Biometry. Lecture 22

Alexey Shipunov

Minot State University

April 11, 2012

Outline

Minot State UNIVERSITY

Outline

Minot State UNIVERSITY

Starting...

```
> setwd("<working folder>")
```

or

“Change dir”

in menu!

Previous final question: the answer

What is ANCOVA?

Previous final question: the answer

What is ANCOVA?

- Analysis which checks if regression lines are different

Two-dimensional statistics

Analysis of covariation

ANCOVA model output

```
> ipo <- read.table(
+ "http://ashipunov.info/data/ipomopsis.txt", h=T)
> ipo.lm <- lm(Fruit ~ Root * Grazing, data=ipo)
> summary(ipo.lm)
```

Two equations:

`Fruit = -125.174 + 23.24 * Root` (for grazed)

`Fruit = (-125.174 + 30.806) + (23.24 + 0.756) * Root` (for ungrazed)

ANCOVA model tuning

```
> ipo.lm2 <- update(ipo.lm, ~ . - Root:Grazing)
> summary(ipo.lm2)
> AIC(ipo.lm)
> AIC(ipo.lm2)
```

AIC stands for “Akaike Information Criterion”

Analysis of covariation, example II

Islands of two types: islet-like and stone-like

```
> it <- read.table("http://ashipunov.info/data/it.txt",
+ h=T, sep="\t")
> str(it)
> it$SQ <- log10(it$SQ)
> plot(SP ~ SQ, data=it, type="n")
> text(it$SQ, it$SP, labels=abbreviate(it$TYPE, 1))
> abline(lm(SP ~ SQ, data=subset(it, TYPE=="islet-like")))
> abline(lm(SP ~ SQ, data=subset(it, TYPE=="stone-like")),
+ lty=2)
```

Analysis of covariation, example II

```
> it.ancova <- lm(SP ~ SQ * TYPE, data=it)
> summary(it.ancova)
> it.ancova2 <- update(it.ancova, ~ . - SQ:TYPE)
> summary(it.ancova2)
> AIC(it.ancova)
> AIC(it.ancova2) # better!
> summary(lm(SP ~ SQ + TYPE, data=it)) # like second
```

Interceptions are different but slopes are the same. In statistical language, we may say that in this case, additive model is better. Square and type are two independent terms.

Two-dimensional statistics
Logistic regression

Numeric influence but categorical response

- What if response is binary?
- It is possible to convert success/failure to the **probability of success** and then apply a **generalized linear model**

Analysis of logistic regression

```
> lo <- read.table("http://ashipunov.info/data/logit.txt")
> head(lo); str(lo)
> lo.logit <- glm(formula=V2 ~ V1, family=binomial,
+ data=lo)
> summary(lo.logit)
```

Finishing...

```
> savehistory("20120411.r")
```

Final question (3 points)

Final question (3 points)

What is a logistic regression?

Summary: most important commands

- `lm()`—estimates the linear regression model and many other models (like ANCOVA)
- `glm()`—estimates the logistic regression model and many others

For Further Reading

A. Shipunov.
Biometry [Electronic resource].
2012—onwards.
Mode of access: `http://ashipunov.info/shipunov/school/biol_299`

P. Dalgaard
Introductory Statistics with R. 2nd edition.
Springer, 2008.
Sections 12.7, 13.1, 13.2.

Minot State UNIVERSITY