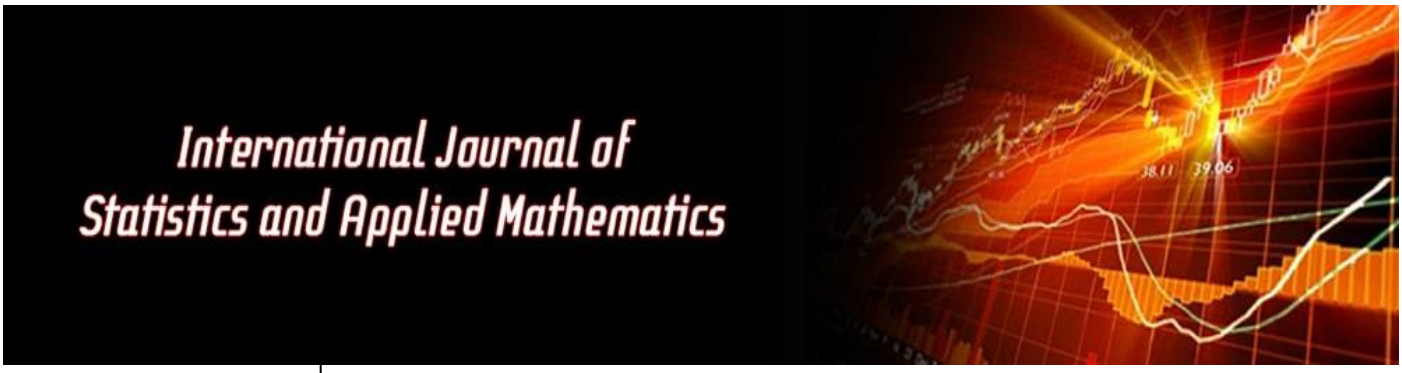
International Journal of Statistics and Applied Mathematics 2022; 7(6): 129-133



ISSN: 2456-1452
Maths 2022; 7(6): 129-133

https://www.mathsjournal.com
Received: 17-09-2022
Accepted: 20-10-2022

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On some aspects of an exponential distribution as life model approach

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DOI: https://doi.org/10.22271/maths.2022.v7.i6b.907

Abstract
The exponential distribution frequently addresses the elapsed time before a particular event. A good example of an exponential distribution is the starting time before an earthquake. Other examples include how long long-distance business calls last in minutes and how long an automobile battery lasts in months. The value of the change in your pocket or handbag can also be demonstrated to roughly follow an exponential distribution.
In opportunity concept and statistics, the exponential distribution is a non-stop chance distribution that often worries the quantity of time till some specific occasion takes place. It's miles a system in which occasions show up continuously and independently at a consistent common price. The exponential distribution has the key belongings of being memoryless. The exponential random variable can be both more small values or fewer larger variables. For example, the quantity of cash spent by the customer on one trip to the supermarket follows an exponential distribution.

Keywords: Variable can, grocery store, poison factor

Introduction
An exponential random variable's values appear in the manner described below. There are more little values than large values. One example of an exponential distribution is the amount of money shoppers spend on a single trip to the grocery store. There are more people who make modest purchases than large ones, and fewer people who make huge purchases.
In the topic of reliability, the exponential distribution is frequently utilized. The durability of a product is a matter of reliability. In possibility idea, the exponential distribution is described as the chance distribution of time between events within the Poisson factor method. The exponential distribution is taken into consideration as a special case of the gamma distribution. Also, the exponential distribution is the continuous analogue of the geometric distribution. In this newsletter, we will speak what's exponential distribution, its components, suggest, variance, memoryless assets of exponential distribution, and solved examples.

Definition
The non-stop random variable, say X is stated to have an exponential distribution, if it has the subsequent opportunity density function:

$$f(x) = \alpha e^{-(x-\mu)}/\alpha, x > \alpha, \alpha > 0$$

Where μ is the location parameter and α is the scale parameter (scale parameter is often referred to as λ which is equal to 1/α. The case where μ=0 and α = 1 is called the Standard exponential distribution.

Methodology
The Exponential Distribution is frequently used to model. The reliability of digital structures, which do not commonly. Revel in put on-out kind disasters.

The distribution is referred to as "memory less," which means that the calculated reliability for, Say, a 10-hour task is the same for a subsequent 10-hour Venture, given that the device is operating properly at the begin of every venture. Given a danger (failure) charge, λ, or mean time among failure (MTBF = $1/\lambda$), the reliability may be determined at a specific point in time (t).

