Lab 7

Multivariate Statistics with R

This week, we will familiarise ourselves further with `OpenMX` and its helper package `umx` and run and compare some models. Onwards!

Task 1: Install the `umx` package.

Task 2: Open help on `umx`: Have a quick scan of the functions, look at an example or two.

Task 3: Run the function `umx_set_optimizer()`.

- **Question 3.1:** What is an optimiser?

  Note This is a *helper* function: all functions beginning `umx_` are helpers.

- **Question 3.2:** How do you see the code inside a function?
- **Question 3.3:** Look at the code inside `umx_set_optimizer`.

Task 4: Get help on `umxRAM()`

Task 5: Look the first simple example in `umxRAM()` help.

- **Question 5.1:** What do `wt`, `disp`, and `mpg` stand for in `mtcars`?
- **Question 5.2:** Create a `mxData` object from the relevant `mtcars` variables (`umxRAM()` can actually cope with dataframes as input but do this anyway).
- **Question 5.3:** Are we using the raw data or a covariance matrix?
- **Question 5.4:** Build model `m1`.

Task 6: By default, once you are done, you see a compact fit summary.

- **Question 6.1:** Is this good fit?

Task 7: Get a `summary()` of the model.

- **Question 7.1:** What do the components mean?

Task 8: Compare with `umxSummary()`.

- **Question 8.1:** Get `umxSummary()` to show the path estimates.

Task 9: Get the AIC from the model.

- **Question 9.1:** What does AIC stand for?

Task 10: Plot the output.

Task 11: Get `plot()` to draw a standardised model.

Task 12: Why aren't there any means in the plot?

Task 13: Draw a model of the hypothesis in your thesis.

- **Question 13.1:** Do all the paths in your drawing have arrow heads on at least one end?
- **Question 13.2:** Why must we always draw the arrow heads on our paths (not just leave them blank)?
- **Question 13.3:** Are all the circles on your model connected to squares?
- **Question 13.4:** Is everything you are interested in measured multiple ways, so it can be a latent variable?

- **Question 13.5:** Did you draw the expected residuals and covariance?

Task 14: Build a new model `m2`.

- **Question 14.1:** Make it like the one in Question 4.4, but leave out the path from `wt` to `mpg`.
- **Question 14.2:** Did it run?

Task 15: umxCompare `m1` and `m2`

- **Question 15.1:** How did `m2` fit the data compared to `m1`? How do you know?
- **Question 15.2:** What happened to AIC?

Task 16: Visit the `OpenMx` home page.

Task 17: Build and run the 1-factor CFA model on the home page.

- **Question 17.1:** Try leaving out a path from g to one of the items.
- **Question 17.2:** Does the model even run?
- **Question 17.3:** Does it fit worse or better? How would we know?

Task 18: Visit the `umx` home page

- **Question 18.1:** For homework, try some other example models.

Next week, we will discuss model fit and model comparison in more detail.

See you!