Statistical Engineering Division Seminar

Tuesday, August 20, 1996, 11:00 am

Lecture Room C, Administration Building
National Institute of Standards and Technology
Gaithersburg, MD

Prediction Intervals for Measurement Error Models, With Application to Predicting Compressive Strength of Concrete

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A measurement error model differs from an ordinary regression model in that the explanatory variable X in the latter model is assumed to be exactly observed, whereas in the former model X is observed with error. Although the least squares estimator works quite well for the regression model, it is inconsistent for the measurement error model. Typically extra information is needed to identify the model and to have any hope of constructing a consistent estimator. This extra information causes problems in application, since in many situations the information is not available.

In some situations though, the least squares approach (even though giving an inconsistent estimator) provides good prediction intervals under the measurement error model without any identifiability assumption. (Isn't this amazing?) We shall discuss situations where the least squares approach works in terms of prediction and where it does not. We focus on the linear model and will deal with some non-linear models. When the least squares approach does not work, we propose a different approach which works for prediction asymptotically without the identifiability assumption.

The focus of the talk is on constructing prediction intervals for one future observation or confidence intervals for the mean of the future observation. The intervals derived by using the least squares approach for these two problems turn out to behave drastically differently in coverage probability. The talk is based on joint work with Ken Snyder at NIST which is motivated by the problem of predicting the compressive strength of concrete using various nondestructive tests, including the ultrasonic pulse velocity test.

Dr. J. T. Gene Hwang joined the faculty at Cornell in 1979 and has been Professor of Statistics and Mathematics since 1989. He is one of the leading researchers in the theory and application of statistical confidence intervals, and has published forty-eight technical statistical papers in refereed journals.

Dr. Hwang has unique expertise in constructing confidence intervals for complicated models, such as the measurement error models, which have wide application to problems studied at NIST. He also has extensive experience in working as a statistical consultant at Cornell and NIST as well as in Taiwan. He has given about 100 research talks including twenty invited talks for national and international meetings. Dr. Hwang has visited NIST from time to time over the last five years and was an ASA Research Fellow at NIST in the Fall of 1993.

He is an associate editor for *The Annals of Statistics*, has been an associate editor for *Statistica Sinica*, and has served as referee for many research journals in statistics. He is a Fellow of the Institute of Mathematical Statistics and an elected member of the International Statistical Institute.

(A NIST Shuttle is scheduled 30 minutes before the talk for pickup from NIST North.)

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