Introduction to Linear Models in glmmTMB

Mollie Brooks

June 2023

This video covers

- simple defaults of `glmmTMB()`
- basic ways to extract output
- accessing help files

Section 1

Fitting a model

Model specification

`glmmTMB(y~x, disp=~1, zi=~0, family=gaussian(), data)`
same as `glmmTMB(y~x, data)`

- `glmmTMB()` defaults
  - `family = gaussian()`
  - `ziformula = ~0`
  - `dispformula = ~1`
  - formula `~x` includes an intercept (unless `~0`)
- use a data object
  - one observation per row

Model specification details

$$\begin{aligned} \mathrm{y} &\sim N(\mu, \sigma^2) && (1) \\ \mu &= E(\mathrm{y}) = X\beta, && (2) \\ \sigma^2 &= \mathrm{Var}(\mathrm{y}) && (3) \end{aligned}$$

β is a parameter vector

X is a model matrix

Plant Weight Example from Base R:

```
## Annette Dobson (1990)
## "An Introduction to Generalized Linear Models" pg 9.
ctl = c(4.17,5.58,5.18,6.11,4.50,4.61,5.17,4.53,5.33,5.14)
trt = c(4.81,4.17,4.41,3.59,5.87,3.83,6.03,4.89,4.32,4.69)
group = gl(2, 10, 20, labels = c("Ctl","Trt"))
weight = c(ctl, trt)
dat = data.frame(weight, group)
lm.D9 = glmmTMB(weight ~ group, dat)
```

see code_lm.R

Interface Formula

- default is to have an intercept, unless `+0` or `-1`
- interaction term `a:b`
- `a*b` is equivalent to `a+b+a:b`
- quadratic term `I(a^2)`
- categorical variables
  - base level and contrasts
  - you can rearrange factor levels

Section 2

Basic Output

Basic Output

- inference with z-statistics
- `bbmle` package has `AICtab`, `AICctab`, `BICtab`
- `residuals()`
- `confint()`
- `profile()`
- `predict()`
- `simulate()`

see `code_lm2.R`

Recap

- how the interface works
- model matrix behind the scenes
- basic ways to extract output
- help files for generic methods