Individual_assignment12

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Prefix

In Section 10.2.3, a formula for calculating PVE was given in Equation 10.8. We also saw that the PVE can be obtained using the sdev output of the prcomp() function. On the USArrests data, calculate PVE in two ways:

```
attach(USArrests)
pr.out = prcomp(USArrests,scale = TRUE)
```

(a) Using the sdev output of the prcomp() function, as was done in Section 10.2.3.

```
pr.var = pr.out$sdev^2
pve1 = pr.var/sum(pr.var)
pve1
```

```
## [1] 0.62006039 0.24744129 0.08914080 0.04335752
```

(b) By applying Equation 10.8 directly. That is, use the prcomp() function to compute the principal component loadings. Then, use those loadings in Equation 10.8 to obtain the PVE.

```
pr.loadings = pr.out$rotation
USArrests.sc = scale(USArrests)
pve2 = apply((as.matrix(USArrests.sc) %*% pr.loadings)^2, 2, sum) /
  sum(apply(as.matrix(USArrests.sc)^2, 2, sum))
pve2
```

```
##        PC1        PC2        PC3        PC4
## 0.62006039 0.24744129 0.08914080 0.04335752
```

The results of two different methods are the same.