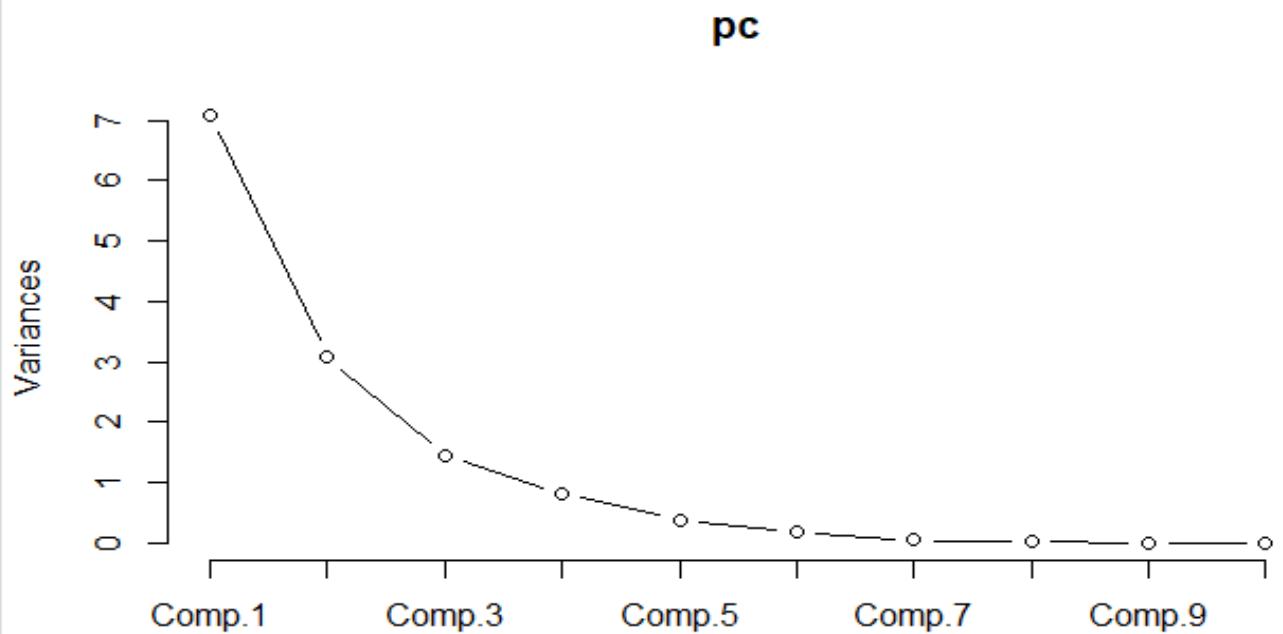
Importance of components:

	Comp.1	Comp.2	Comp.3	Comp.4	Comp.5	Comp.6	Comp.7	Comp.8	Comp.9	Comp.10	Comp.11
Standard deviation	2.6609906	1.7544472	1.2005680	0.90283814	0.61482389	0.40365251	0.191126674	0.0645585	0.0512018889	1.512664e-02	8.223100e-03
Proportion of Variance	0.5446824	0.2367758	0.1108741	0.06270129	0.02907757	0.01253349	0.002809954	0.0003206	0.0002016641	1.760117e-05	5.201490e-06
Cumulative Proportion	0.5446824	0.7814581	0.8923323	0.95503356	0.98411113	0.99664461	0.999454569	0.9997752	0.9999768327	9.999944e-01	9.999996e-01
	Comp.12	Comp.13									
Standard deviation	2.177227e-03	0									
Proportion of Variance	3.646398e-07	0									
Cumulative Proportion	1.000000e+00	1									

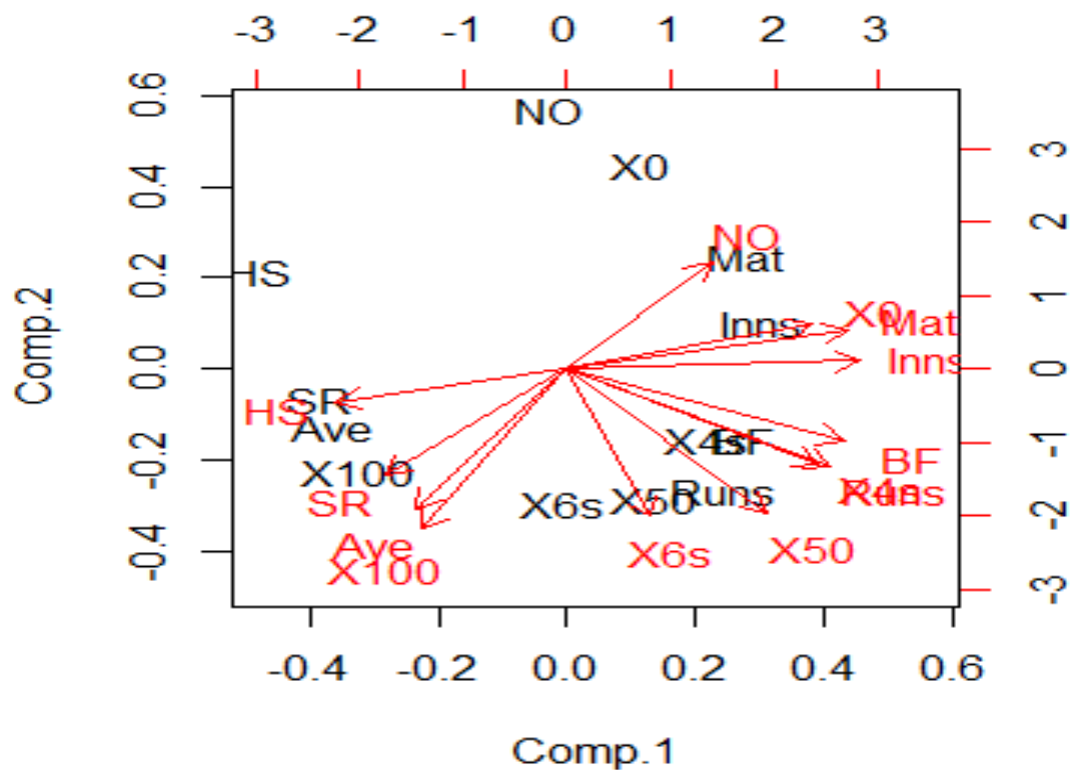
```
> plot(pc)
```



```
> plot(pc, type="l")
```



```
> biplot(pc)
```



```
> dim(d)
```

```
[1] 49 15
```

```
> attributes(pc)
```

```
$names
```

```
[1] "sdev" "loadings" "center" "scale" "n.obs" "scores" "call"
```

```
$class
```

```
[1] "princomp"
```

```
> pc$loadings
```

```
Loadings:
      Comp.1  Comp.2  Comp.3  Comp.4  Comp.5  Comp.6  Comp.7  Comp.8  Comp.9  Comp.10  Comp.11  Comp.12  Comp.13
Mat    0.355    0.103    0.208    0.176    0.183    0.213    0.168    -0.101    0.416    0.246    -0.418    -0.131    -0.291
Inns    0.368    0.182    0.286    0.546    -0.291    0.101    0.246    -0.104    0.102    -0.418    -0.131    -0.262    -0.798
NO      0.331    -0.264    -0.197    -0.154    -0.892    -0.140    -0.221    0.458    0.116    0.216    -0.156    0.578
Runs    -0.190    -0.375    -0.192    -0.133    -0.205    0.145    -0.255    -0.169    0.101    0.173    -0.479    0.412
HS      0.348    -0.192    -0.285    0.408    0.291    -0.108    -0.644    0.163    0.152    0.354
SR      -0.228    -0.429    0.385    0.385    0.636    0.351    0.253    0.184
X100    -0.182    -0.250    -0.385    -0.176    -0.221    -0.128    -0.171    -0.566    0.127    0.531
X50     0.309    0.121    -0.294    0.416    -0.164    0.346    -0.212    -0.684    0.315    0.108
X4s     0.316    -0.259    -0.230    0.205    0.138    -0.474    -0.260    -0.368    -0.150
