

Exact Confidence Bounds when Sampling from Small Finite Universes

An Easy Reference Based on the Hypergeometric Distribution

There is a very simple and fundamental concept: to much of probability and statistics that can be conveyed using the following problem. **PROBLEM.** Assume a finite set (universe) of N units where A of the units have a particular attribute. The value of N is known while the value of A is unknown. If a proper subset (sample) of size n is selected randomly and a of the units in the subset are observed to have the particular attribute, what can be said about the unknown value of A ? The problem is not new and almost anyone can describe several situations where a particular problem could be presented in this setting. Some recent references with different focuses include Cochran (1977); Williams (1978); Hajek (1981); Stuart (1984); Cassel, Samdal, and Wretman (1977); and Johnson and Kotz (1977). We focus on confidence interval estimation of A . Several methods for exact confidence interval estimation of A exist (Buonaccorsi, 1987, and Peskun, 1990), and this volume presents the theory and an extensive Table for one of them. One of the important contributions in Neyman (1934) is a discussion of the meaning of confidence interval estimation and its relationship with hypothesis testing which we will call the Neyman Approach. In Chapter 3 and following Neyman's Approach for simple random sampling (without replacement), we present an elementary development of exact confidence interval estimation of A as a response to the specific problem cited above.

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