The equation of the standard exponential distribution is

$f(x) = e - x, x \geq 0.$

The general form of probability functions can be expressed in terms of the standard exponential distribution. Subsequent formulas in this section are given are for the (1- α) form of the function.

The following is the plot of the exponential probability density function.

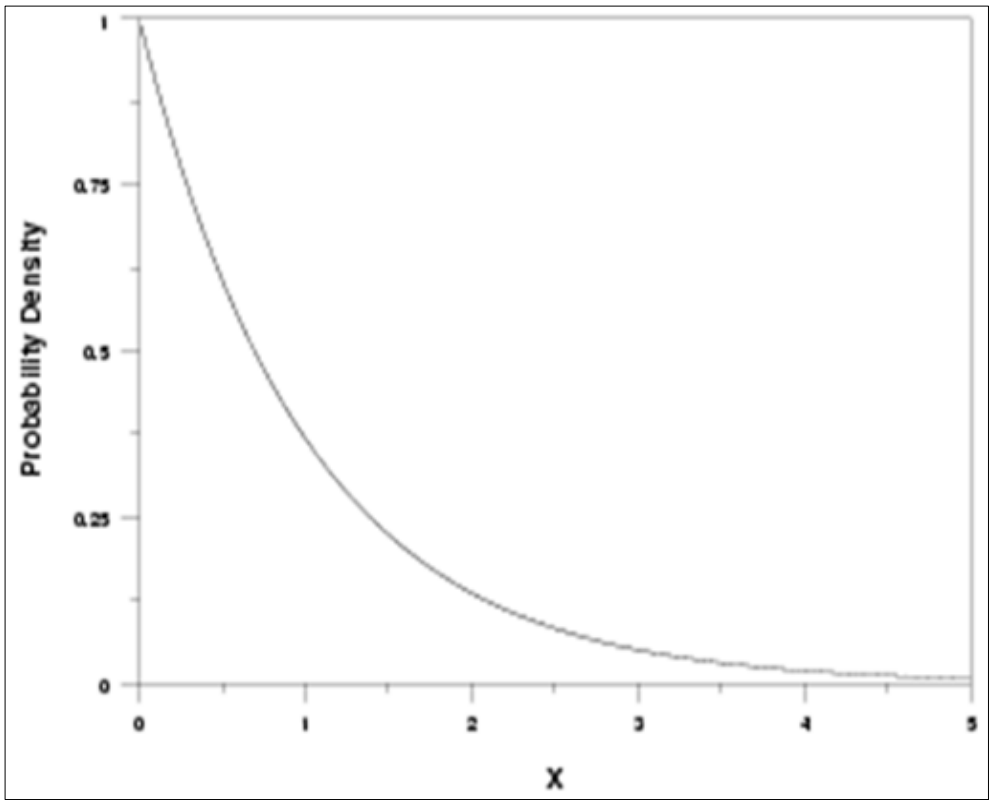

Fig 1: Exponential PDF

The formula for the cumulative distribution function of the exponential distribution is

$F(x) = 1- e^{-x/\alpha}, x \geq 0, \alpha > 0.$

The following is the plot of the exponential cumulative distribution function.