X6s     0.105    -0.396    0.501    0.247    0.205    0.138    -0.474    -0.260    -0.368    -0.150

SS loadings      Comp.1  Comp.2  Comp.3  Comp.4  Comp.5  Comp.6  Comp.7  Comp.8  Comp.9  Comp.10  Comp.11  Comp.12  Comp.13
Proportion Var   0.077    0.077    0.077    0.077    0.077    0.077    0.077    0.077    0.077    0.077    0.077    0.077    0.077
Cumulative Var   0.077    0.154    0.231    0.308    0.385    0.462    0.538    0.615    0.692    0.769    0.846    0.923    1.000
```

```
> pc$scores
```

```
      Comp.1  Comp.2  Comp.3  Comp.4  Comp.5  Comp.6  Comp.7  Comp.8  Comp.9  Comp.10  Comp.11  Comp.12  Comp.13
Mat  2.67166120 1.5452215 0.8529141 0.07794457 0.2296855 0.04290448 0.153752894 -0.013391804 -0.0182620273 0.0258199521 0.0181789882
Inns 2.93613719 0.6442855 0.5764077 0.14074395 0.3594692 -0.06549165 0.093337655 -0.035558692 0.0009792033 0.0150356226 -0.0096958854
NO   -0.24396234 3.6023083 1.7848891 -0.93514007 -0.3289590 0.32140366 0.053524731 0.058940375 -0.0104766743 -0.0219137402 -0.0054743053
Runs 2.35227276 -1.6833308 0.1736495 -0.22359768 0.3684063 -0.01623019 -0.034210758 0.048715780 -0.1417022239 -0.0148141001 0.0064698011
HS   -4.58406177 1.3365218 -1.3986706 -0.46939543 1.5595088 -0.22660763 -0.001667094 0.011290019 -0.0094142431 -0.0012237923 0.0005192880
Ave  -3.45273832 -0.8034667 -0.2527444 -1.85236529 -0.8675021 0.18836427 -0.131244964 -0.088107280 0.0237158431 0.0115367895 0.0042004328
BF   2.65269304 -0.9803000 -0.4261552 -0.45766128 0.2077270 0.06192856 0.012327255 -0.039789882 0.0101780915 0.0119771250 -0.0179717924
SR   -3.69706148 -0.4108766 1.4344494 1.05651371 -0.5813473 -0.93349144 0.117091688 0.006178314 0.0235937933 0.0042936666 -0.0033345335
X100 -3.10945075 -1.4307896 -0.4443874 1.30770877 -0.1982612 0.93667500 0.253672817 0.038957305 0.0021995056 0.0041442338 -0.0014026893
X50  1.33072526 -1.8033904 -0.7878463 -0.66700542 -0.3625935 -0.23810911 -0.123832097 0.162210824 -0.0710854043 0.0074541576 0.0008834351
X0   1.10840625 2.8397218 -2.0607762 1.37495265 -0.6411698 -0.01382531 -0.308069010 -0.014919428 0.0224528349 -0.0009982954 0.0004714631
