STAT 703/J703

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-Lecture 16-

Instructor: Brian Habing

Department of Statistics

LeConte 203

Telephone: 803-777-3578

E-mail: habing@stat.sc.edu

Today

- Power of a Test (Cont.)
- Example: Test for a Multinomial Distribution

Power: P(reject H_0 | H_0 is False)

Non-central t-distribution

$$t_{df,\Delta} = \frac{Z+\Delta}{\sqrt{\frac{\chi^2_{df}}{df}}} = \frac{\bar{x}-\mu_0}{s/\sqrt{n}}$$

then

$$\Delta = \frac{\mu_A - \mu_0}{\sigma/\sqrt{n}}$$

Example: Consider a data set that could have come from a binomial distribution with n=5, but may also have come from a hypergeometric or some other distribution.

X	0	1	2	3	4	5
#obs	9	21	16	10	4	0

Test H_0: X is binomial vs. H_A: it isn't

So in general we get

$$G^2 = -2\log\Lambda = 2\sum_{i=1}^{n} O_i \log\left(\frac{O_i}{E_i}\right)$$

Page 342-343 demonstrates that this is asymptotically the same as the classic

$$\sum_{i=1}^{n} \frac{(O_i - E_i)^2}{E_i}$$

Theorem A pg.310: Under smoothness conditions on the pdf, the null distribution of $-2\ln\Lambda$ has an approximate chi-square distribution with d.f.=$\dim\Omega - \dim\omega_0$ for large n.

Note: You must be careful what estimates you use for the parameters!!!