Summary

- The **Laplace Distribution** is a continuous probability distribution named after Pierre-Simon Laplace. It is also sometimes called the double exponential distribution. This distribution is often referred to as Laplace's first law of errors. He published it in 1774 when he noted that the frequency of an error could be expressed as an exponential function of its magnitude once its sign was disregarded
- A continuous random variable X is said to have Laplace (double exponential) distribution if its pdf is given by, $f(x) = \frac{1}{2} e^{-|X|}; -\infty < x < \infty$
- A continuous random variable X is said to have a double exponential (Laplace) distribution with two parameters λ and μ if it's pdf is given by, $f(x) = \frac{1}{2\lambda} e^{-\frac{|x-\mu|}{\lambda}}; -\infty < x < \infty, \lambda > 0$
- The r[th] raw moment is given by $\frac{1}{2} r! \{(-1)^r + 1\}$
- The coefficient of skewness and kurtosis is given by $\beta_1 = \frac{\mu_3^2}{\mu_2^3} = 0, \beta_2 = \frac{\mu_4}{\mu_2^2} = 6$. Hence, standard Laplace distribution has symmetric and leptokurtic curve
- Mgf of standard Laplace is given by $(1-t^2)^{-1}$ and of Laplace distribution with 2 parameters is given by $e^{t\mu}(1 - t^2\lambda^2)^{-1}$
- The Laplace has found a variety of very specific uses, but they nearly all relate to the fact that it has long tails compared to the Normal Distribution
- The Laplacian distribution has been used in speech recognition to model priors on DFT coefficients
- The addition of noise drawn from a Laplacian distribution, with scaling parameter appropriate to a function's sensitivity, to the output of a statistical database query is the most common means to provide differential privacy in statistical databases