

STATISTICS COLLOQUIUM

MONDAY, SEPTEMBER 18, 2006

TALK: 4:00 PM — SCIENCE CENTER B-10

RECEPTION: 5:15 PM — SCIENCE CENTER, 7TH FLOOR

“The Dempster-Shafer Calculus for Statisticians”

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ABSTRACT

The Dempster-Shafer (DS) theory of probabilistic reasoning is presented in terms of a semantics whereby every meaningful formal assertion is associated with a triple (p, q, r) where p is the probability “for” the assertion, q is the probability “against” the assertion, and r is the probability of “don’t know”. Arguments are presented for the necessity of “don’t know”. Elements of the calculus are sketched, including the extension of a DS model from a margin to a full state space, and DS combination of independent DS uncertainty assessments on the full space. The methodology is applied to inference and prediction from Poisson counts, including an introduction to the use of join-tree model structure to simplify and shorten computation. The relation of DS theory to statistical significance testing is elaborated, introducing along the way the new concept of “dull” null hypothesis.

Key words: Dempster-Shafer; belief functions; state space; Poisson model; join-tree computation; statistical significance; dull null hypothesis