MITx CSE.0002x
Introduction to Computational Science and Engineering

Help

sandipan_dey ⌄

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15.3.1 Statistics

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Statistics are properties of a sample and are frequently used to estimate properties of the population. A common example is the *sample mean*. Suppose we ran a Monte Carlo simulation which generate N instances of the random variable X. Then the sample mean is defined as,

$$\overline{x} \equiv \frac{1}{N} \sum_{i=0}^{N-1} x_i \tag{15.13}$$

The sample mean is usually used to estimate the mean of the population, i.e. $\mu_x = E[X]$ as defined in Equation (15.8).

Another common estimator is the fraction of instances for which an event occurs. For example, suppose we were interested in the frequency with which the random variable X was less than some value, $e.\,g.\,9$. We can run a Monte Carlo simulation and count the number of times the event occurred, which we will call N_event. We define the fraction,

$$\hat{p}_\text{event} \equiv \frac{N_\text{event}}{N} \tag{15.14}$$

As you probably would guess, this fraction is an estimate of the probability that the event occurs within the entire

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