Variance Components

Fall 2007

1 Introduction

Mixed models arise in many experimental situations. While a lot of attention is focused on fixed effects, variance components are also of interest. When examining fixed effects variance components play an important role in experimental design, testing, and estimation. In addition, variance components (and functions of them) are of interest in themselves. The amount of variability present in a population is important both in determining the opportunity to improve the population through selection and in quality control.

The purpose of this course is to develop an understanding of different methods of estimating variance components in linear mixed models. To accomplish this we will need to brush up on our matrix algebra and review mixed models. The necessary matrix algebra will be introduced as needed. Appendix M summarizes most of the results we will need for this course. An introduction to mixed models is contained in Chapter 1. Chapter 2 contains a brief history and is recommended reading.

We will be using a number of computer packages. `PROC IML` will be used for examining the underlying mechanics of the estimation procedures. `PROC MIXED` will be also used to estimate variance components. While standard statistical packages are often inadequate for the analysis of large data sets we will not be using any of the more specialized programs. It is also important to note that in many cases there may not be a program that is capable of conducting the analysis.

2 Text

Searle, S.R., Casella G. and McCulloch, C.E. (1992). *Variance Components*. John Wiley & Sons, New York.

3 Instructor

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4 Grading

Two Exams:	100 points each
Quizzes and Homework:	100 points
Final exam:	150 points
	Grading will be on a straight 90, 80, 70, 60 percent basis.
Web Page:	http://statistics.unl.edu/faculty/steve/972/2007

5 Outline

Topic	Book
Mixed Models (matrix)	1
Sampling Distributions	3.5–3.6
ML/REML	3.7–3.8
Balanced ANOVA	4.1–4.4
Sampling and Matrix	4.5–4.6
ML/REML	4.7–4.10
Unbalanced	5.1–5.2,5.5–5.6
ML/REML	6
Prediction	7
Computing	
Review	
Final Exam	Tuesday Dec. 18 at 10:00