STAT 890
Functional Data Analysis

Spring 2008
Day Course

Students requiring accommodations as a result of disability, must contact the Centre for Students with Disabilities 778-782-3112 or csdo@sfu.ca

Instructor: Dr. Jigu Cao

Textbook:

Functional Data Analysis, 2nd ed. by: Ramsay & Silverman, Publisher: Springer

Slides will be posted in the website (http://www.stat.sfu.ca/~cao/teaching.html) before each class.

Course Outline:

Doctors have growth curves of the children after measuring their body heights over the entire growing period. Functional data analysis (FDA) would treat one growth curve as one functional data. Without any assumption on the parametric forms for growth curves, we can transfer the discrete measurements for body heights into a continuous curve by nonparametric smoothing. FDA can then study many important features for growth curves such as growth rates, which are just derivatives of growth curves. In fact, the central theme of FDA is the many uses of derivatives.

The course will introduce nonparametric smoothing with the spline method. Some special topics will be discussed, including the generalized additive models and the semiparametric additive models. We will also study dynamical models, usually in forms of ordinary or stochastic differential equations. Particularly, we will review varied methods for estimating dynamical models from noisy data. This is one new and exciting research area for statisticians. The classic functional linear models, functional component principle analysis and curve registration will also be covered.

Grading Scheme:

Homework: 30%, Projects: 70%, No exams.

Some programming and data analysis are required using matlab/R packages. You are very welcome to bring your research projects involved with smoothing. I also have a few projects for you to choose.

Students should be aware that they have certain rights to confidentiality concerning the return of course papers and the posting of marks. Please pay careful attention to the options discussed in class at the beginning of the semester. Students are reminded that Academic Honesty is a cornerstone of the acquisition of knowledge. Scholarly integrity is required of all members of the University. Please consult the General Guidelines of the calendar for more details.

Revised October 2007