*Location*: typical or central value that best describes the data.

*Measures of Location:*

Mean:sum of the data points divided by the number of data points

Median:the point which has half the data smaller than that point and half the data larger than that point. That is, if *X*1, *X*2, ... ,*X*N is a random sample sorted

Mode:the value of the random sample that occurs with the greatest frequency

Quantiles

Percentiles

IQR-Inter quartile range

Normal distribution

*Exponential Distribution*

*Robustness:*lack of susceptibility to the effects of nonnormality

Robustness of validity

confidence intervals for the population location have a 95% chance of covering the population location regardless of what the underlying distribution is

Robustness of efficiency

confidence intervals for the population location tend to be almost as narrow as the best that could be done if we knew the true shape of the distributuion

*Alternative Measures of Location:*

Mid-Mean= (Q1+Q3)/2

Trimmed mean: mean for data between the 5th and 95th percentiles.

Winsorized Mean: instead of trimming the outliers, they are set to the lowest (or highest) value.

Boxplot:

EDA[Exploratory data analysis] tool for determining if a factor has a significant effect on the response with respect to either location or variation.

Utility:

Is a factor significant?

Does the location differ between subgroups?

Does the variation differ between subgroups?

Are there any outliers?

Vertical axis: response variable

Horizontal variable: factor of interest

L1 = lower quartile - 1.5\*IQ  
L2 = lower quartile - 3.0\*IQ  
U1 = upper quartile + 1.5\*IQ  
U2 = upper quartile + 3.0\*IQ

Confidence limits

(Y¯± t1−α/2,N−1 \*s)/√ N

Y¯: sample mean,

*s :* sample standard deviation

*N :*sample size

*α :* desired significance level,

*t*1-*α*/2, *N*-1 :100(1-*α*/2) percentile of the t-distribution with *N*- 1 degrees of freedom. 1 -*α:* confidence coefficient

Higher N => smaller interval => pricision of estimates increases

Larger s => noisy data and hence lower pricision