

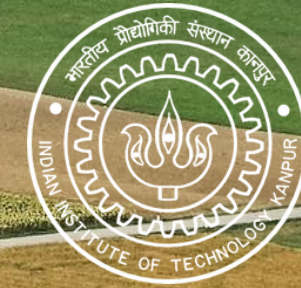
Week-01-L-06

# Statistics for Agriculturists

## Statistical Variables

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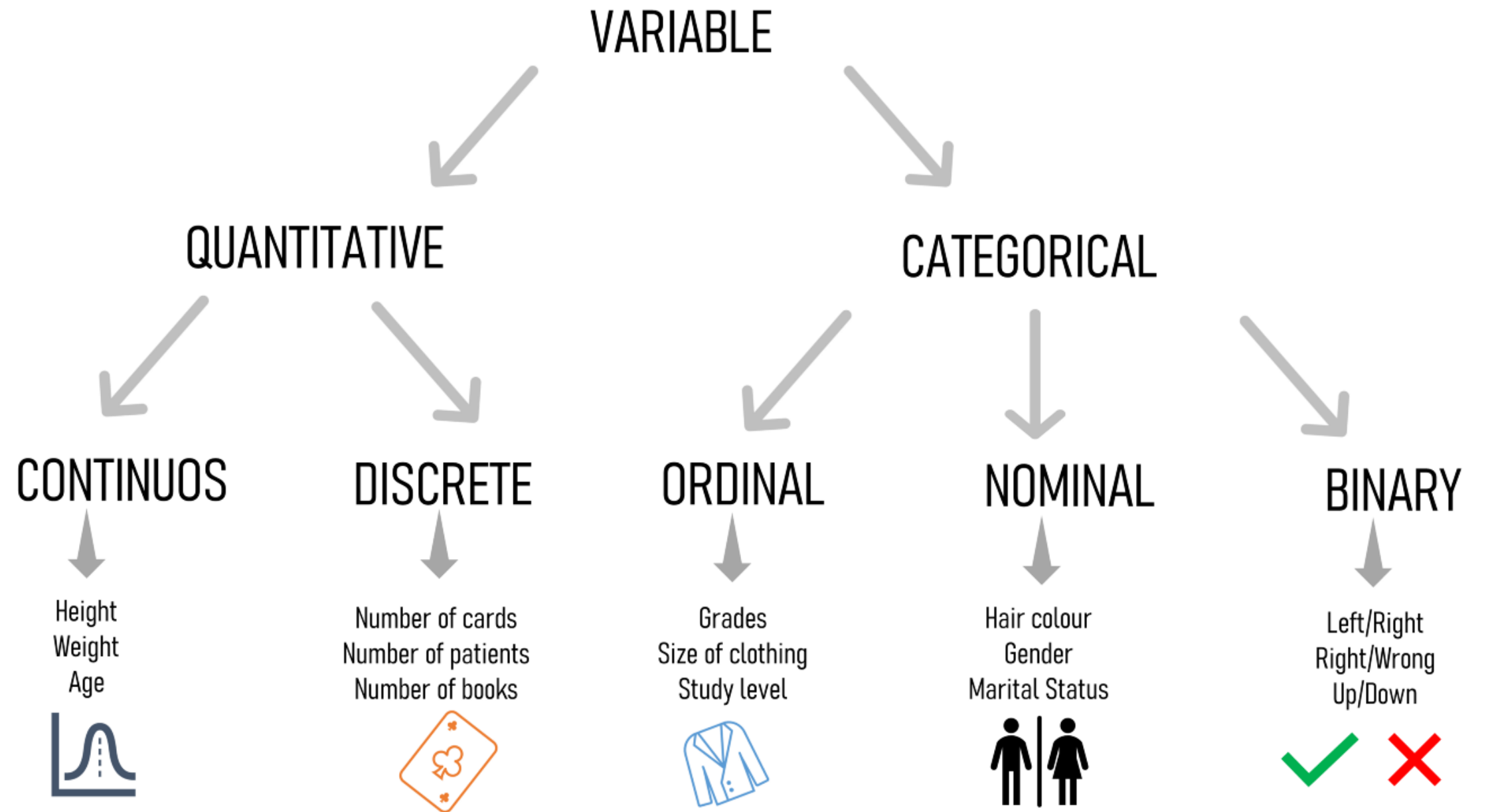
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# How do you select and scale the process variables?



