singlm: A simple introduction to GLM for analysing Poisson and Binomal responses in R

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2020-07-15

Contents

Introduction

expected audience, prerequisite knowledge but will include brief intros. first course in data analysis in which taught regression, t-tests and ANOVA as separate tests.

assumes you have used t.test and aov

```r
# make a plot
# a string
word <- "hello"
x <- rnorm(20)
y <- rnorm(20)
plot(x,y)
```

previous teaching - response variables - predictor variables - choice of test depends on nature of these - regression one contin; t tests one categorical with two levels; one-way anova one categorical with 2 or more levels; two-way anova two categorical each with two or more - functions that you probably used in R

would have been taught that these tests (or models) need response variable that are continuous, in particular normally distributed.

the subject of this book is to teach you how to deal with variables that are Poisson or Binomially distributed.

what is a poisson response

what is a binomial response is

These are analysed with glm()

my experience is that people are often confused by the output in comparison to t.test().

what helps is recognise that that t tests and anova and regression all of these have the same underlying maths. they are linear models and can be analysed with lm()

and the output of lm is very similar to that of glm

Overview of the chapter contents Chapter 1 Revisit regression, t-tests and one- and two-way ANOVA in each case briefly saying when you use them, how you've probably done them before then how you do them with lm(). describe the links between the outs so you can related the new information to your previous knowledge

code conventions used in the book

approach taken in the book: we'll be using `tidyverse` (Wickham et al., 2019) packages.

scope of the book, what isn't covered

Chapter 1

What are linear models

1.1 Introduction

- what is meant by a linear model
- revise regression
- revise t.tests
- doing t.tests as linear models
- linking output of t.test to lm
- revise one way ANOVA
- linking output of aov to lm
- revise two way ANOVA
- doing two way ANOVA as linear models
- linking output of aov to lm
- extensible - ancova design

1.2 What is a linear model?

1.3 Single linear regression

1.4 t-tests

1.4.1 t.test()

1.4.2 lm()

1.4.3 link between the outputs

1.4.4 reporting from lm()

including a figure

1.5   One-way ANOVA

1.5.1   aov()

1.5.2   lm()

1.5.3   link between the outputs

1.5.4   post-hoc for lm()

1.5.5   reporting from lm()

including a figure

1.6   Two-way ANOVA

1.6.1   aov()

1.6.2   lm()

1.6.3   link between the outputs

1.6.4   post-hoc for lm()

1.6.5   reporting from lm()

including a figure

1.7

Chapter 2

GLM for poisson responses

2.1 intro

some stuff introducing pois

2.2 build

some stuff about build pois

2.3 output

some stuff about pois output

Chapter 3

GLM for binomial responses

3.1 intro

some stuff introducing bino

3.2 build

some stuff about build bino

3.3 output

some stuff about bino output

Chapter 4

Summary

key points

where to go next

Bibliography

Wickham, H., Averick, M., Bryan, J., Chang, W., McGowan, L. D., François, R., Grolemund, G., Hayes, A., Henry, L., Hester, J., Kuhn, M., Pedersen, T. L., Miller, E., Bache, S. M., Müller, K., Ooms, J., Robinson, D., Seidel, D. P., Spinu, V., Takahashi, K., Vaughan, D., Wilke, C., Woo, K., and Yutani, H. (2019). Welcome to the tidyverse. *Journal of Open Source Software*, 4(43):1686.