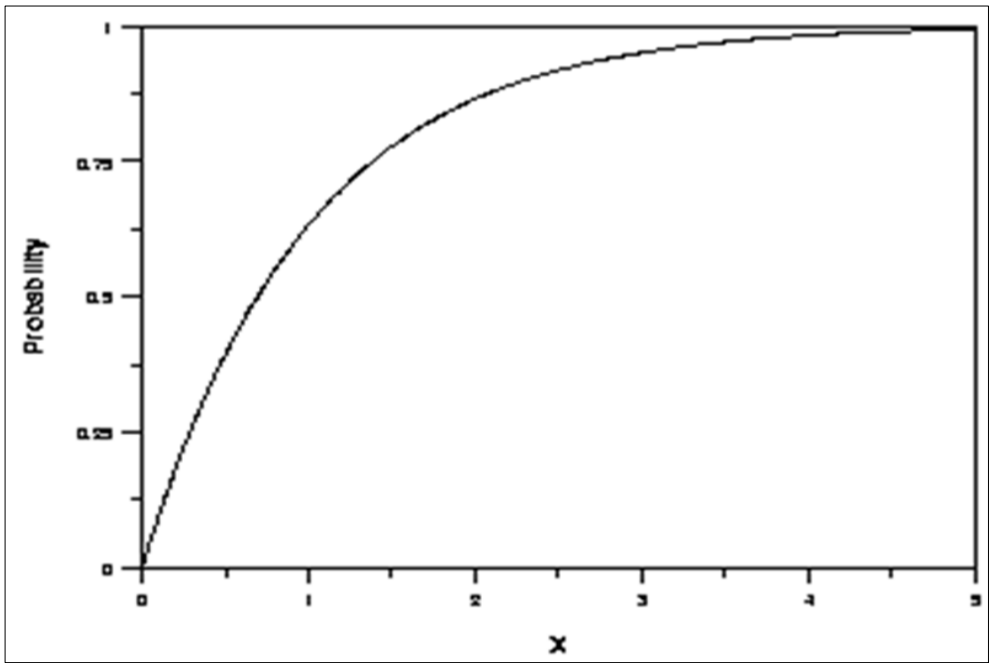

Fig 2: Exponential CDF

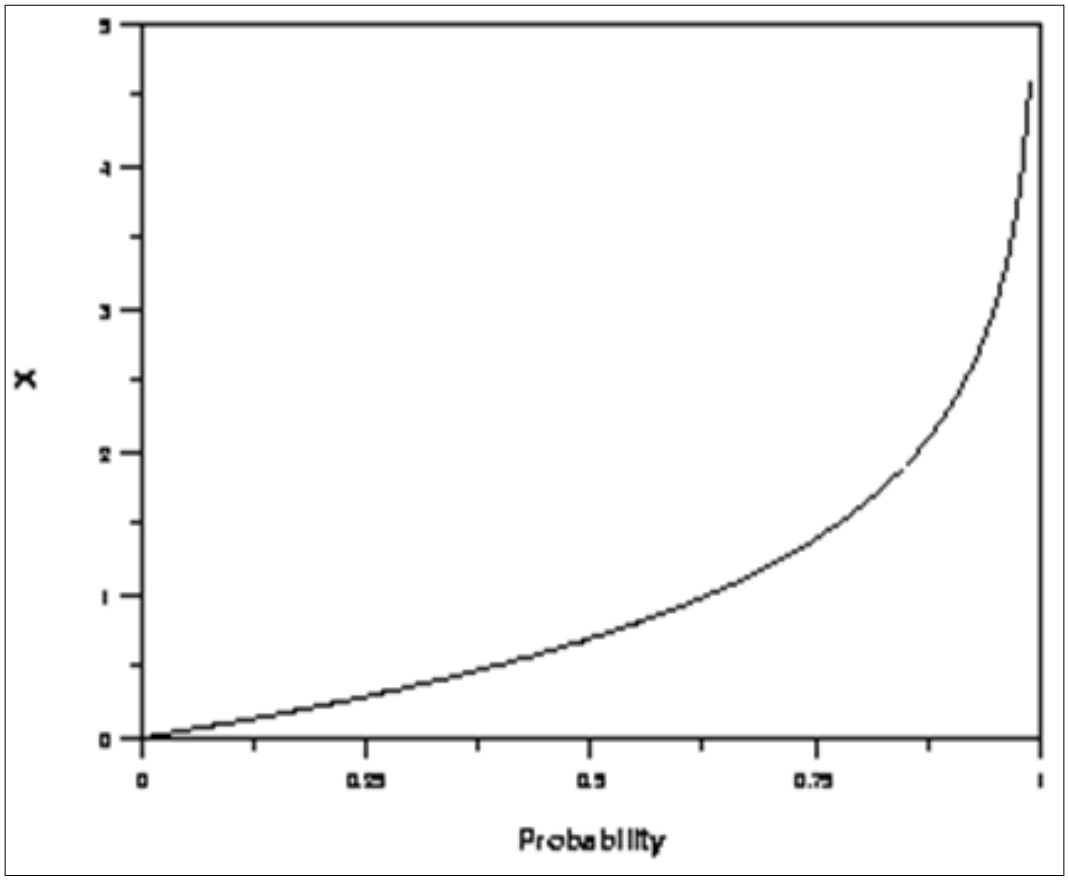

Fig 3: Exponential PPF

The following is the plot of the exponential hazard function.

