Conditional binomial distribution for predicted outcomes

For: Continuous non-normally distributed outcomes

Outcome: *c* out of *n* trials. Two limits. Integers (what the model predicts (number of events)) or percentages (the scale the outcome is)

Model scale:

Logit: predicted probability of having 1 out of n trials correct (technically, 1s) for the reference case.

Probability: the predicted proportion of correct responses (1s) out of 1.

Example:

Outcome: score between 0 and 50

Logit: 1.7 -> the logit of the probability of any (NOT 1) trial being correct (we can multiply the logit by 50 to get the proportion of correct answers). .845 \* 50 = 42.28 (expected mean (data scale) out of 50).

Probability (1/(1+exp(-1\*1.7))): the predicted proportion of any correct.

Unlogit: the probability of a correct answer (any). We can multiply this probability for the max value *n* to get an estimate of the number of correct responses.

correct answers for the reference case is 84.5% (which is the same as the correct proportion of 1 out 50)

Multilevel modelling

**Unconditional model (empty)**

Math score (range between 350 - 850)

484.573

Predicted performance on Math admission test among schools (the grand mean of the school means)

**Conditional model**

**Conditional/Expected (based on the model) mean for predictor values at 0.**

SexFem\_RBD2 (difference between school mean and general mean across schools):

-32.9403 (1 = difference between schools with not girls and only girls)

-3.29403 if I use 10% shift scale

Difference between a level 2 predictor equals 1 and 0

Estimated mean difference in math performance between males and females among schools (centered at the overall mean of women in each school)

SexFem\_RBD1 (difference between the specific value of each case and the average of its school):

-20.3560

Expected diff between boys and girls that go to the same school

Estimated mean difference in math performance between males and females within schools (centered at the average mean of women of each school)

SexFem\_RBD2 : SexFem\_RBD1:

7.2579

The difference become smaller the more girls there are in the school

The mean difference in math performance between males and females across schools is less negative within schools

The mean difference in math performance between males and females within schools is less negative between schools

RBD Sex Sex\_RBD Sex\_2 Sex\_1

1 1 .78 .18 .22

1 0 .78 .18 -.78

2 0 .30 -.30 -.30

2 1 .30 -.30 .70

Mean across schools = .60

Gender gap (level 1) -20.3560

Gender composition of the school (level 2)

For a 1 unit change in gender composition (the whole range of the predictor), the gender gap becomes less negative by 7.2579.

Cross-validation (50%: set up the model

50%: does the model fit the data? -> same conclusions?)