

R: Homework 5

1. Report -2LnLike , number of parameters, AIC, BIC from lmer, BIC from lmer, BIC.new from bic.hlm, $\hat{\tau}s$, $\hat{\sigma}^2$, R_1^2 and R_2^2 for Models (d) through (u) from computer labs 1 and 2. Report (a table of this information would be very nice).
 - (a) Are there any differences in terms of “best” models when from BIC from lmer and BIC from bic.hlm?
 - (b) Based on the information criteria, among the random intercept models, which is the “best” (or is there a unique one)?
 - (c) Based on the information criteria, among ALL models (random intercept and random slopes models), which is the “best” (or is there a unique one)?
 - (d) What is the value of the harmonic mean used to compute R_2^2 ?
 - (e) Which is the “best” model based on R^2 measures? Are the models with the better R^2 's the same as the better/best models according to the information criteria?
 - (f) Interpret the values of R_1^2 and R_2^2 from model (s).
2. Consider the “base model” in lab 3, do you need a random slope? (Be sure to report any statistical tests that you use for this question).
3. Compare the standard errors of parameters and results of significance tests for fixed effects when you use the model based versus the robust estimators of the standard errors. Use the satterthwaite degrees of freedom. Which do you think is the best to use for testing fixed effects and why?

Note: For this problem, just look at the base model.

4. Report what contrasts you tested, the results of them, and any action you took based on the results for
 - (a) Type of community
 - (b) Hours watching TV or videos
 - (c) Hours playing computer games
5. Starting with the base model from computer lab 3 how did you refine this to obtain a “best” model (i.e. simplify by dropping effects, re-coding a discrete variable, etc.). Summarize the steps that you and why you took them. This includes how you used the information from your contrasts, information criteria, $-2 \log(\textit{likelihood})$, R_1^2 , R_2^2 , tests of parameters, etc.
6. If your final model has a random slope, re-check to make sure that you need it. Report your results.
7. Give a full interpretation of the final model. Also give the HLM, linear mixed model and marginal model formulations using the parameter estimates.