

Analysis-of-Covariance.R

User

2022-10-28

```
# Anaylsis of Covariance -----
# Loading Packages
library(pacman)
p_load(tidyverse, rstatix, readxl, gridExtra, emmeans, car)

# Importing data
monofilament <- read_excel("D:/Documents/R-Studio Programms/Design/covariates.xlsx")
head(monofilament)
```

```
## # A tibble: 6 x 3
##   Machine Strength Diameter
##   <chr>      <dbl>    <dbl>
## 1 A          36      20
## 2 A          41      25
## 3 A          39      24
## 4 A          42      25
## 5 A          49      32
## 6 B          40      22
```

```
# Summary statistics for the dependent variable strength
monofilament |>
  group_by(Machine) |>
  get_summary_stats(Strength, type = "common")
```

```
## # A tibble: 3 x 11
##   Machine variable      n  min  max median  iqr mean  sd  se  ci
##   <chr>    <chr>    <dbl> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl>
## 1 A      Strength    5    36   49    41     3  41.4  4.83  2.16  5.99
## 2 B      Strength    5    39   48    44     5  43.2  3.70  1.66  4.60
## 3 C      Strength    5    32   42    35     3   36   3.81  1.70  4.73
```

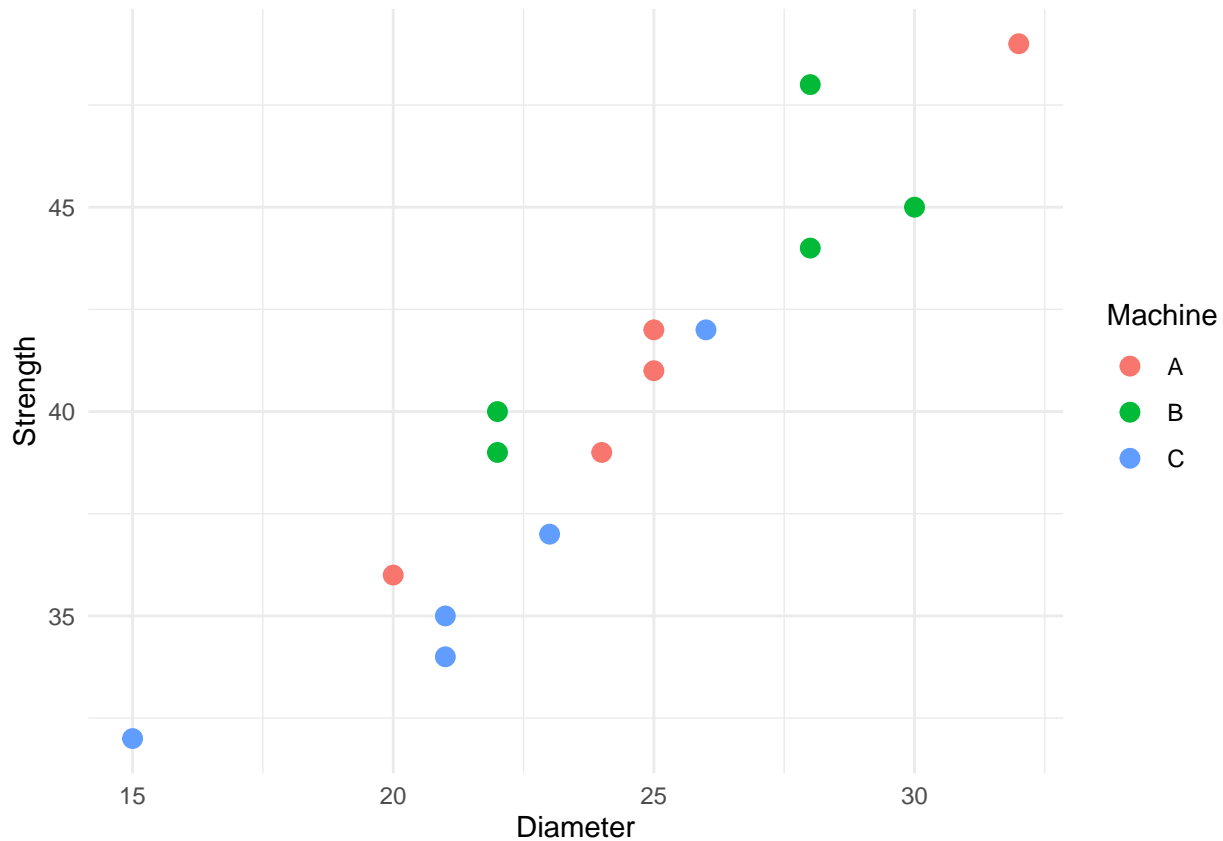
```
#Summary statistics for independent variable diameter
```

```
monofilament |>
  group_by(Machine) |>
  get_summary_stats(Diameter, type = "common")
```

```
## # A tibble: 3 x 11
##   Machine variable      n  min  max median  iqr mean  sd  se  ci
##   <chr>    <chr>    <dbl> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl>
## 1 A      Diameter    5    20   32    25     1  25.2  4.32  1.93  5.37
## 2 B      Diameter    5    22   30    28     6   26   3.74  1.67  4.65
## 3 C      Diameter    5    15   26    21     2  21.2  4.03  1.8   5.00
```

```
#Visualiazing the Data set
```

```
p1 <- ggplot(monofilament, aes(Diameter, Strength, colour = Machine)) +  
  geom_point(size = 3) +  
  theme(legend.position = "top") +  
  theme_minimal()  
p1
```



```
# Perform the Anaylsis of Covariance (One Way Classification - ANCOVA)
```

```
ancov <- anova_test(data = monofilament, formula = Strength ~ Diameter + Machine,  
  type = 3, detailed = TRUE) # type 3 SS should be used in ANCOVA
```

```
## Coefficient covariances computed by hccm()
```

```
get_anova_table(ancov)
```

```
## ANOVA Table (type III tests)
```

```
##
```

##	Effect	SSn	SSd	DFn	DFd	F	p	p<.05	ges
## 1	(Intercept)	96.921	27.986	1	11	38.095	6.99e-05	*	0.776
## 2	Diameter	178.014	27.986	1	11	69.969	4.26e-06	*	0.864
## 3	Machine	13.284	27.986	2	11	2.611	1.18e-01		0.322

```
# Adjusted Means
```

```
adjMeans <- emmeans_test(data = monofilament, formula = Strength ~ Machine,  
  covariate = Diameter)
```

```
get_emmeans(adjMeans)
```

```
## # A tibble: 3 x 8
```

##	Diameter	Machine	emmean	se	df	conf.low	conf.high	method
##	<dbl>	<fct>	<dbl>	<dbl>	<dbl>	<dbl>	<dbl>	<chr>
## 1	24.1	A	40.4	0.724	11	38.8	42.0	Emmeans test
## 2	24.1	B	41.4	0.744	11	39.8	43.1	Emmeans test
## 3	24.1	C	38.8	0.788	11	37.1	40.5	Emmeans test