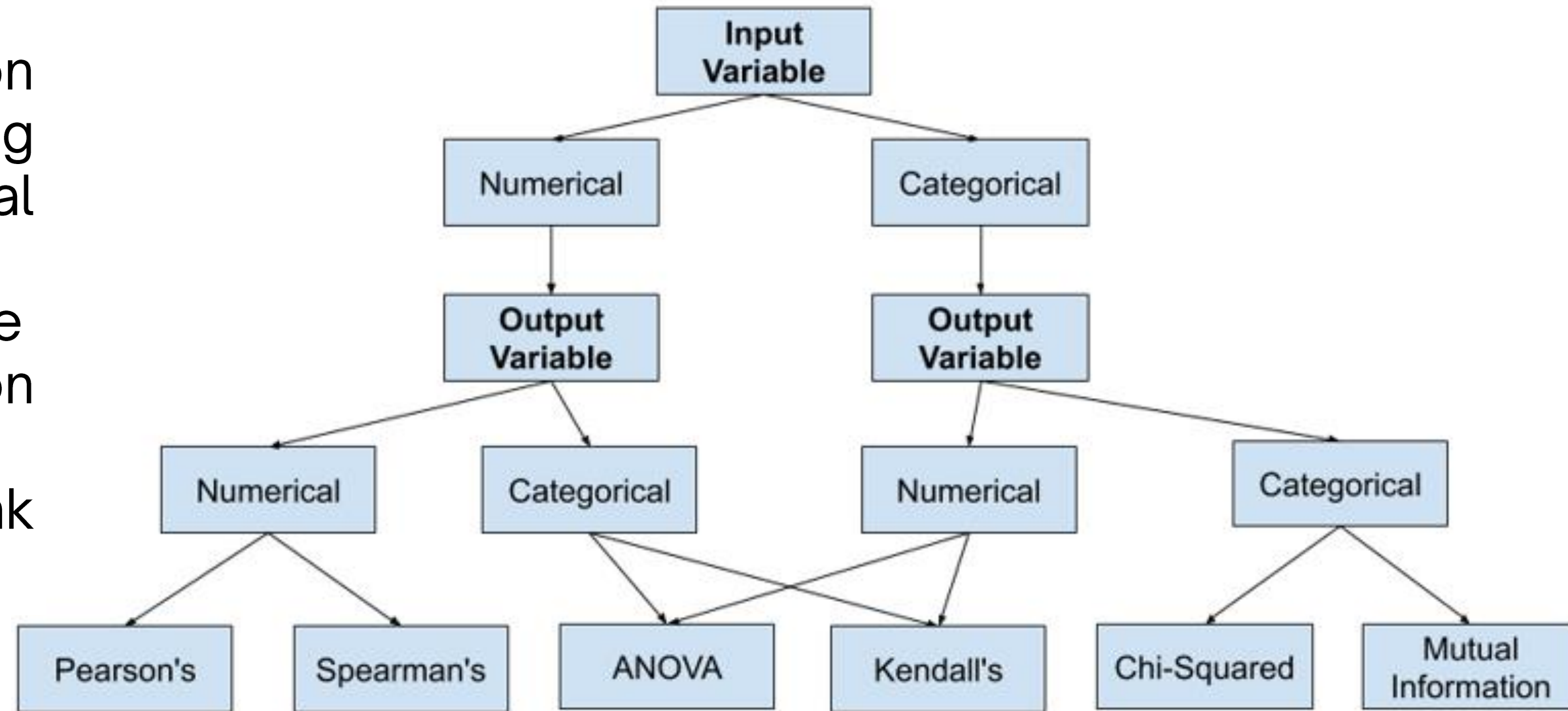
It is important to distinguish the difference between the type of variables because this plays a key role in determining the correct type of statistical test to adopt.



