

Chapter 2 Applied Exercises

Cool Beans Programming

2023-04-20

Loading libraries and data

```
library(ISLR2)
```

```
college <- read.csv("https://www.statlearning.com/s/College.csv")
rownames(college) <- college[, 1]
View(college)
```

Exploring the data

```
college <- college[, -1]
head(college)
```

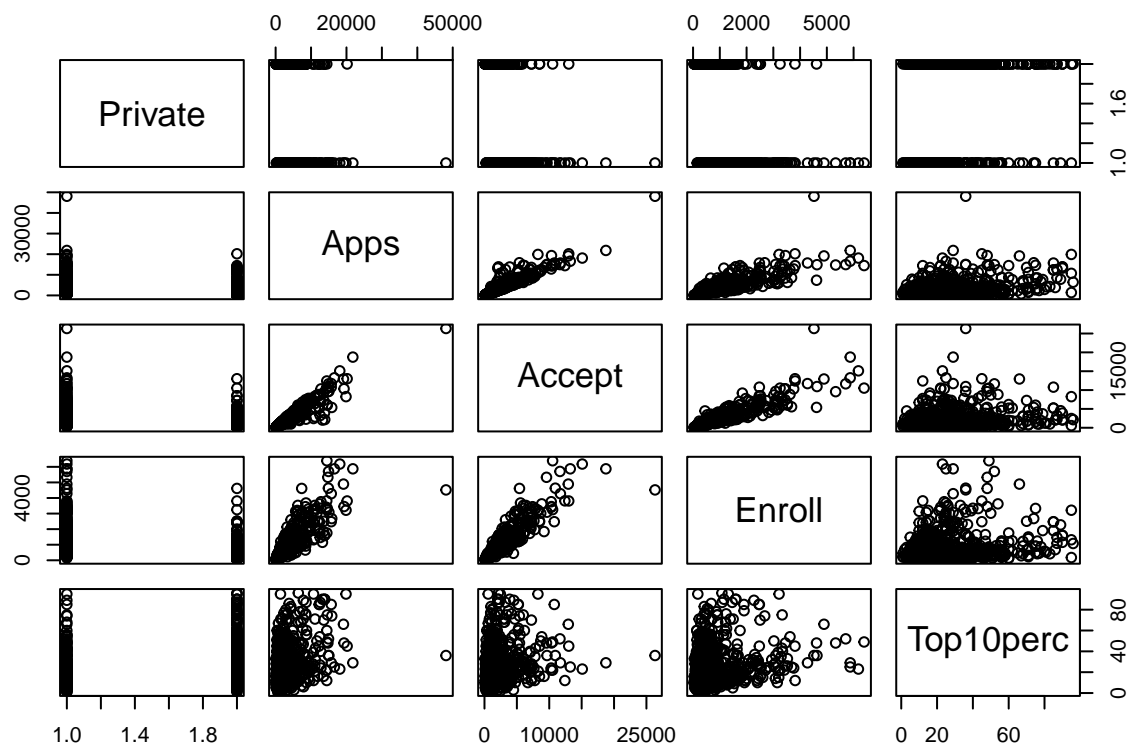
```
##               Private Apps Accept Enroll Top10perc Top25perc
## Abilene Christian University    Yes 1660   1232    721         23         52
## Adelphi University              Yes 2186   1924    512         16         29
## Adrian College                 Yes 1428   1097    336         22         50
## Agnes Scott College             Yes  417    349    137         60         89
## Alaska Pacific University       Yes  193    146     55         16         44
## Albertson College              Yes  587    479    158         38         62
##               F.Undergrad P.Undergrad Outstate Room.Board Books
## Abilene Christian University    2885          537    7440      3300   450
## Adelphi University             2683          1227   12280      6450   750
## Adrian College                 1036           99   11250      3750   400
## Agnes Scott College             510           63   12960      5450   450
## Alaska Pacific University       249          869    7560      4120   800
## Albertson College               678           41   13500      3335   500
##               Personal PhD Terminal S.F.Ratio perc.alumni Expend
## Abilene Christian University    2200   70         78    18.1         12   7041
## Adelphi University             1500   29         30    12.2         16  10527
## Adrian College                 1165   53         66    12.9         30   8735
## Agnes Scott College             875   92         97     7.7         37  19016
## Alaska Pacific University       1500   76         72    11.9          2  10922
## Albertson College               675   67         73     9.4         11   9727
##               Grad.Rate
## Abilene Christian University    60
## Adelphi University             56
```

```
## Adrian College          54
## Agnes Scott College     59
## Alaska Pacific University 15
## Albertson College       55
```

```
summary(college)
```

```
##      Private      Apps      Accept      Enroll
## Length:777      Min.   : 81      Min.   : 72      Min.   : 35
## Class :character 1st Qu.: 776      1st Qu.: 604      1st Qu.: 242
## Mode  :character Median : 1558      Median : 1110      Median : 434
##                               Mean  : 3002      Mean  : 2019      Mean  : 780
##                               3rd Qu.: 3624      3rd Qu.: 2424      3rd Qu.: 902
##                               Max.   :48094      Max.   :26330      Max.   :6392
##      Top10perc      Top25perc      F.Undergrad      P.Undergrad
## Min.   : 1.00      Min.   : 9.0      Min.   : 139      Min.   : 1.0
## 1st Qu.:15.00      1st Qu.: 41.0      1st Qu.: 992      1st Qu.: 95.0
## Median :23.00      Median : 54.0      Median : 1707      Median : 353.0
## Mean   :27.56      Mean   : 55.8      Mean   : 3700      Mean   : 855.3
## 3rd Qu.:35.00      3rd Qu.: 69.0      3rd Qu.: 4005      3rd Qu.: 967.0
## Max.   :96.00      Max.   :100.0      Max.   :31643      Max.   :21836.0
##      Outstate      Room.Board      Books      Personal
## Min.   : 2340      Min.   :1780      Min.   : 96.0      Min.   : 250
## 1st Qu.: 7320      1st Qu.:3597      1st Qu.: 470.0      1st Qu.: 850
## Median : 9990      Median :4200      Median : 500.0      Median :1200
## Mean   :10441      Mean   :4358      Mean   : 549.4      Mean   :1341
## 3rd Qu.:12925      3rd Qu.:5050      3rd Qu.: 600.0      3rd Qu.:1700
## Max.   :21700      Max.   :8124      Max.   :2340.0      Max.   :6800
##      PhD      Terminal      S.F.Ratio      perc.alumni
## Min.   : 8.00      Min.   : 24.0      Min.   : 2.50      Min.   : 0.00
## 1st Qu.: 62.00      1st Qu.: 71.0      1st Qu.:11.50      1st Qu.:13.00
## Median : 75.00      Median : 82.0      Median :13.60      Median :21.00
## Mean   : 72.66      Mean   : 79.7      Mean   :14.09      Mean   :22.74
## 3rd Qu.: 85.00      3rd Qu.: 92.0      3rd Qu.:16.50      3rd Qu.:31.00
## Max.   :103.00      Max.   :100.0      Max.   :39.80      Max.   :64.00
##      Expend      Grad.Rate
## Min.   : 3186      Min.   : 10.00
## 1st Qu.: 6751      1st Qu.: 53.00
## Median : 8377      Median : 65.00
## Mean   : 9660      Mean   : 65.46
## 3rd Qu.:10830      3rd Qu.: 78.00
## Max.   :56233      Max.   :118.00
```