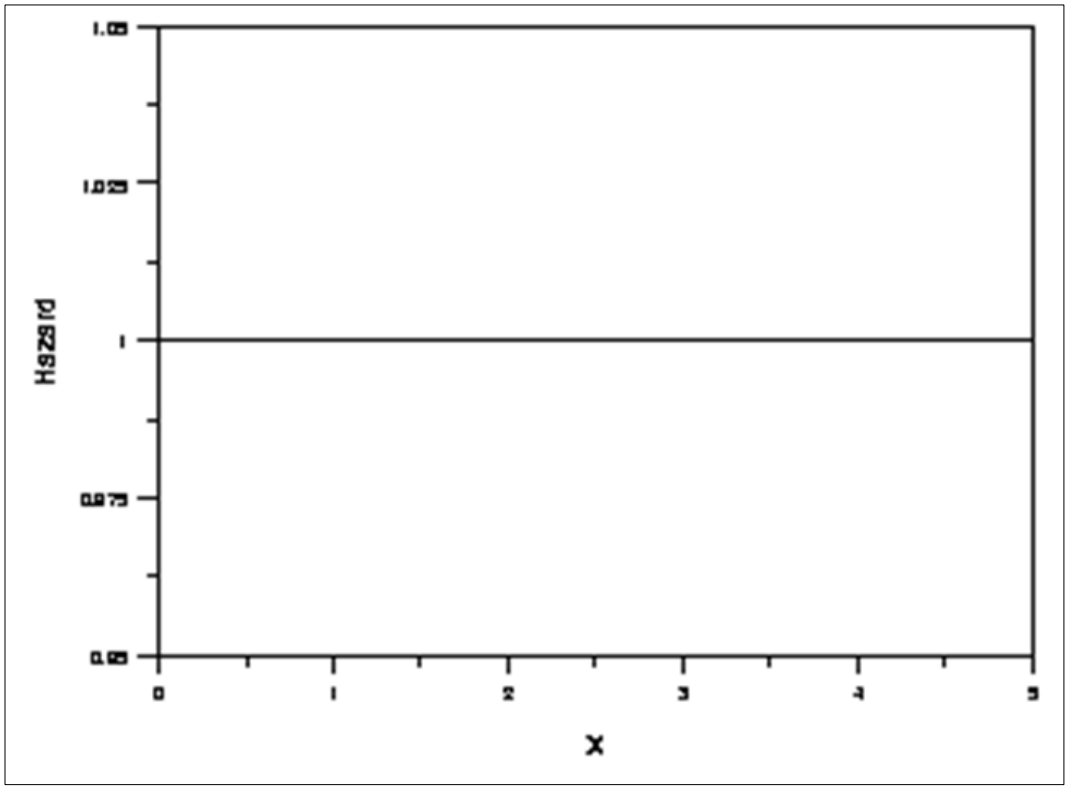

Fig 4: Exponential Hazard

The formula for the cumulative hazard function of the exponential distribution is

$H(x) = x\,\alpha$, $x \geq 0$; $\alpha > 0$.

The following is the plot of the exponential cumulative hazard function.