X4s  2.09481848 -0.9813461 -1.3050009 -0.13126297 -0.2649448 -0.26380380 0.296205533 -0.079042001 -0.0563203262 -0.0295621138 0.0046144749
X6s  -0.05943952 -1.8745585 1.8532713 0.77856449 0.5199808 0.20628317 -0.380888650 -0.055483530 -0.0592628203 -0.0117495054 0.0025413227

      Comp.12  Comp.13
Mat  2.105254e-03 1.310410e-14
Inns -5.803098e-03 2.551084e-14
NO   6.029463e-04 -1.369044e-14
Runs -2.781593e-04 2.500777e-14
HS   4.385245e-05 -2.636780e-16
Ave  -1.094961e-03 1.717376e-14
BF   4.539074e-03 -6.268944e-14
SR   7.964329e-04 -7.979728e-15
X100 -2.578999e-04 5.967449e-16
X50  -7.096677e-04 -1.866562e-15
X0   6.407925e-05 5.967449e-16
X4s  -1.807466e-04 8.489737e-15
```

```
> pc$call
```

```
princomp(x = d1, cor = TRUE, scores = TRUE)
```

```
> pc$sdev
```

```
      Comp.1  Comp.2  Comp.3  Comp.4  Comp.5  Comp.6  Comp.7  Comp.8  Comp.9  Comp.10  Comp.11  Comp.12  Comp.13
2.660990616 1.754447169 1.200568025 0.902838143 0.614823890 0.403652512 0.191126674 0.064558496 0.051201889
      Comp.10  Comp.11  Comp.12  Comp.13
0.015126637 0.008223100 0.002177227 0.000000000
```

```
> pc$center
```

```
      Mat      Inns      NO      Runs      HS      Ave      BF      SR      X100      X50      X0
0.5055885 0.5561340 0.2912803 0.6355472 0.2038769 0.3009627 0.5982583 0.2960542 0.3474416 0.5558722 0.3074208
      X4s      X6s
0.5432307 0.5529925
```

```
> pc$scale
```

```
      Mat      Inns      NO      Runs      HS      Ave      BF      SR      X100      X50      X0
0.3574333 0.3486572 0.3062936 0.2851729 0.2668221 0.3027183 0.3209102 0.2765957 0.2713836 0.2844140 0.3385967
      X4s      X6s
0.3254476 0.2022471
```

```
> pc$n.obs
```

```
[1] 13
```

```
> str(pc)
```

```
list of 7
 $ sdev      : Named num [1:13] 2.661 1.754 1.201 0.903 0.615 ...
 $ loadings  : num [1:13, 1:13] 0.355 0.368 0.182 0.331 -0.29 ...
 $ dimnames  :List of 2
 .. $ : chr [1:13] "Mat" "Inns" "NO" "Runs" ...
 .. $ : chr [1:13] "Comp.1" "Comp.2" "Comp.3" "Comp.4" ...
 $ center    : Named num [1:13] 0.506 0.556 0.291 0.636 0.204 ...
 $ scale     : Named num [1:13] 0.357 0.349 0.306 0.285 0.267 ...
 $ n.obs     : int 13
 $ scores    : num [1:13, 1:13] 2.672 2.936 -0.244 2.352 -4.584 ...