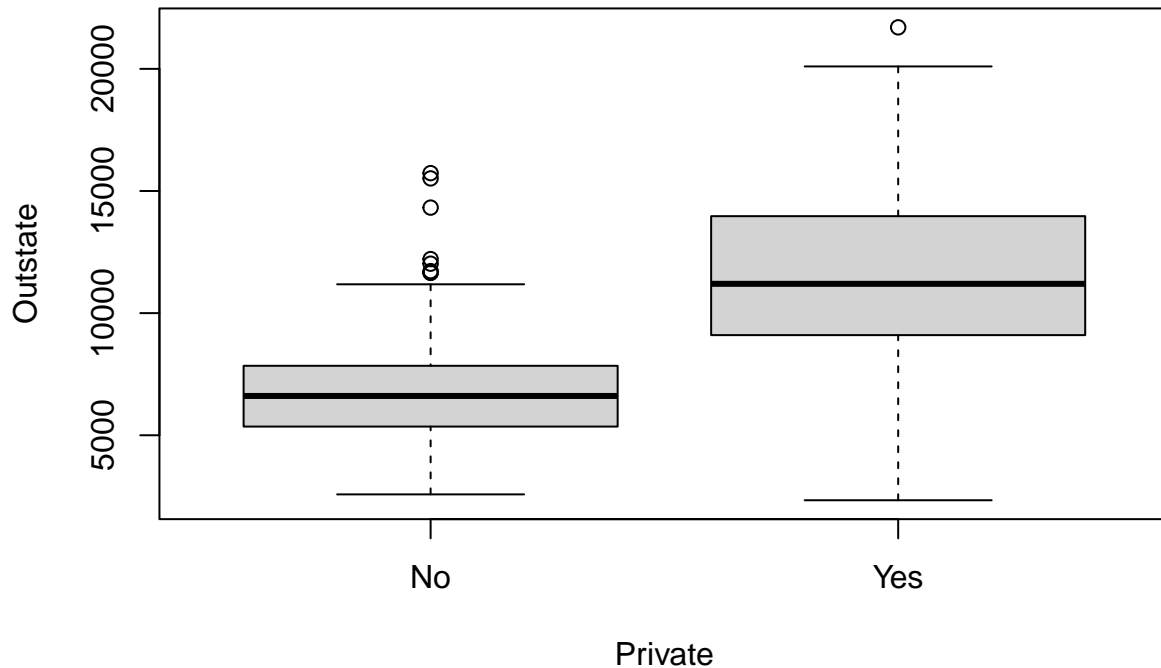
```
# convert Private to factor variable
college$Private <-as.factor(college$Private)
pairs(college[,1:5])
```



