Practical Data Science: Reducing High Dimensional Data in R

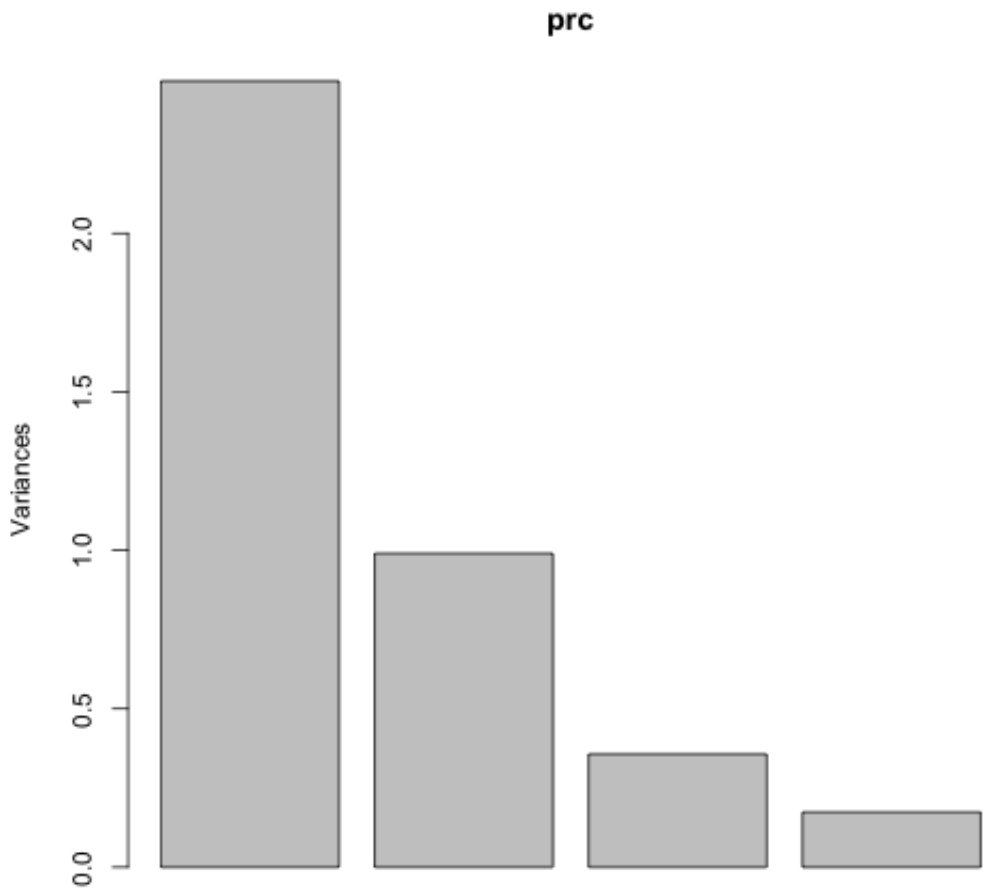
Let's start with prcomp and the example listed at the bottom of the page. (**Note**: the examples use the `USArrests` data set that is included in the stats package so you don't have to download anything)

```
require(graphics)

# run prcomp on data set but scale all data first
prc <- prcomp(USArrests, scale = TRUE)
summary(prc)
```

```
## Importance of components:
##                           PC1   PC2    PC3    PC4
## Standard deviation     1.57 0.995 0.5971 0.4164
## Proportion of Variance 0.62 0.247 0.0891 0.0434
## Cumulative Proportion  0.62 0.868 0.9566 1.0000
```

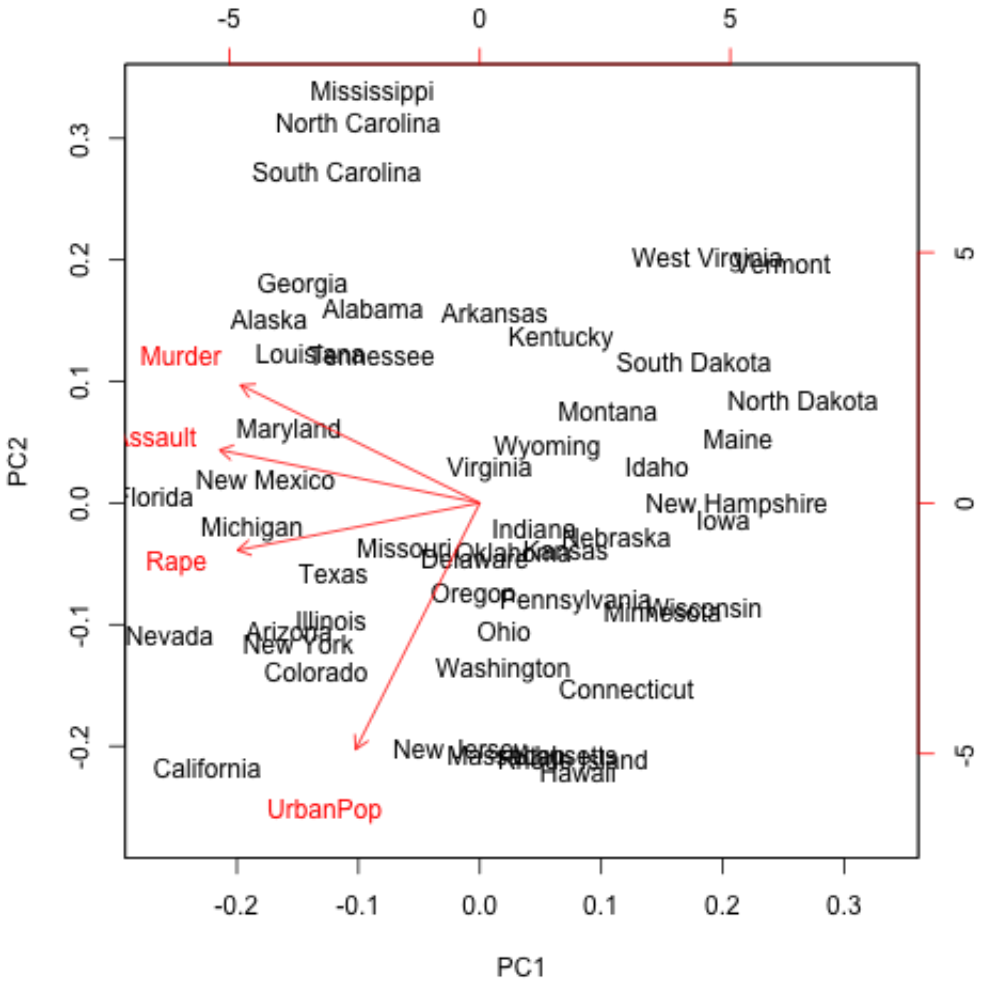
```
screeplot(prc)
```




```
# square the sdev to get the eigen value of each component
prc$sdev ^ 2 #
```

```
## [1] 2.4802 0.9898 0.3566 0.1734
```

```
# plot first two pcas along with feature correlations
biplot(prc)
```



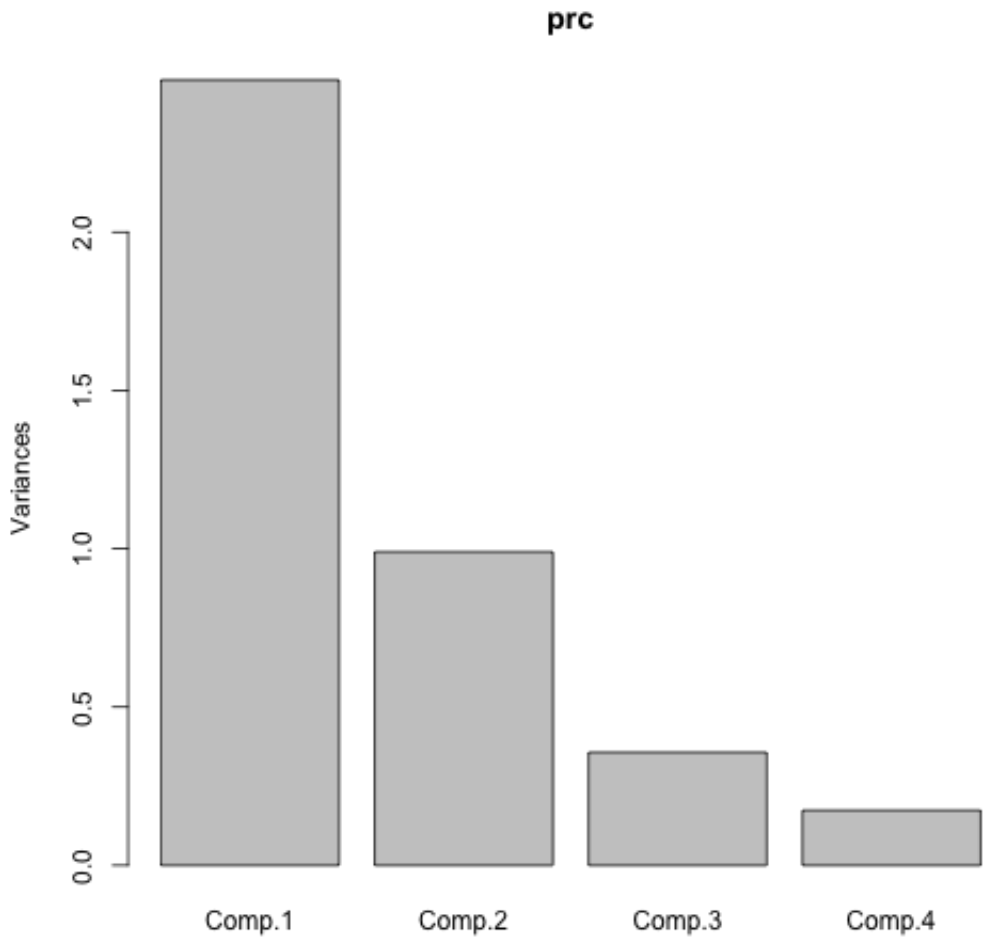

```
# look at data
USArrests[order(USArrests$UrbanPop,decreasing=TRUE),]
