"On Testing For and Against a Set of Inequality Constraints"

Abstract:

There are numerous situations in categorical data analysis where one wishes to test hypotheses involving a set of linear inequality constraints placed upon probability vectors corresponding to independent multinomials. For example, it may be of interest to test for equality of these probability vectors against the alternative that they are stochastically ordered. In this case the null hypotheses imposes a set of linear equality constraints on the probability vectors whereas the alternative specifies directional inequalities. In this talk we extend existing likelihood-ratio results to cover more general situations. Specifically, assume that we have r-independent multinomials with probability vectors $(p_{11}, p_{12}, \ldots, p_{1k})^T$, $i = 1, 2, \ldots, r$, respectively, and consider testing $\mathcal{H}_0$ against $\mathcal{H}_1 - \mathcal{H}_0$ and $\mathcal{H}_1$ against $\mathcal{H}_2 - \mathcal{H}_1$ when

$$\mathcal{H}_0 : \sum_{i=1}^{r} \sum_{j=1}^{k} x_{ij} p_{ij} = 0, \quad s = 1, 2, \ldots, c,$$

$$\mathcal{H}_1 : \sum_{i=1}^{r} \sum_{j=1}^{k} x_{ij}^2 p_{ij} \leq 0, \quad s = 1, 2, \ldots, c,$$

and $\mathcal{H}_2$ does not impose any constraints the $p_{ij}$s. The $x_{ij}$s here are known constants and $c \leq r(k-1)$. We show that asymptotic distributions of the likelihood ratio tests are of chi-bar square type and specify the weighting values. Some generalizations of these result will also be discussed and example will be used to illustrate the theoretical results.

Friday, February 15, 2008
3:00 PM in 372 Jabara Hall

Please come join us for refreshments before the lecture
at 2:30 p.m. in room 353 Jabara Hall.