APLM Class notes and Homework

Course: Applied Linear Models, Fall 2002.
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O ce Hour: Thr 1200{1300.

Class notes

A few questions to ask yourself:

- Why am I taking this course?
- What am I going to learn?
- What does it take to prevail or to succeed in this course?
- What are the connection among this course and other course?
- Am I well-equipped for this course? Or do I need to repolish some skills I've had but a little bit rusty?
- How does this course t to my career planning?

Learning APLM

In additional to lectures, we will do a few projects in this course. The whole

Gauss-Markov Theorem and its implication,

Multiple Regression and ANOVA: Compare and contrast,

Diagnosis and Remedial measures in GLM,

Cochran Theorem and its applications in GLM,

Simultaneous Inferences in GLM.

Brief survey on sampling theory

Evaluation

Your performance will be evaluated by homework, team project and presentation, exams (written, oral, onsite and quiz).

Outline

Regression and GLM

- { Why is it so popular?
- { What are the applications?
- { Does linear regression apply to non-linear relation?
- { Estimation and Prediction
- { Use, Misuse and Abuse
- { Review of Simple Linear Regression
  - Formulation and Interpretation
  - Parameters, Estimating parameters
  - Statistical Theory and criteria
  - Estimation/Control/Prediction

Examples

Reading and Practice

1. Review the basic probability and statistic stu in Appendix A, NKNW.
2. Preview Ch. 1. Simple Linear Regression
3. NWNK, Ch. 5: Matrix Approach to Simple Linear Regression
4. Familiar yourself with our am.ndhu.edu.tw, learn Unix
5. Practice R. Read the sample programs and .
6. Browse http://lib.stat.cmu.edu. Particularly, read the stories and data in DATA and STORY link

Homework (due on 020927 in class). No late homework accepted.)

Properties of X
Let $X_1; \quad ; X_n \quad N(\; ; \; ^2)$ assuming ^{2} is known. Is $X = \frac{1}{n}\sum_{i=1}^{n} X_i$ a good estimators for ? List a few good properties of X and prove brie y. What if $X_1; \quad ; X_n$ is only known to be uncorrelated but $E(X_i) = \;$, will the earlier properties persist?

Sampling distributions related to normal
Let $X_1; \quad ; X_n \quad N(\; ; \; ^2)$ assuming ^{2} is known. What are the distributions of X, $\sum_{i=1}^{n}(X_i \quad)^2; X{=}S$ where $S^2 = \frac{1}{n-1}\sum_{i=1}^{n}(X_i \quad X)^2$? Sketch the proof of your claim. Hint: mgf or change-of-variable.

Data Set Skim through the description about the data sets in the Appendix C. Preview the chapters which will be covered in this course. Do you nd any similar or analogous local problem/question of interest? • ~ } |