# Correlation Coefficient



- This is a regression predictive modeling problem with numerical input variables.
- There are two ways to use
  - a) Pearson's correlation coefficient (linear).
  - b) Spearman's rank coefficient (nonlinear)



a) 
$$r = \frac{\sum (x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\sum (x_i - \bar{x})^2 \sum (y_i - \bar{y})^2}}$$

$r$  = correlation coefficient  
 $x_i$  = values of the x-variable in a sample  
 $\bar{x}$  = mean of the values of the x-variable  
 $y_i$  = values of the y-variable in a sample  
 $\bar{y}$  = mean of the values of the y-variable

b) 
$$\rho = 1 - \frac{6 \sum d_i^2}{n(n^2 - 1)}$$

$\rho$  = Spearman's rank correlation coefficient  
 $d_i$  = difference between the two ranks of each observation  
 $n$  = number of observations

# Points to keep in mind

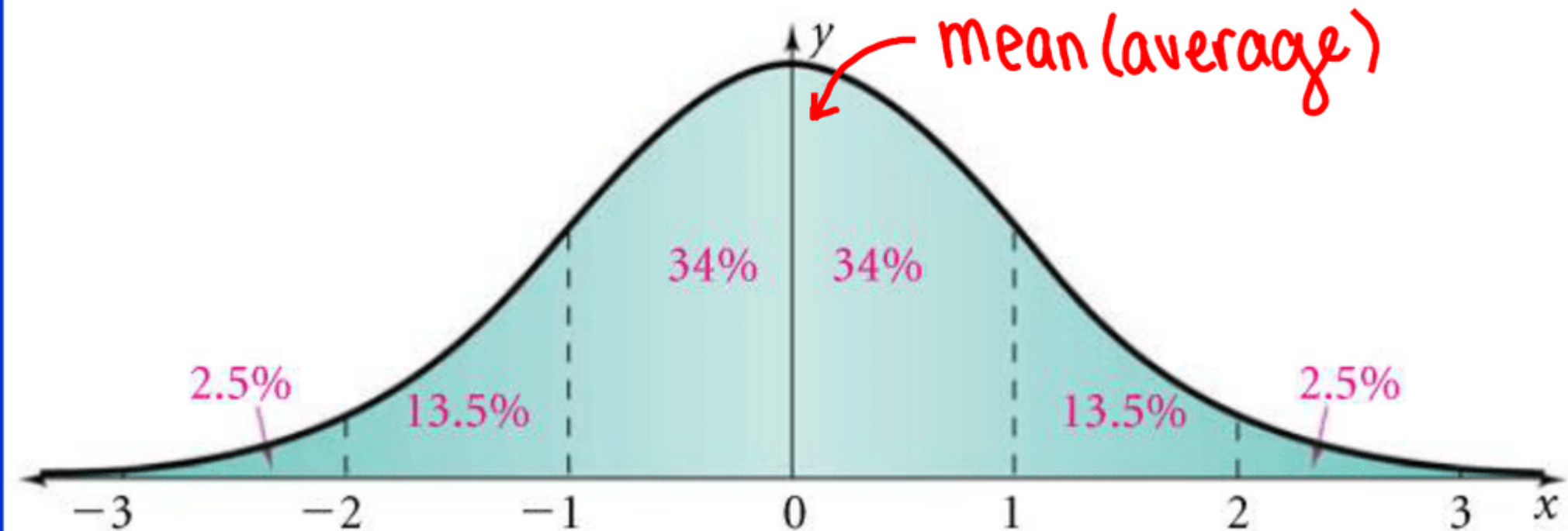


- Independence of observations
- Homogeneity of variance
- Normality of data

## The Bell Curve

**Normal Distribution** – shows data that vary randomly from the mean.  
**Normal Curve** – The pattern the data form is a bell-shaped curve.

### The Standard Normal Bell Curve



68% of the data fall within one standard deviation of the mean

95% of the data fall within two standard deviations of the mean

# Making Intervals



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- While making intervals it's necessary to keep in mind the points mentioned aside.

Include all important factors and choose low and high factor levels intelligently

Choose range carefully don't pickup just extremes, two-level design have a high & low for each factor so try adding some center points

Check for impossible & irrelevant combinations and include only relevant responses



**Thank you**