 $ call      : language princomp(x = d1, cor = TRUE, scores = TRUE)
 $ class     : chr "princomp"
```

```
> data2 <- read.csv("C:/Users/Ashish/Desktop/R2/bowler.csv")
```

```
> data2
```

```

1 X Player Span Mat Inns Overs Mdns Runs wkts BBI Ave Econ SR X4 X5
2 1 SL Malinga 2009-2019 122 122 471.1 8 3366 170 5/13 19.80 7.14 16.6 6 1
3 2 A Mishra 2008-2019 147 147 516.5 6 3795 157 5/17 24.17 7.34 19.7 3 1
4 3 Harbhajan Singh 2008-2019 160 157 562.2 6 3967 150 5/18 26.44 7.05 22.4 1 1
5 4 PP Chawla 2008-2019 157 156 520.4 2 4072 150 4/17 27.14 7.82 20.8 2 0
6 5 DJ Bravo 2008-2019 134 131 430.5 2 3618 147 4/22 24.61 8.39 17.5 2 0
7 6 B Kumar 2011-2019 117 117 435.2 8 3154 133 5/19 23.71 7.24 19.6 2 1
8 7 R Ashwin 2009-2019 139 136 487.2 4 3309 125 4/34 26.47 6.79 23.3 1 0
9 8 SP Narine 2012-2019 110 109 426.1 3 2845 122 5/19 23.31 6.67 20.9 6 1
10 9 UT Yadav 2010-2019 119 118 413.2 3 3496 119 4/24 29.37 8.45 20.8 2 0
11 10 RA Jadeja 2008-2019 170 142 415.5 1 3152 108 5/16 29.18 7.57 23.1 3 1
12 11 A Nehra 2008-2017 88 88 318.0 2 2495 106 4/10 23.53 7.84 18.0 1 0
13 12 R Vinay Kumar 2008-2018 105 104 353.3 1 2966 105 4/40 28.24 8.39 20.2 1 0
14 13 Z Khan 2008-2017 100 99 366.4 3 2782 102 4/17 27.27 7.38 21.3 1 0
15 14 YS Chahal 2013-2019 84 83 297.5 3 2318 100 4/25 23.18 7.78 17.8 2 0
16 15 DW Steyn 2008-2019 92 92 351.0 7 2375 96 3/8 24.73 6.76 21.9 0 0
17 16 Sandeep Sharma 2013-2019 79 79 290.5 8 2272 95 4/20 23.91 7.81 18.3 2 0
> pairs(data2[,2:5], pch=20, col="#FC4E07")
> d3 <- data2[, -1]
> head(d3)
  Player Span Mat Inns Overs Mdns Runs wkts BBI Ave Econ SR X4 X5
1 SL Malinga 2009-2019 122 122 471.1 8 3366 170 5/13 19.80 7.14 16.6 6 1
2 A Mishra 2008-2019 147 147 516.5 6 3795 157 5/17 24.17 7.34 19.7 3 1
3 Harbhajan Singh 2008-2019 160 157 562.2 6 3967 150 5/18 26.44 7.05 22.4 1 1
4 PP Chawla 2008-2019 157 156 520.4 2 4072 150 4/17 27.14 7.82 20.8 2 0
5 DJ Bravo 2008-2019 134 131 430.5 2 3618 147 4/22 24.61 8.39 17.5 2 0
6 B Kumar 2011-2019 117 117 435.2 8 3154 133 5/19 23.71 7.24 19.6 2 1
>
> sapply(d3, class)
> sapply(d3, is.factor)
> cor(d3[sapply(d3, function(x) !is.factor(x))])
  Mat Inns Overs Mdns Runs wkts Ave Econ
Mat 1.0000000 0.94221238 0.85531658 0.276510400 0.86966484 0.7573195 0.12131528 -0.1471798
Inns 0.9422124 1.00000000 0.96756181 0.385639480 0.96934897 0.8778399 0.03449028 -0.2501571
Overs 0.8553166 0.96756181 1.00000000 0.468200314 0.97361641 0.9284369 -0.08027503 -0.3738521
Mdns 0.2765104 0.38563948 0.46820031 1.000000000 0.43537332 0.3728808 0.11118897 -0.2588605
