**TIME SERIES ANALYSIS**

Why to choose time series?

This would be the first question which will come in any reader’s mind before getting into what is time series. So let us consider a scenario in which you want to see how your consumption pattern changes yearly as your income gets incremented every year. So if you take data in random order you will not able to see the correct behavior of your responsiveness towards the change in your income. But if you take yearly data you will able to recognize the changes in your yearly consumption level more accurately. This is the main reason we use time series data for predicting the future value of given series.

So now you will get clearer picture of what time series refers to.

Time Series refers to the arrangement of statistical data in accordance with occurrence of time. We can also state time series as collection of data belonging to different time period but of same economic variable. If data is taken at different time period then the value of the variable we are considering will change from time to time. These fluctuations are not because of single reasons but there are many other forces which lead to relative data at different point of time. If these forces are in state of equilibrium, then series would remain constant.

For Instance, We consider simple case of different prices of some commodities in different region of country. There are several reasons affecting the price of commodity i.e. demand of commodity, income distribution of region in which commodity is going to be sold, the state of region (boom, recession), preferences and taste of people and many more. As we know choices fluctuate very often therefore at different time period we will get data which is not constant.

Now, we shall move towards some “*Components of Time Series”*. The various factors which affects the values of phenomenon in a time series can be broadly classified as three movements described as follows:  
  
1. Trend or Long Term Fluctuations:

With trend we refer to the natural tendency of data to increase or decrease during a long period of time. With increase we doesn’t mean that increase or decrease will be in same direction there might be the cases where we will see different tendencies of data to increase, decrease or remain stable in different section of time. However, we can say that overall tendency is upward, downward or stable. For example: The growth or decline of many economic time series depends upon advancement of production technology, large – scale production, improved marketing management , the invention or new discovery etc.. All of which are gradual process.

One should keep in mind that all the series doesn’t show upward or downward trend, some fluctuate around a particular value. For example: Temperature of a particular geographical region. Also one might get confused with term “*long term fluctuations”*, this term is a relative term and can be adjusted accordingly. For instance : If we are analyzing the life span of bacteria then a single day can be considered as a long period where as the data of agricultural production given for 2 years can be regarded as short term.

2. Periodic Fluctuations

There are many other fluctuations which hinder the smooth flow of the series in a particular direction and tend to repeat themselves in particular span of time those are called periodic fluctuations. These can be classified as :  
  
a) Seasonal Fluctuations – These fluctuations in time series is mainly due to regular changes that occur within a specific span of less than a year. These variations are not continuous but occur recurrently .Thus seasonal variations in the time series occur if data is recorded monthly, weekly, and hourly and so on. For example: The sale of notebooks increases during the time of examination. To isolate seasonal variation from the trend must me the main objective of analyst for studying their effect. Thus study of seasonal variations for businessmen, producer etc., is very necessary. The wrong understanding of seasonal might lead to some troublesome decisions.

b) Cyclic Fluctuations – You should not get confused with seasonal and cyclic variations. Cyclic Variations are oscillatory movement in a time series that occurs in time span of more than one year. One complete period referred as cycle. The best example of cyclic variation is “*Business Cycle”* that is composed of four phases which are: i) boom, ii) recession, iii) depression and iv) recovery and lasts for 10 to 11 years.

3. Irregular Fluctuations

Apart from above fluctuation there is one more fluctuation that can be seen in time series data i.e. random fluctuations. These fluctuations play a vital in affecting the smooth flow of series as these are randomly caused fluctuations and are beyond human control. For instance: Earthquake, War, Strikes, Riots, Epidemics etc. The time period in which these fluctuations are observed can drastically change our analysis. So it is important for analyst to keep an eye on these fluctuations during its analysis.