```

```
##                Murder Assault UrbanPop Rape
## California       9.0     276       91 40.6
## New Jersey       7.4     159       89 18.8
## Rhode Island     3.4     174       87  8.3
## New York        11.1     254       86 26.1
## Massachusetts    4.4     149       85 16.3
## Hawaii           5.3      46       83 20.2
## Illinois        10.4     249       83 24.0
## Nevada          12.2     252       81 46.0
## Arizona          8.1     294       80 31.0
## Florida         15.4     335       80 31.9
## Texas           12.7     201       80 25.5
## Utah             3.2     120       80 22.9
## Colorado         7.9     204       78 38.7
## Connecticut      3.3     110       77 11.1
## Ohio             7.3     120       75 21.4
## Michigan        12.1     255       74 35.1
## Washington       4.0     145       73 26.2
## Delaware         5.9     238       72 15.8
## Pennsylvania     6.3     106       72 14.9
## Missouri         9.0     178       70 28.2
## New Mexico      11.4     285       70 32.1
## Oklahoma         6.6     151       68 20.0
## Maryland        11.3     300       67 27.8
## Oregon           4.9     159       67 29.3
## Kansas           6.0     115       66 18.0
## Louisiana       15.4     249       66 22.2
## Minnesota        2.7      72       66 14.9
## Wisconsin        2.6      53       66 10.8
## Indiana          7.2     113       65 21.0
## Virginia         8.5     156       63 20.7
## Nebraska         4.3     102       62 16.5
## Georgia         17.4     211       60 25.8
## Wyoming          6.8     161       60 15.6
## Tennessee       13.2     188       59 26.9
## Alabama         13.2     236       58 21.2
## Iowa             2.2      56       57 11.3
## New Hampshire    2.1      57       56  9.5
## Idaho            2.6     120       54 14.2
## Montana          6.0     109       53 16.4
## Kentucky         9.7     109       52 16.3
## Maine            2.1      83       51  7.8
## Arkansas         8.8     190       50 19.5
## Alaska          10.0     263       48 44.5
## South