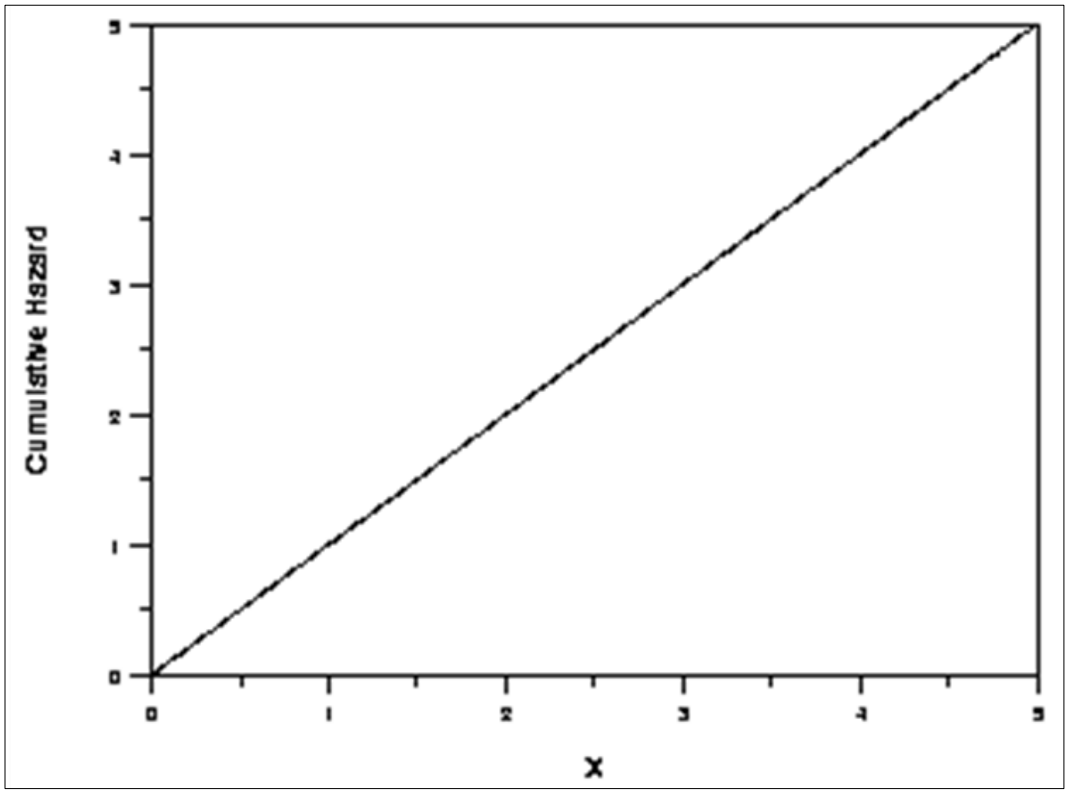

Fig 5: Exponential cumulative hazard

The formula for the survival function of the exponential distribution is

$S(x) = e^{-x/\alpha}$, $x \geq 0$; $\alpha > 0$.

The following is the plot of the exponential survival function.

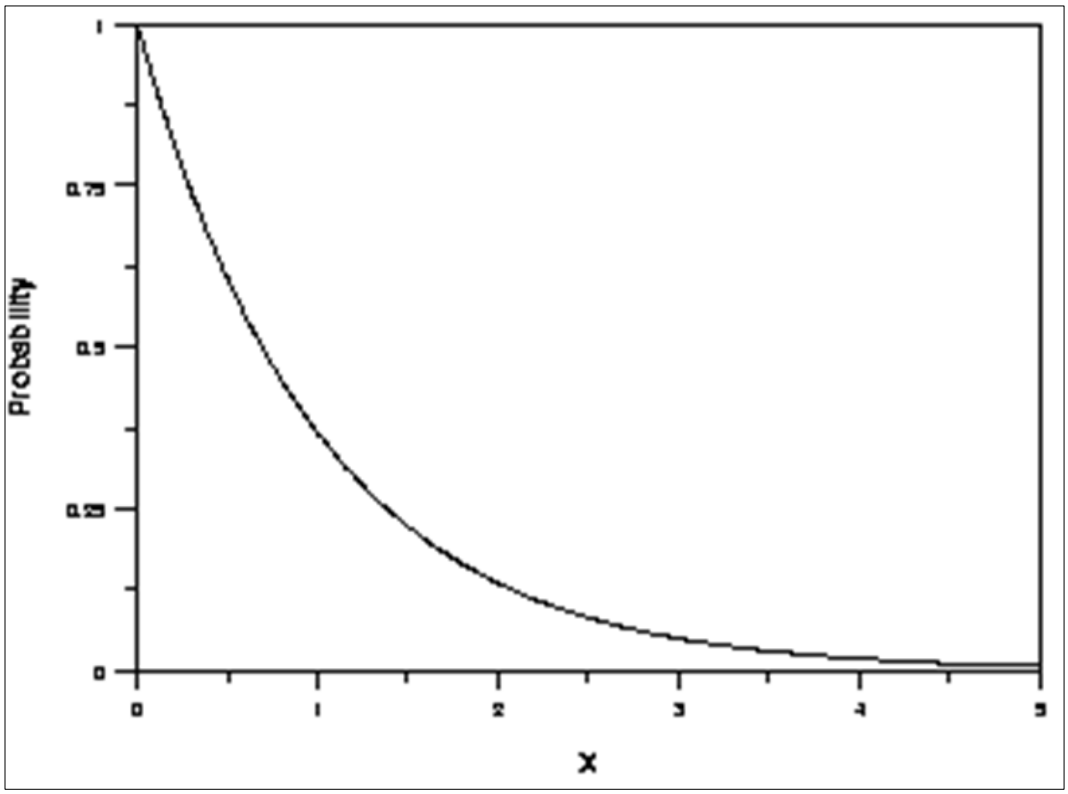

Fig 6: Exponential survival

The formula for the inverse survival function of the exponential distribution is

$Z(y) = \alpha \ln(y)$, $0 \leq y < 1$; $\alpha > 0$.

