Modeling covariance

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April 2021

When we explicitly model covariance in MLMs our predictive capability goes up—the models perform better on out of sample predictions. Often we model varying effects (slopes and intercepts) with a Multivariate Normal consisting of a population of αs and βs.[1] The variance-covariance matrix describes how each parameter's posterior probability is associated with each other parameter's posterior probability. Modeling this makes our predictions improve.

[1] tbh: you've been working with the multivariate normal distribution since Ch. 4.

You can refrain from studying Chapter 14.2 and 14.4 (they introduce non-centered parameterization in the context of varying effects models and custom covariance matrices). However, Chapter 14.3 is well worth a read since it introduces *Multivariate Linear Models*, i.e., when we have > 1 outcomes.

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In Chapter 14.5 we look into Gaussian Processes. This is a computationally heavy and advanced concept that is mainly used for modeling time and/or space variables. Doing this with the `Rethinking` package is a bit complicated so you will see in exercises for week 8 how we can do this more straightforwardly in another tool.

A.k.a. temporal and spatial modeling.