Runs 0.8696648 0.96934897 0.97361641 0.43537332 1.00000000 0.9169555 0.00649456 -0.1671729
wkts 0.7573195 0.87783991 0.92843688 0.372880788 0.91695552 1.00000000 -0.37288680 -0.2917987
Ave 0.1213153 0.03449028 -0.08027503 0.111188971 0.00649456 -0.3728868 1.00000000 0.3747767
Econ -0.1471798 -0.25015708 -0.37385213 -0.258860453 -0.16717293 -0.2917987 0.37477671 1.0000000
SR 0.2143566 0.18606279 0.13843188 0.257265850 0.10485187 -0.2224691 0.82812638 -0.2072197
X4 0.2777151 0.30900637 0.34108943 0.004092607 0.30392800 0.5228159 -0.52174205 -0.1808914
X5 0.1537780 0.18756581 0.21442104 0.197259116 0.20483199 0.2394914 -0.04980508 0.0173907
  SR X4 X5
Mat 0.21435657 0.277715145 0.15377800
Inns 0.18606279 0.309006369 0.18756581
Overs 0.13843188 0.341089427 0.21442104
Mdns 0.25726585 0.004092607 0.19725912
Runs 0.10485187 0.303928005 0.20483199
wkts -0.22246912 0.522815920 0.23949139
Ave 0.82812638 -0.521742054 -0.04980508
Econ -0.20721973 -0.180891382 0.01739070
SR 1.00000000 -0.454973186 -0.07530916
X4 -0.45497319 1.000000000 0.25830928
X5 -0.07530916 0.258309279 1.000000000
> d4 <- cor(d3[sapply(d3, function(x) !is.factor(x))])
> head(d4)
  Mat Inns Overs Mdns Runs wkts Ave Econ SR
Mat 1.0000000 0.9422124 0.8553166 0.2765104 0.8696648 0.7573195 0.12131528 -0.1471798 0.2143566
Inns 0.9422124 1.0000000 0.9675618 0.3856395 0.9693490 0.8778399 0.03449028 -0.2501571 0.1860628
Overs 0.8553166 0.9675618 1.0000000 0.4682003 0.9736164 0.9284369 -0.08027503 -0.3738521 0.1384319
Mdns 0.2765104 0.3856395 0.4682003 1.0000000 0.4353733 0.3728808 0.11118897 -0.2588605 0.2572658
Runs 0.8696648 0.9693490 0.9736164 0.4353733 1.0000000 0.9169555 0.00649456 -0.1671729 0.1048519
wkts 0.7573195 0.8778399 0.9284369 0.3728808 0.9169555 1.0000000 -0.37288680 -0.2917987 -0.2224691
  X4 X5
Mat 0.277715145 0.1537780
Inns 0.309006369 0.1875658
Overs 0.341089427 0.2144210
Mdns 0.004092607 0.1972591
Runs 0.303928005 0.2048320
wkts 0.522815920 0.2394914
> d5 <- eigen(d4)$vectors
> head(d5)
  [,1] [,2] [,3] [,4] [,5] [,6] [,7] [,8]
[1,] -0.3878802 -0.1384853 -0.17657761 0.19564908 -0.166251335 0.002651027 0.78722905 -0.29098234
[2,] -0.4261116 -0.1048936 -0.08198725 0.13345548 -0.060856901 0.066471078 0.08040646 0.73007587
[3,] -0.4340554 -0.0514543 0.04472288 0.05478887 0.009125118 0.103022768 -0.27938201 0.01976086
[4,] -0.2119488 -0.1833176 0.29041132 -0.47087876 0.690375296 -0.310195985 0.20375319 0.02933940
[5,] -0.4240072 -0.0773004 -0.13139919 0.09451298 0.108554288 0.089067446 -0.34974119 0.05548120
[6,] -0.4169500 0.1661663 -0.03712544 0.06757815 0.127286584 0.112308741 -0.27104572 -0.58584435
