Department of Statistics, The Chinese University of Hong Kong
STAT 5102 Regression in Practice (Term 1, 2018–19)

Course Outline

Description:

The course introduces applied regression methodologies using various functional areas of business as the frame of reference, including management, finance and marketing. Topics include the use of correlation coefficient as a measure of relationship, the use of simple linear regression, multiple regression and logistic regression in business projection and forecasting, as well as the use of model building techniques to incorporate qualitative variables in prediction.

Learning objectives:

At the end of this course, students are expected to

i. learn the essential skills in model building using multiple regression techniques,
ii. understand the procedures of applying regression analysis to real datasets in practical problems,
iii. become familiar with the SAS statistical software (the regression module) and
iv. be able to use the regression model for prediction and forecasting.

Course content:

Topic	Content
I. Simple Linear Regression	Simple linear regression and the method of least squares, estimation and inference of regression parameters, interpretation of the regression equation, prediction and residual plots
II. Multivariate Linear Regression	Introduction of the multiple regression model, least squares estimation, maximum likelihood estimation and inference of regression parameters, regression models for quantitative and qualitative predictors, prediction and applications
III. Model Building	Model building and variable selection, stepwise regression and all-possible-regressions selection procedure
IV. Diagnostics and Regression Pitfalls	Diagnostics, residual analysis, multicollinearity, remedial measures
V. Weighted least squares regression, Logistic regression, Ridge regression	Estimation, inference and their applications

Time and venue:

Lectures: Every Monday 7:00-9:15pm, 305 Wu Ho Man Yuen Building (WMY)

Assessment Scheme:

Homework	20%	
Midterm	25%	(An in-class written exam; 2 A4 double-sided info sheets are allowed)
Final	25%	(An in-class written exam; 4 A4 double-sided info sheets are allowed)
Term-end Project	30%	

Instructor and Teaching Assistant Contacts:

Instructor: Tony Sit
106 Lady Shaw Building
tel: +852.3943.7054; email: tonysit@sta.cuhk.edu.hk

Teaching assistant: Arthur Sze Ming Lee
G32 Lady Shaw Building
tel: +852.3943.8535; email: 1155049067@link.cuhk.edu.hk

Suggested References:

i. *Mendenhall, W. and Sincich, T. (2012). *A Second Course in Statistics: Regression Analysis, 7th ed.*: Prentice Hall.

ii. Weisberg, S. (2005). *Applied Linear Regression*: Wiley.

iii. Montgomery, D.C., Peck, E.A. and Vining, G.G. (2012). *Introduction to Linear Regression Analysis, 5th ed.*: Wiley. (More advanced)

Learning Platform:

You may use the University *e*-learning platform to access course information and course materials. The website is managed by the University. Should you have enquiry on the system, please contact Mr. Julian Wong (julianwong@cuhk.edu.hk) by e-mail. Should you have comments on the course content, please contact me or the teaching assistant directly.

Feedback and Evaluation:

Students' comments and feedback are valuable for improving the course, and students are welcomed to provide comments and feedback via various channels. Mid-term course evaluation and course evaluation will be conducted. For comments that require immediate action, please let me or the teaching assistant know as soon as possible.

Tentative Course Schedule:

Date	Topics covered
[L1] 3/Sept	- Background Introduction (Matrix operations) - Introduction to simple linear regression - Least-squares estimation
[L2] 10/Sept	- Parameter estimation and inference for simple linear regression models - Interpretation of the regression equation - Prediction - Residual plots
[L3] 17/Sept	- Computer Lab Demonstration (G25, Lady Shaw Building)
24/Sept, 1/Oct	*Mid-autumn Festival, National Day Holiday*
[L4] 8/Oct	- Introduction to multiple linear regression - Least squares estimation - Maximum likelihood estimation (MLE) - Estimation and inference of parameters in multiple regression models - Interpretation of parameters in multiple regression models
[L5] 15/Oct	- Quantitative and qualitative predictors - Prediction and applications
[L6] 22/Oct	- Computer Lab Demonstration (G25, Lady Shaw Building)
[L7] 29/Oct	- Model building - Variable selection
5/Nov	*Mid-term Examination*
[L8] 12/Nov	- Diagnostics and regression pitfalls
[L9] 19/Nov	- Logistic regression

Date	Topics covered
[L10] 26/Nov	- Computer Lab Demonstration (G25, Lady Shaw Building)
[L11] 3/Dec	- Revision - Backup
10/Dec	*Final Examination*

Academic Honesty and Plagiarism:

Honesty for Academic Works: A Guide for Students and Teachers Attention is drawn to University policy and regulations on honesty in academic work, and to the disciplinary guidelines and procedures applicable to breaches of such policy and regulations. Details may be found at http://www.cuhk.edu.hk/policy/academichonesty/.

The final version of the term project must be uploaded before the due date to the plagiarism detection engine VeriGuide[1]. The system will issue a receipt which also contains a declaration of honesty. The declaration should be signed, and the receipt stapled to the hard copy of the report. Reports without the receipt will not be graded by the teacher.

[1]For details, refer to the website https://academic.veriguide.org/academic/login_CUHK.jspx.