Time Series

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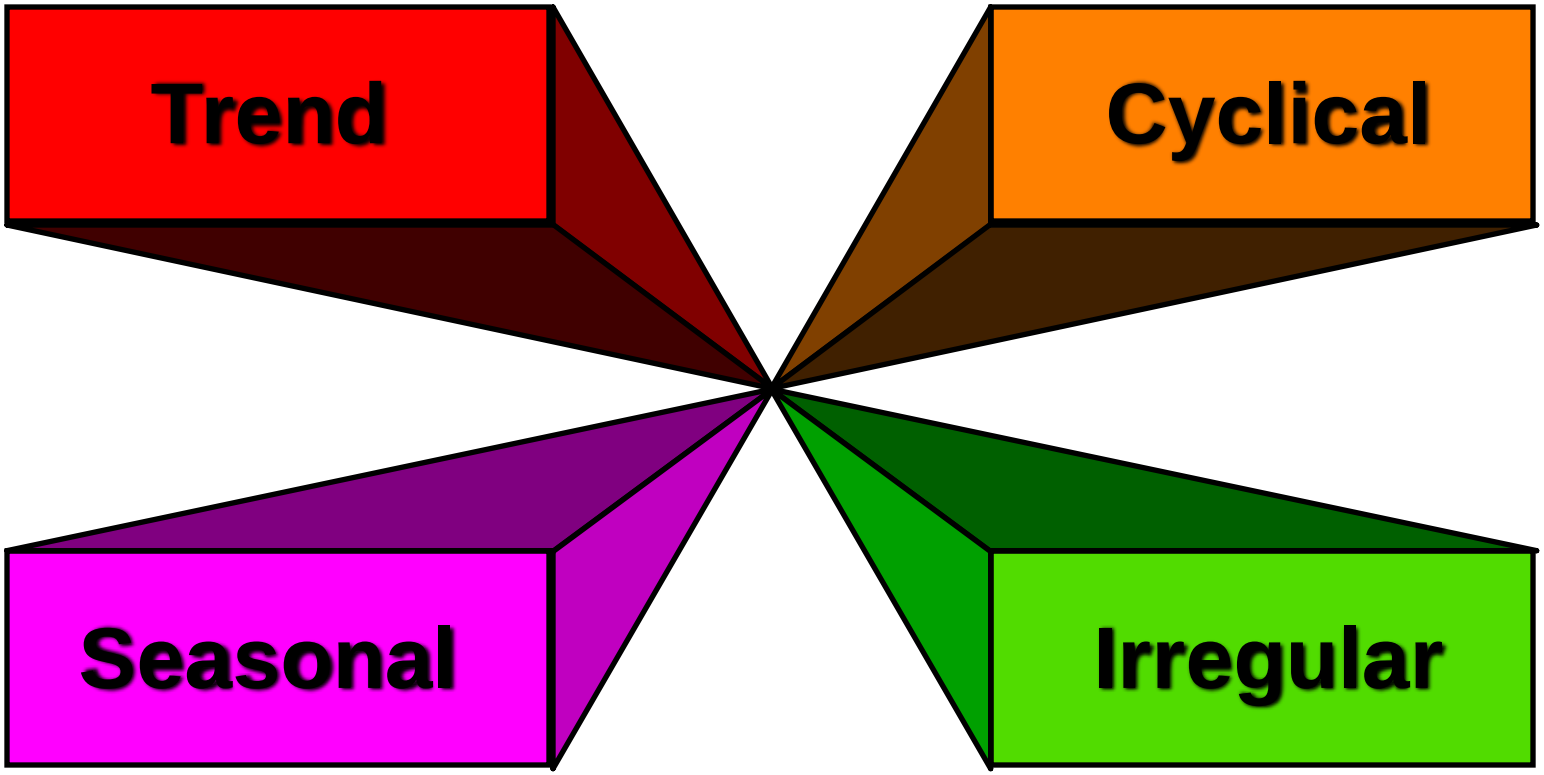
Time Series Components



Following methods are used for measuring trend

Linear Trend	Non –linear Trend
Freehand or Graphic Method	Freehand or Graphic Method
Semi Average Method	Moving Averages
Method of Least Square	

Methods of Least Square

- Widely used method in practice
- For trend line analysis following 2 components.

$$(i)\quad \Sigma (Y - Y_C) = 0$$

i.e. the sum of the deviations of the actual and computed values of Y is 0.

$$(ii)\quad \Sigma (Y - Y_C)^2 \text{ is least}$$

i.e. the sum of the squares of deviation of the actual and computed value is the least from this line.

Methods of Least Square (Cont..)

- The line obtained by this method is called the" line of best fit".
- Straight line represented by the equation is given by the following formula.

$$Y_C = a + b X$$

Where Y_C is computed value of the depend variable.

Methods of Least Square (Cont..)

- ‘ a ’ is the Y axis Intercept.
- ‘ b ’ is the slope of the line which is based on the angle Trend line Makes with the X- axis.
- ‘ X ’ denotes Independent Variable.
- For calculating value of constant ‘a’ & ‘b’ following normal equations needed to be solved.

$$\Sigma Y = Na + b \Sigma X$$

$$\Sigma XY = a \Sigma X + b \Sigma X^2$$

- Where **N** represents number of years in the Time series

Methods of Least Square (Cont..)

Solving these two equation we get b

Slope of the Best- Fitting Regression Line

$$b = \frac{\Sigma XY - n\bar{X}\bar{Y}}{\Sigma X^2 - n\bar{X}^2}$$

Y- Intercept of the Best- Fitting Regression Line

$$a = \bar{Y} - b\bar{X}$$

Methods of Least Square (Cont..)

When the midpoint of the time is taken as the origin then $\Sigma x = 0$

And

The simplified formula would be

$$b = \frac{\Sigma xY}{\Sigma x^2}$$

and

$$a = \frac{\Sigma Y}{N} = \bar{Y}$$

C

- Time coding 2 Numericals
- Register and LEVIN BOOK

Thank You