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Abstract

Sampling is a key subject in any statistical analysis and has been at the forefront of history for about 120 years. It is also a key part of the learning mechanism (we learn from samples by abstraction) and this makes it a key object and tool for uncovering scientific truth. This text develops the basic aspects of the subject of sampling and its applications. There are two basic types of sampling: (A) probability sampling and (B) non-probability sampling (Probability Sampling). The former are implemented through several techniques, such as (A1) Simple Random Sampling, (A2) Stratified Sampling, (A3) Cluster Sampling and (A4) Systematic Sampling. The latter can also be considered a form of Feasibility Sampling in some applications. Feasibility Sampling is a diverse group of sampling techniques that do not follow randomness (only), but exploit information from many aspects and incorporate techniques from other branches of mathematics. They are the subject of a chapter in this text. The others are the subject of the other chapters, while Chapter 1 introduces basic concepts such as population, sample, random variable, estimating functions, parameters and statistics. Among others, the polynomial form approximation of the probability density function (PFS) of continuous random variables using sampling is presented as an application. An important application is the determination of a complete polynomial of degree 2 with two variables defined in the space [0, 1]x[0, 1] through Feasibility Sampling with a very small sample. More generally also, Feasibility Sampling is also various low-cost sampling. They are sampling of a subset of the population, deliberately selected, that undercuts the cost of sampling many times, e.g. 80 times (practically).

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