  [,9] [,10] [,11]
[1,] 0.165579086 0.026653501 0.02718256
[2,] -0.482687622 -0.014072341 -0.04594224
[3,] 0.435098023 -0.704492037 -0.17083716
[4,] -0.005286378 0.003123989 0.01238316
[5,] 0.435417569 0.666726130 0.09390309
[6,] -0.582365893 -0.023731919 0.08595707
> pc1 <- princomp(d4, cor = TRUE, scores = TRUE)
> pca1 <- prcomp(t(d4), scale = TRUE)
> pca1$x

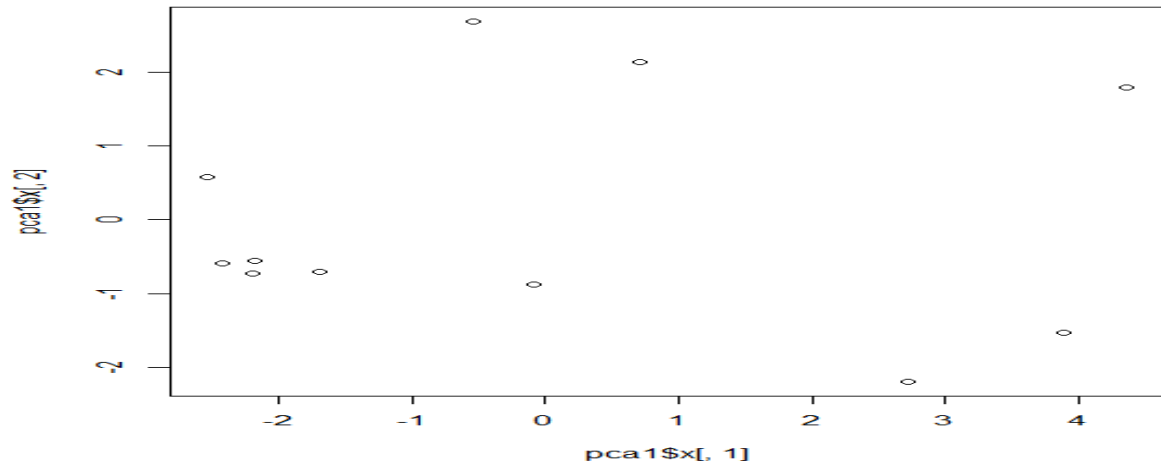
```

```

      PC1      PC2      PC3      PC4      PC5      PC6      PC7      PC8
Mat -1.69842168 -0.7026306 0.7757062 -0.51763320 0.038039008 0.229175869 0.167708151 -6.662300e-03
Inns -2.19789948 -0.7275001 0.4738759 -0.34858968 -0.030478605 0.055762444 -0.006515935 1.730500e-02
Overs -2.43090704 -0.5940960 0.1154638 -0.06157165 -0.003712497 -0.122311344 -0.044671081 1.081948e-04
Mdns -0.08319083 -0.8819047 -1.6924334 1.26784744 -0.758588760 0.100376028 0.032368397 7.175053e-04
Runs -2.18797612 -0.5515706 0.4073589 -0.26035017 -0.357214654 0.008524456 -0.139218132 -3.000614e-03
wkts -2.54142124 0.5799235 0.3220299 0.25745094 -0.103494656 -0.260806360 0.032389339 -8.979761e-03
Ave 3.89454542 -1.5308420 0.2400632 -0.28073131 0.091036766 0.144211367 -0.111722413 -6.846831e-03
Econ 4.36999318 1.7889449 1.3169645 0.11574748 -0.795181713 -0.087170708 0.042077704 3.749174e-03
SR 2.71537586 -2.1866711 -0.3506420 0.14307656 0.910548511 -0.189668296 0.060906038 3.014205e-03
X4 -0.54773632 2.6782056 0.3116061 0.94218568 0.990426295 0.138042057 -0.041226118 5.331384e-04
X5 0.70763824 2.1281411 -1.9199931 -1.25743209 0.038620304 -0.016135512 0.007904051 6.229081e-05
      PC9      PC10      PC11
Mat -1.248466e-03 -2.039684e-04 2.016616e-17
Inns 3.769551e-03 2.395233e-04 6.234162e-18
Overs -5.022103e-03 3.296091e-03 4.233471e-18
Mdns -4.756407e-06 -4.915132e-05 4.174178e-17
Runs -2.537601e-03 -3.133251e-03 -3.366448e-17
wkts 5.260719e-03 4.468857e-05 1.551493e-16
Ave 3.288888e-03 1.480847e-03 -1.921206e-16
Econ -1.622311e-03 -1.158072e-04 -9.671083e-17
SR -1.522038e-03 -1.396012e-03 -2.792905e-16
X4 -3.530852e-04 -7.279451e-05 5.648693e-17
X5 -8.795946e-06 -9.016523e-05 2.411266e-16

```

```
> plot(pca1$x[,1], pca1$x[,2])
```



```
> pca1.var <- pca1$sdev^2
```

```
> pca1.var
```

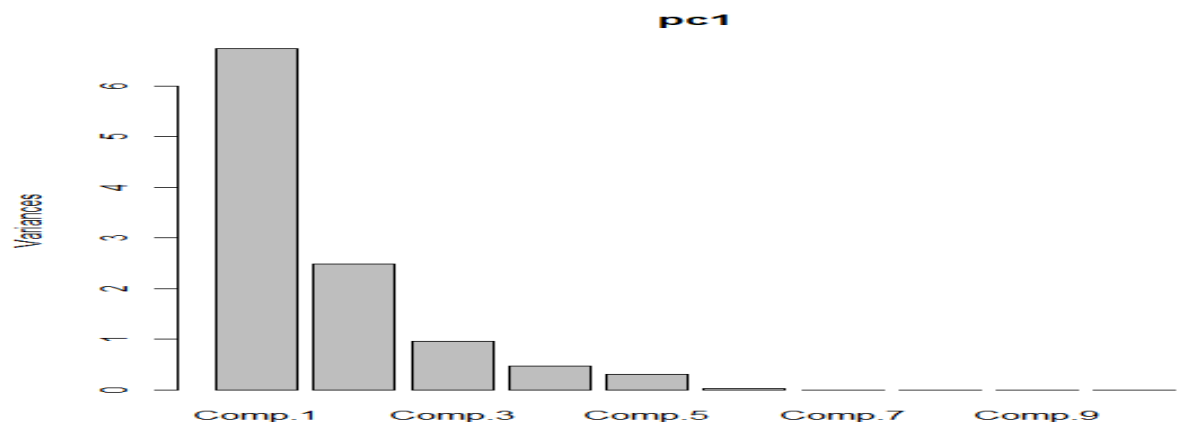
```
[1] 6.731605e+00 2.482129e+00 9.672033e-01 4.716278e-01 3.169915e-01 2.324447e-02 7.136650e-03 5.043245e-05 9.099433e-06 2.495346e-06 3.335773e-33
```

```
> summary(pca1)
```

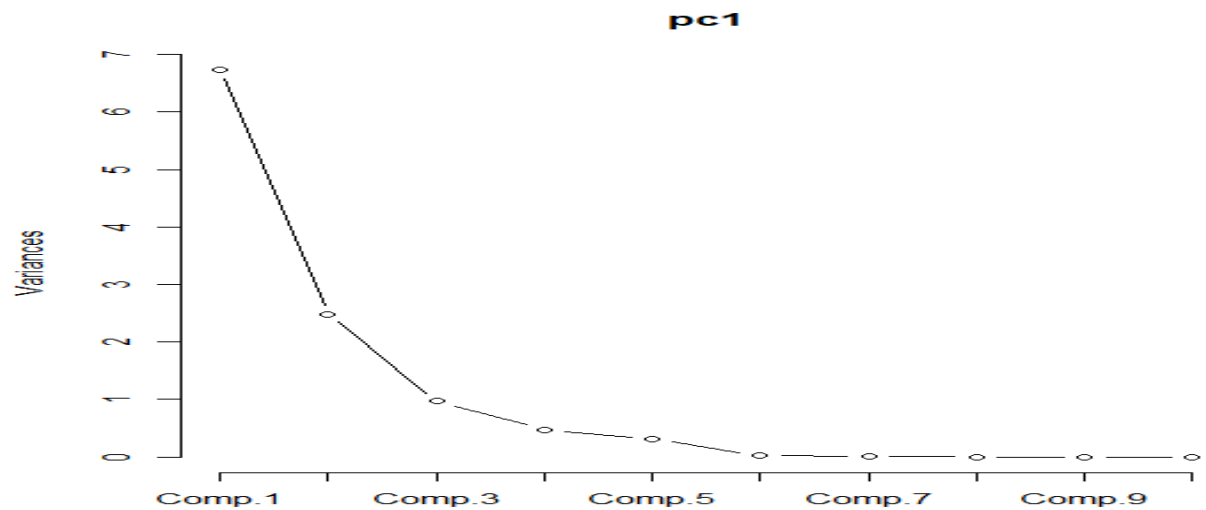
```
Importance of components:
```

	Comp.1	Comp.2	Comp.3	Comp.4	Comp.5	Comp.6	Comp.7	Comp.8	Comp.9	Comp.10	Comp.11