Graphing the data

```
boxplot(college$Outstate ~ college$Private, xlab= "Private", ylab="Outstate",
        main="Out of State Tuition vs Private")
```

Out of State Tuition vs Private



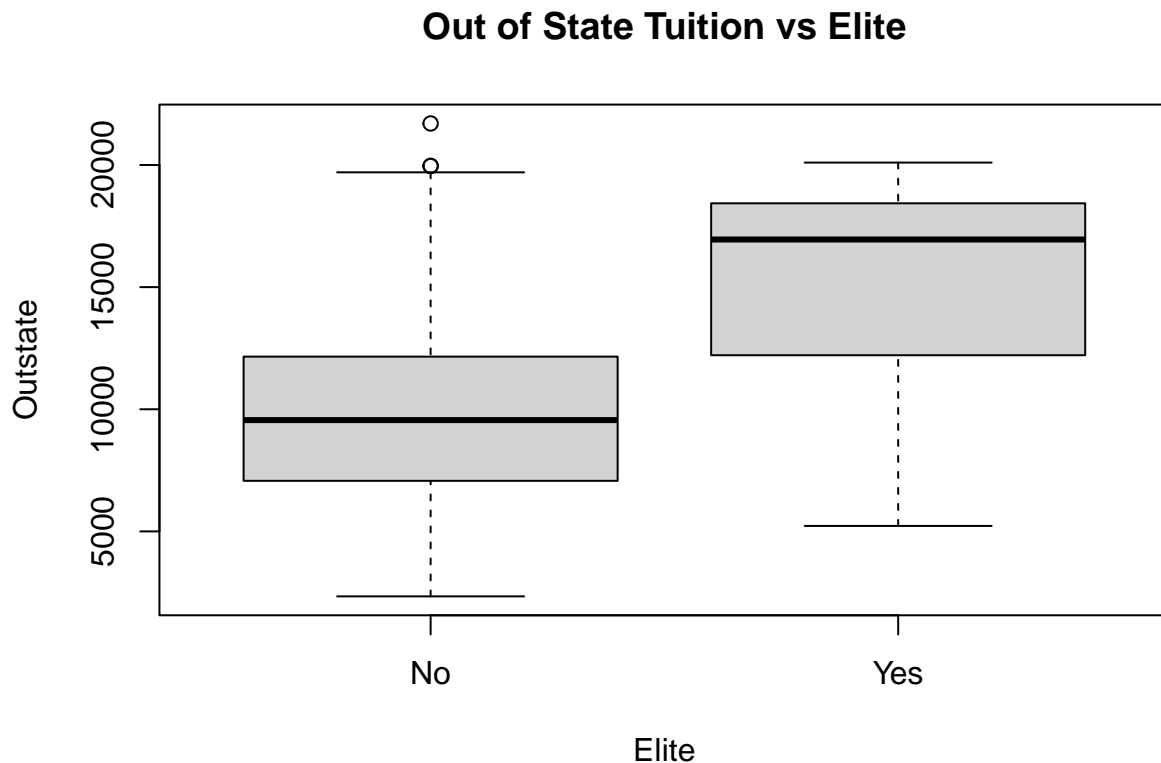
```
Elite <-rep("No", nrow(college))
Elite[college$Top10perc > 50] <-"Yes"
Elite <-as.factor(Elite)
college <-data.frame(college,Elite)
```

```
summary(college)
```

```
## Private      Apps      Accept      Enroll      Top10perc
## No :212      Min.   : 81      Min.   : 72      Min.   : 35      Min.   : 1.00
## Yes:565      1st Qu.: 776      1st Qu.: 604      1st Qu.: 242      1st Qu.:15.00
##              Median : 1558      Median : 1110      Median : 434      Median :23.00
##              Mean   : 3002      Mean   : 2019      Mean   : 780      Mean   :27.56
##              3rd Qu.: 3624      3rd Qu.: 2424      3rd Qu.: 902      3rd Qu.:35.00
##              Max.   :48094      Max.   :26330      Max.   :6392      Max.   :96.00
## Top25perc    F.Undergrad    P.Undergrad      Outstate
## Min.   : 9.0      Min.   : 139      Min.   : 1.0      Min.   : 2340
## 1st Qu.: 41.0      1st Qu.: 992      1st Qu.: 95.0      1st Qu.: 7320
## Median : 54.0      Median : 1707      Median : 353.0      Median : 9990
## Mean   : 55.8      Mean   : 3700      Mean   : 855.3      Mean   :10441
## 3rd Qu.: 69.0      3rd Qu.: 4005      3rd Qu.: 967.0      3rd Qu.:12925
## Max.   :100.0      Max.   :31643      Max.   :21836.0      Max.   :21700
## Room.Board    Books      Personal      PhD
## Min.   :1780      Min.   : 96.0      Min.   : 250      Min.   : 8.00
## 1st Qu.:3597      1st Qu.: 470.0      1st Qu.: 850      1st Qu.: 62.00
## Median :4200      Median : 500.0      Median :1200      Median : 75.00
```

