Special Topics: Latent Class and Mixture Models

HUDM 6552 002

Spring 2009	Thursday 5:10-6:50, Grace Dodge Hall 452
Instructor:	Lawrence T. DeCarlo
Office:	Dodge 453h
Office hours:	Tues., 3-5, and by appointment
Phone:	212-678-4037
Email:	decarlo@tc.edu
Website:	http://www.columbia.edu/~ld208/

Required Texts:

Latent Class Scaling Analysis. (1998). C. Mitchell Dayton. Thousand Oaks, CA: Sage Publications.

Latent Class Analysis. (1987). Allan L. McCutcheon. Newbury Park: CA: Sage Publications.

Loglinear Models with Latent Variables. (1993). Jacques A. Hagenaars. Newbury Park, CA: Sage Publications.

Recommended:

Latent Class and Discrete Latent Trait Models: Similarities and differences. (1996). Ton Heinen. Thousand Oaks, CA: Sage Publications.

An Introduction to Categorical Data Analysis. (1996). Alan Agresti, NY: John Wiley & Sons.

Intepreting Probability models: Logit, Probit and Other Generalized Linear Models. (1994). Tim Futing Liao. Sage Publications.

Linear Probability, Logit, and Probit Models. (1984). J. H. Aldrich & F. D. Nelson. Sage Publications.

Objectives

This course focuses on the analysis of variables that consist of ordered or unordered categories. These variables are typically viewed as being measures of latent categorical variables (latent classes) or latent continuous variables (latent traits). This course will examine current approaches to measuring latent variables with categorical indicators. Topics covered include the analysis of contingency tables, measures of association, the binomial and multinomial distributions, logistic regression for binary and ordinal responses, generalized linear models, log-linear models, latent class analysis, extensions of latent class models, mixture models, and some applications in measurement and signal detection theory.

Software

The software LEM, which is freely available, will be used; there is a link to it at my website. LEM is a general program for categorical data analysis that can be used to fit many types of models, such as loglinear models, generalized linear models, latent class models, and lisrel-like models for categorical dependent variables. A manual that you can print is included. The manual is:

> *LEM: A general program for the analysis of categorical data*. (1997). Jeroen K. Vermunt. Tilburg University.

Some additional references that are particularly important for material covered in the course:

> *Categorical variables in developmental research*. (1996). Alexander von Eye, & Clifford Clogg, (Eds.). NY: Academic Press.
>
> *Latent variables analysis: Applications for developmental research*. (1994). Alexander von Eye, & Clifford C. Clogg, (Eds.). Thousand Oaks, CA: Sage Publications.
>
> *Log-linear models for event histories.* (1997). Jeroen K. Vermunt, Thousand Oaks, CA: Sage Publications.
>
> *Applications of latent trait and latent class models in the social sciences*. (1997). Jürgen Rost, & Rolf Langeheine, (Eds.). NY: Waxmann Münster.
>
> *Handbook of statistical modeling for the social and behavioral sciences*. (1995). Gerhard Arminger, Clifford C. Clogg, & Michael E. Sobel, (Eds.). NY: Plenum press.
>
> *Ordinal data modeling*. (1999). Valen E. Johnson, & James H. Albert. NY: Springer.

Some general useful references:

> *Categorical data analysis*. (1990). Agresti, Alan. NY: John Wiley & Sons.
>
> *Multivariate statistical modelling based on generalized linear models*. (1994). Ludwig Fahrmeir, & Gerhard Tutz. NY: Springer-Verlag.
>
> *Generalized linear models*. (2^{nd} ed.). (1989). Peter McCullagh, & John A. Nelder. NY: Chapman & Hall.
>
> *An introduction to generalized linear models*. (1990). Annette J. Dobson. NY: Chapman & Hall.

Topic	Reading	Date
Overview	Class notes	1/22
Background: Probability		1/29
Probability distributions, Odds Ratio		2/5
Introduction to LEM	Vermunt	2/12
Logistic Regression	Agresti	2/19
Other software: Mplus	Muthén & Muthén	2/26
Parameterization of Models		3/5
Log-linear models, Association models	Hagenaars	3/12
Spring Break		3/19
Multivariate log-linear models		3/26
Latent class analysis	Dayton, McCutcheon	4/2
Latent class models continued	Clogg	4/9
Latent class models - technical issues		4/16
Multivariate categorical models	McCutcheon	4/23
Advanced categorical models		4/30
Summary		5/7

Grading

Grades will be based on a project to be arranged between the student and professor. The project will consist of an analysis that uses latent categorical variables in a multivariate model. The analysis, which much be approved by the professor, must involve the use of LEM, Mplus, or other software approved by the instructor.

Services for Students with Disabilities

The College will make reasonable accommodations for persons with documented disabilities. Students are encouraged to contact the Office of Access and Services for Individuals with Disabilities for information about registration (166 Thorndike Hall). Services are available only to students who are registered and submit appropriate documentation." As your instructor, I am happy to discuss specific needs with you as well.

IN Incomplete

The grade of Incomplete is to be assigned only when the course attendance requirement has been met but, for reasons satisfactory to the instructor, the granting of a final grade has been postponed because certain course assignments are outstanding. If the outstanding assignments are completed within one calendar year from the date of the close of term in which the grade of Incomplete was received and a final grade submitted, the final grade will be recorded on the permanent transcript, replacing the grade of Incomplete, with a transcript notation indicating the date that the grade of Incomplete was replaced by a final grade.

If the outstanding work is not completed within one calendar year from the date of the close of term in which the grade of Incomplete was received, the grade will remain as a permanent Incomplete on the transcript. In such instances, if the course is a required course or part of an approved program of study, students will be required to re-enroll in the course including repayment of all tuition and fee charges for the new registration and satisfactorily complete all course requirements. If the required course is not offered in subsequent terms, the student should speak with the faculty advisor or Program Coordinator about their options for fulfilling the degree requirement. Doctoral students with six or more credits with grades of Incomplete included on their program of study will not be allowed to sit for the certification exam.