Standard deviation	2.5945336	1.5754775	0.98346496	0.68675163	0.56302000	0.152461386	0.0844786959	7.101581e-03	3.016527e-03	1.579666e-03	0
Proportion of Variance	0.6119641	0.2256481	0.08792758	0.04287525	0.02881741	0.002113134	0.0006487864	4.584768e-06	8.272212e-07	2.268497e-07	0
Cumulative Proportion	0.6119641	0.8376122	0.92553977	0.96841503	0.99723244	0.999345575	0.9999943612	9.999989e-01	9.999998e-01	1.000000e+00	1

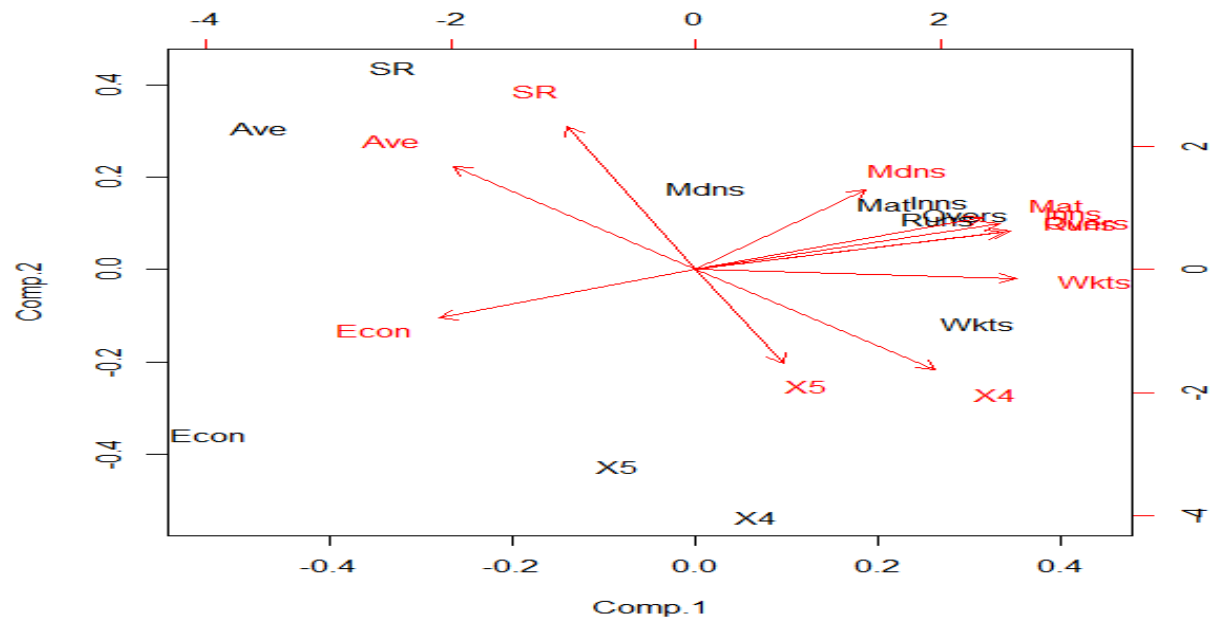
```
> plot(pc1)
```



```
> plot(pc1,type="l")
```



```
> biplot(pc1)
```



```
> dim(d3)
```

```
[1] 49 14
```

```
> attributes(pc1)
```

```
$names
```

```
[1] "sdev" "loadings" "center" "scale" "n.obs" "scores" "call"
```

```
$class
```

```
[1] "princomp"
```

```
> pc1$loadings
```

```
Loadings:
```

	Comp.1	Comp.2	Comp.3	Comp.4	Comp.5	Comp.6	Comp.7	Comp.8	Comp.9	Comp.10	Comp.11
Mat	0.343	0.202	0.256	0.279		0.429	0.653	0.270	0.116		
Inns	0.362	0.179	0.158	0.183				-0.792	-0.383		
Overs	0.373	0.149				-0.185	-0.248		0.496	-0.686	-0.110
Mdns	0.202	0.309	-0.565	-0.454	0.501	0.295					
Runs	0.366	0.144	0.153	0.142	0.187	-0.178	-0.368		0.329	0.697	
Wkts	0.382				0.126	-0.200	-0.192	0.512	-0.667	-0.140	0.158
Ave	-0.289	0.402		0.267		0.295	-0.309	0.166	-0.196		-0.658
Econ	-0.305	-0.189	0.359	0.204	0.658	0.298	-0.201			-0.139	0.338
SR	-0.152	0.556	-0.147	0.191	-0.353	0.134	-0.229				0.643
X4	0.285	-0.387		-0.226	-0.368	0.653	-0.388				
X5	0.105	-0.363	-0.630	0.674							

	Comp.1	Comp.2	Comp.3	Comp.4	Comp.5	Comp.6	Comp.7	Comp.8	Comp.9	Comp.10	Comp.11
SS loadings	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Proportion Var	0.091	0.091	0.091	0.091	0.091	0.091	0.091	0.091	0.091	0.091	0.091
Cumulative Var	0.091	0.182	0.273	0.364	0.455	0.545	0.636	0.727	0.818	0.909	1.000

```
> pc1$scores
```


	Comp.1	Comp.2	Comp.3	Comp.4	Comp.5	Comp.6	Comp.7	Comp.8	Comp.9	Comp.10	Comp.11
Mat	1.78131969	0.7369252	0.8135675	0.54289828	-0.039895648	0.240361679	0.175893793	6.987479e-03	1.309402e-03	2.139239e-04	-3.368323e-14
Inns	2.30517642	0.7630085	0.4970052	0.36560394	0.052942408	0.058484144	-0.006833970	-1.814964e-02	-3.953538e-03	-2.512142e-04	8.553401e-14
Overs	2.54955681	0.6230931	0.1210994	0.06457689	0.003893699	-0.128281220	-0.046851425	-1.134757e-04	5.267226e-03	-3.456969e-03	-1.400276e-14
Mdns	0.08725128	0.9249494	-1.7750391	-1.32972961	0.795614603	0.105275266	0.033948261	-7.525260e-04	4.988562e-06	5.155055e-05	-6.158268e-17
Runs	2.29476871	0.5784922	0.4272416	0.27305757	0.374649890	0.008940525	-0.146013209	3.147071e-03	2.661459e-03	3.286181e-03	-8.849686e-14