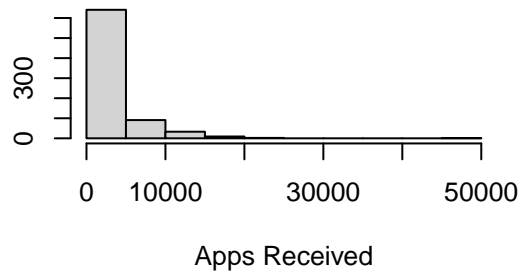
```
## Mean :4358 Mean : 549.4 Mean :1341 Mean : 72.66
## 3rd Qu.:5050 3rd Qu.: 600.0 3rd Qu.:1700 3rd Qu.: 85.00
## Max. :8124 Max. :2340.0 Max. :6800 Max. :103.00
## Terminal S.F.Ratio perc.alumni Expend
## Min. : 24.0 Min. : 2.50 Min. : 0.00 Min. : 3186
## 1st Qu.: 71.0 1st Qu.:11.50 1st Qu.:13.00 1st Qu.: 6751
## Median : 82.0 Median :13.60 Median :21.00 Median : 8377
## Mean : 79.7 Mean :14.09 Mean :22.74 Mean : 9660
## 3rd Qu.: 92.0 3rd Qu.:16.50 3rd Qu.:31.00 3rd Qu.:10830
## Max. :100.0 Max. :39.80 Max. :64.00 Max. :56233
## Grad.Rate Elite
## Min. : 10.00 No :699
## 1st Qu.: 53.00 Yes: 78
## Median : 65.00
## Mean : 65.46
## 3rd Qu.: 78.00
## Max. :118.00
```

```
boxplot(college$Outstate ~ college$Elite, xlab="Elite", ylab="Outstate",
        main="Out of State Tuition vs Elite")
```

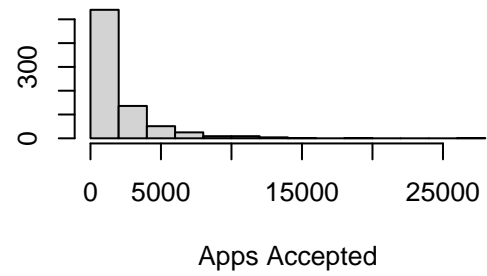


```
par(mfrow=c(2,2))
hist(college$Apps, xlab="Apps Received", ylab="", main="Dist. of Applications Received")
hist(college$Accept, xlab="Apps Accepted", ylab="", main="Dist. of Applications Accepted")
hist(college$Room.Board, xlab="Room and Board Cost", ylab="", main="Dist. of Room & Board Costs")
hist(college$Books, xlab="Estimated Book Cost", ylab="", main="Dist. of Textbook Costs")
```

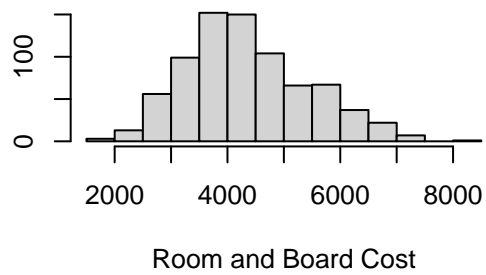
Dist. of Applications Received



Dist. of Applications Accepted



Dist. of Room & Board Costs



Dist. of Textbook Costs

