

19.1: Jackknife sampling

Introduction

edits: — under construction —

R packages

There are several R packages one could use. The package `bootstrap` may be the most general, and includes a jackknife routine suitable for any function. This page demonstrates jackknife estimate of correlation.

Example data set of cars, showing stopping distance by speed of car (scroll down or [click here](#)).

install package `bootstrap`

Jackknife estimates on linear models

These procedures can be done with the `bootstrap` package, but `lmboot` is a specific package to solve the problem

install package `lmboot`

Example data set, Tadpoles from Chapter 14, copied to end of this page for your convenience (scroll down or [click here](#)).

R code

```
jackknife(V02~Body.mass, data = Tadpoles)
```

R returns two values:

1. `bootEstParam`, which are the jackknife parameter estimates. Each column in the matrix lists the values for a coefficient. For this model, `bootEstParam$[,1]` is the intercept and `bootEstParam$[,2]` is the slope.
2. `origEstParam`, a vector with the original parameter estimates for the model coefficients.

```
$bootEstParam
      (Intercept) Body.mass
[1,]    -660.8403    472.6841
[2,]    -539.5951    430.3990
[3,]    -612.8495    454.5188
[4,]    -512.5914    423.0815
[5,]    -543.1577    434.2789
[6,]    -572.3895    442.9176
[7,]    -613.7873    451.2656
[8,]    -594.0366    446.2571
[9,]    -582.1833    443.5404
[10,]   -598.2244    456.0599
[11,]   -531.3152    415.2467
[12,]   -555.7287    430.5604
[13,]   -726.8522    512.1268
```

```
$origEstParam
[,1]
(Intercept) -583.0454
Body.mass   444.9512
```

Get necessary statistics and plots

```
#95% CI slope
quantile(jack.model.1$bootEstParam[,2], probs=c(.025, .975))
```

R returns

```
      2.5%      97.5%
417.5971 500.2940
```

```
#95% CI intercept
quantile(jack.model.1$bootEstParam[,1], probs=c(.025, .975))
```

R returns

```
      2.5%      97.5%
-707.0486 -518.2085
```

Coefficient estimates

Slope

```
#plot the sampling distribution of the slope coefficient
par(mar=c(5,5,5,5)) #setting margins to my preferred values
hist(jack.model.1$bootEstParam[,2], col="blue", main="Jackknife Sampling Distribution
xlab="Slope Estimate")
```

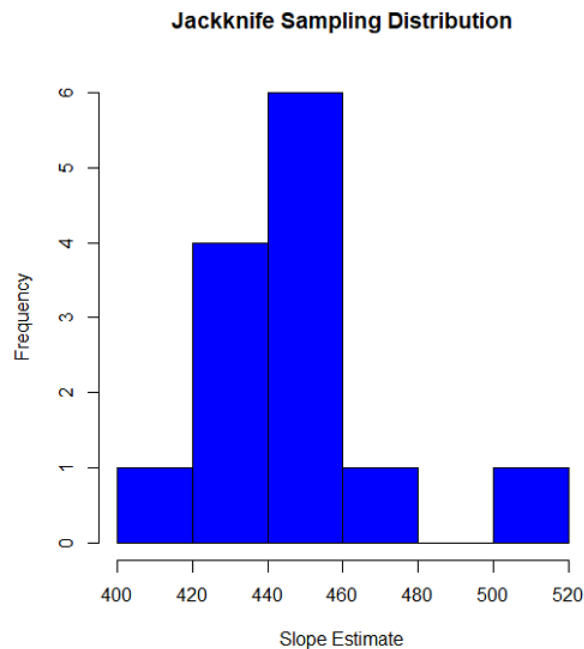


Figure 19.1.1: Histogram of jackknife estimates for slope.

Intercept

```
#95% CI intercept
quantile(jack.model.1$bootEstParam[,1], probs=c(.025, .975))
```

```
par(mar=c(5,5,5,5))
hist(jack.model.1$bootEstParam[,1], col="blue", main="Jackknife Sampling Distribution",
     xlab="Intercept Estimate")
```

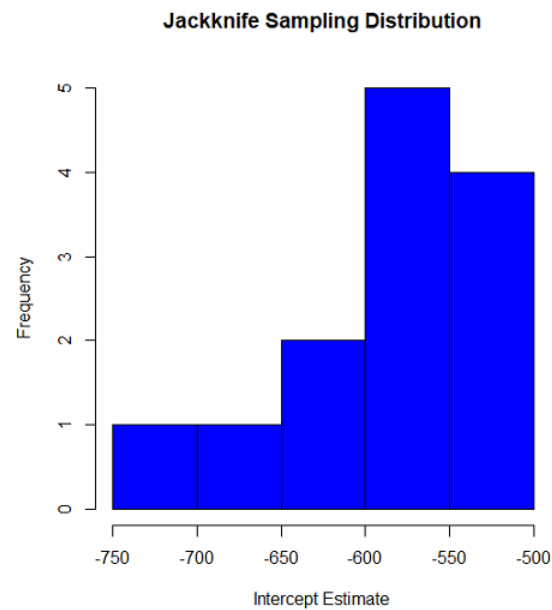


Figure 19.1.2: Histogram of jackknife estimates for intercept.

Questions

edits: pending

Cars data set used in this page

speed	dist
4	2
4	10
7	4
7	22
8	16
9	10
10	18
10	26
10	34
11	17
11	28

12	14
12	20
12	24
12	28
13	26
13	34
13	34
13	46
14	26
14	36
14	60
14	80
15	20
15	26
15	54
16	32
16	40
17	32
17	40
17	50
18	42
18	56
18	76
18	84
19	36
19	46

19	68
20	32
20	48
20	52
20	56
20	64
22	66
23	54
24	70
24	92
24	93
24	120
25	85

Tadpole data set used in this page (sorted)

Gosner	Body mass	VO2
I	1.76	109.41
I	1.88	329.06
I	1.95	82.35
I	2.13	198
I	2.26	607.7
II	2.28	362.71
II	2.35	556.6
II	2.62	612.93
II	2.77	514.02

Gosner	Body mass	VO2
II	2.97	961.01
II	3.14	892.41
II	3.79	976.97
NA	1.46	170.91

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