Carolina  14.4     279       48 22.5
## North Carolina  13.0     337       45 16.1
## South Dakota     3.8      86       45 12.8
## Mississippi     16.1     259       44 17.1
## North Dakota     0.8      45       44  7.3
## West Virginia    5.7      81       39  9.3
## Vermont          2.2      48       32 11.2
```

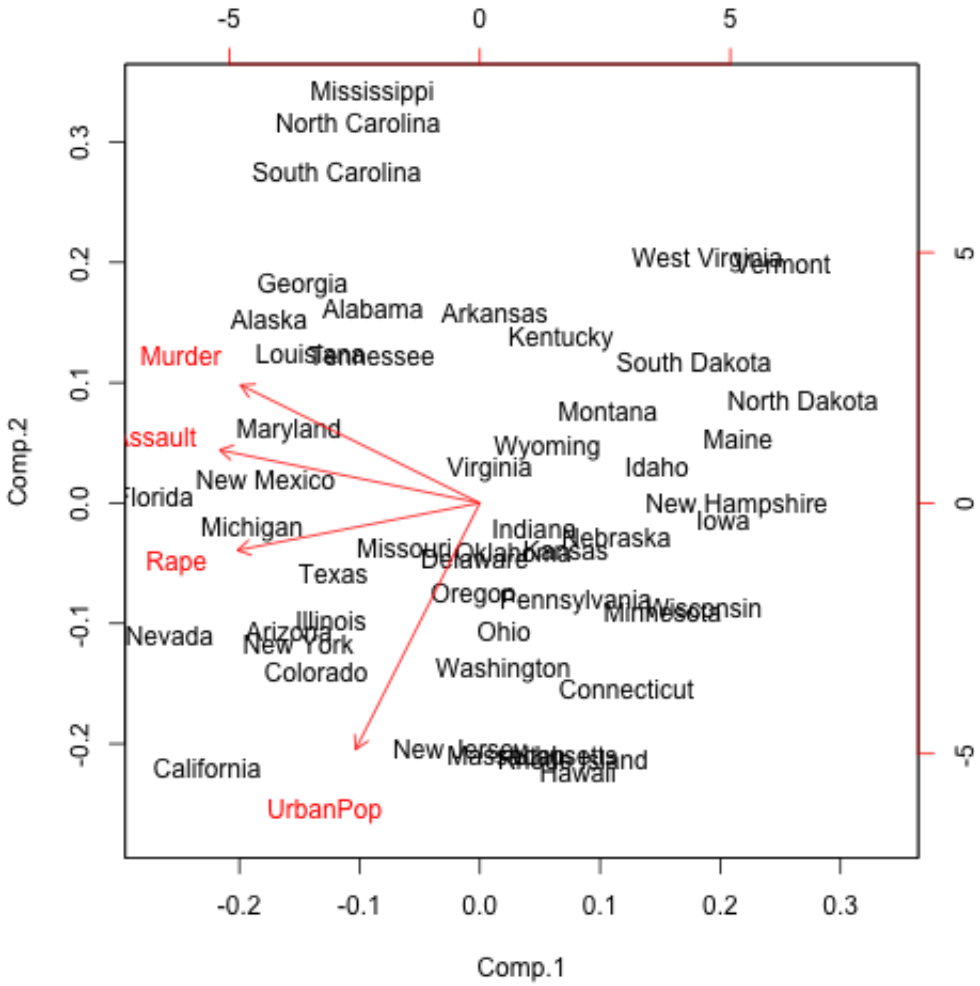
Let's take a look at example listed in princomp:

```
require(graphics)

prc <- princomp(USArrests, cor = TRUE, scale=TRUE)
plot(prc) # shows a screeplot.
```




```
biplot(prc)
```


-5
0
5
Mississippi
North Carolina
South Carolina
West Virginia
Vermont
Georgia
Alaska
Alabama
Arkansas
Kentucky
Murder
Louisiana
Tennessee
South Dakota
Montana
North Dakota
Maryland
Wyoming
Maine
Virginia
Idaho
New Mexico
New Hampshire
Iowa
Michigan
Indiana
Nebraska
Rape
Missouri
Delaware
Texas
Oregon
Pennsylvania
Minnesota
Illinois
Nevada
Arizona
Ohio
New York
Colorado
Washington
Connecticut
California
Hawaii
UrbanPop
0.3
0.2
0.1
0.0
-0.1
-0.2
Comp.2
-0.2
-0.1
0.0
0.1
0.2
0.3
Comp.1
5
0
-5