Wkts	2.66546508	-0.6082288	0.3377478	-0.27001682	0.108546111	-0.273536018	0.033970225	9.418053e-03	-5.517488e-03	-4.686977e-05	5.583468e-14
Ave	-4.08463370	1.6055606	0.2517804	0.29443348	-0.095480166	0.151250157	-0.117175455	7.181017e-03	-3.449414e-03	-1.553126e-03	5.498900e-14
Econ	-4.58328751	-1.8762612	1.3812441	-0.12139698	0.833993617	-0.091425410	0.044131468	-3.932167e-03	1.701494e-03	1.214596e-04	-1.595902e-14
SR	-2.84791023	2.2934000	-0.3677564	-0.15005996	-0.954991335	-0.198925787	0.063878791	-3.161325e-03	1.596327e-03	1.464150e-03	-3.712742e-14
X4	0.57447070	-2.8089258	0.3268153	-0.98817267	-1.038767862	0.144779731	-0.043238317	-5.591602e-04	3.703189e-04	7.634753e-05	-5.274969e-15
X5	-0.74217725	-2.2320133	-2.0137058	1.31880590	-0.040505317	-0.016923067	0.008289839	-6.533116e-05	9.225266e-06	9.456609e-05	-1.712172e-15

```
> pc1$call
princomp(x = d4, cor = TRUE, scores = TRUE)
```

```
> pc1$sdev
```

Comp.1	Comp.2	Comp.3	Comp.4	Comp.5	Comp.6	Comp.7	Comp.8	Comp.9	Comp.10	Comp.11
2.594533617	1.575477546	0.983464962	0.686751631	0.563020001	0.152461386	0.084478696	0.007101581	0.003016527	0.001579666	0.000000000

```
> pc1$center
```

Mat	Inns	Overs	Mdns	Runs	Wkts	Ave	Econ	SR	X4	X5
0.4837281	0.5099610	0.4939043	0.2954137	0.5107175	0.4298714	0.1319712	-0.0440877	0.1608295	0.1690318	0.2134485

```
> pc1$scale
```

Mat	Inns	Overs	Mdns	Runs	Wkts	Ave	Econ	SR	X4	X5
0.3855124	0.4318343	0.4613432	0.3011344	0.4240922	0.5006969	0.4351767	0.3812835	0.4137722	0.4176829	0.2725375

```
> pc1$n.obs
```

```
[1] 11
```

```
> str(pc1)
```

```
List of 7
```

```

 $ sdev      : Named num [1:11] 2.595 1.575 0.983 0.687 0.563
 ..- attr(*, "names")= chr [1:11] "Comp.1" "Comp.2" "Comp.3" "Comp.4" ...
 $ loadings: 'loadings' num [1:11, 1:11] 0.343 0.362 0.373 0.202 0.366 ...
 ..- attr(*, "dimnames")=List of 2
 .. ..$ : chr [1:11] "Mat" "Inns" "Overs" "Mdns" ...
 .. ..$ : chr [1:11] "Comp.1" "Comp.2" "Comp.3" "Comp.4" ...
 $ center    : Named num [1:11] 0.484 0.51 0.494 0.295 0.511 ...
 ..- attr(*, "names")= chr [1:11] "Mat" "Inns" "Overs" "Mdns" ...
 $ scale     : Named num [1:11] 0.386 0.432 0.461 0.301 0.424 ...
 ..- attr(*, "names")= chr [1:11] "Mat" "Inns" "Overs" "Mdns" ...
 $ n.obs     : int 11
 $ scores    : num [1:11, 1:11] 1.7813 2.3052 2.5496 0.0873 2.2948 ...
 ..- attr(*, "dimnames")=List of 2
 .. ..$ : chr [1:11] "Mat" "Inns" "Overs" "Mdns" ...
 .. ..$ : chr [1:11] "Comp.1" "Comp.2" "Comp.3" "Comp.4" ...
 $ call      : language princomp(x = d4, cor = TRUE, scores = TRUE)
 - attr(*, "class")= chr "princomp"

```

```
>
```