The following is the plot of the exponential inverse survival function.

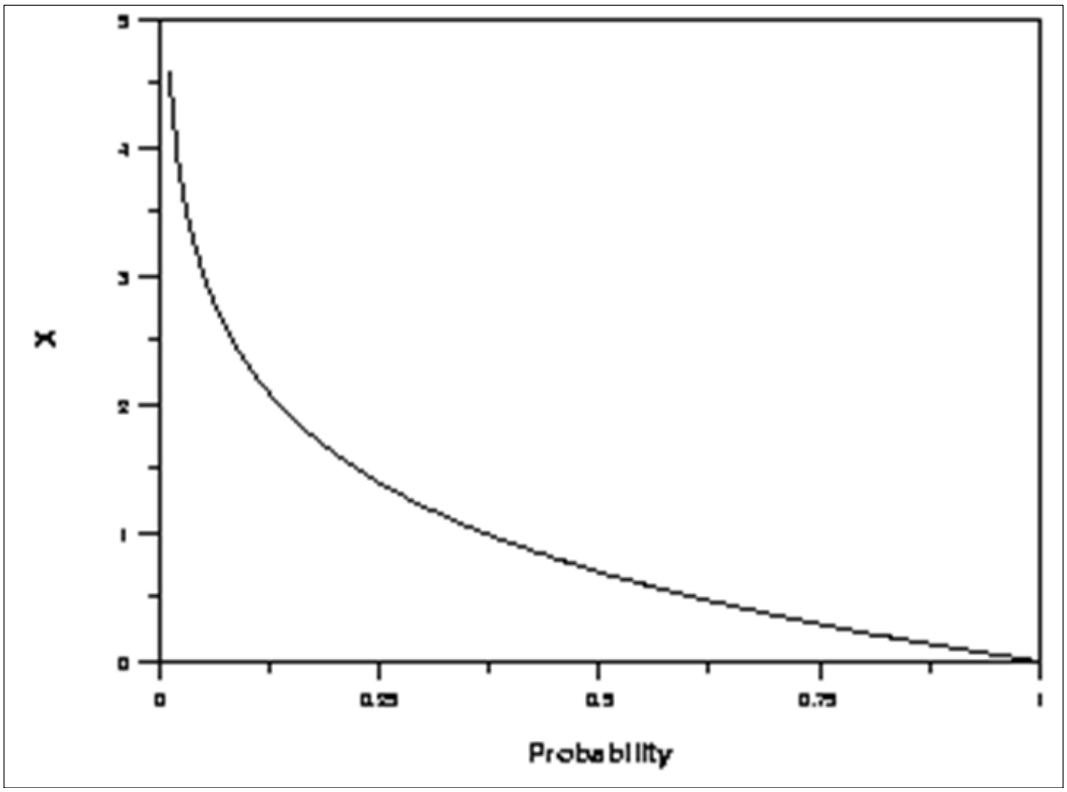

Fig 7: Exponential inverse survival

Fig 8: Common Statistics

Mean	α
Median	α ln2
Mode	μ
Range	μ to ∞
Standard Deviation	α
Coefficient of Variation	1
Skewness	2
Kurtosis	9

Parameter Estimation

For the full sample case, the maximum likelihood estimator of the scale parameter is the sample mean. Maximum likelihood estimation for the exponential distribution is discussed in the chapter on reliability.

Comments

The exponential distribution is primarily used in reliability applications. The exponential distribution is used to model data with a constant failure rate (indicated by the hazard plot which is simply equal to a constant).

Software: Most general purpose statistical software programs support at least some of the probability functions for the exponential distribution.

Exponential Distribution packages

One of the widely used continuous distribution is the exponential distribution. It helps to decide the time elapsed among the events. It's miles utilized in various applications which include reliability principle, queuing idea, physics and so forth. A number of the fields which might be modelled by the exponential distribution are as follows:

1. Exponential distribution allows to find the space among mutations on a DNA strand calculating the time until the radioactive particle decays.
2. Helps on finding the peak of various molecules in a gasoline on the stable temperature and stress in a uniform gravitational discipline.
3. Helps to compute the monthly and annual maximum values of everyday rainfall and river outflow volumes.

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