UNIVERSITY OF SYDNEY

SCHOOL OF MATHEMATICS AND STATISTICS

Statistics Seminar

Friday, 18 May 2007, 2.00pm

Carslaw 373

Estimation of a regression function when the observations contain measurement errors: Berkson vs classical errors

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Abstract

We consider density and regression estimation from a sample that contains measurement errors. In the classical context, the variable X of interest is observed with an error that is independent and additive. In other words, we observe W where W=X+U, with X and U independent. There are many practical examples where such a model can not reasonably be assumed. In many epidemiologic studies, for example, the erroneous observations are such that the roles of X and W are inverted: in such problems, it is not possible to measure the variable of interest, X, directly, and one rather measures another quantity, W, that is linearly related to X. For example, W could represent the concentration of a toxic substance measured at several fixed stations, whereas the actual exposure of individuals, X, varies around the concentrations at the stations. In this second type of problems, the errors are called Berkson errors. Although the two types of errors look similar, the methodology used to estimate a curve with classical errors is not valid in the case of Berkson errors. We discuss techniques of regression estimation for Berkson errors and a mixture of the two types of errors.

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