

Moving average method: limitations and types of



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Forecasting is very essential and important part in business planning. It refers to estimation of the demand for products and services in coming future and the resource necessary to produce these outputs. Estimates of the future demand for products or services are commonly referred to as sales forecast. In other words, forecasting is the art and science of predicting future events. It is not mere a guess or prediction about the future without any rational basis. It may involve taking historical data or intuitive prediction in the absence of historical data.

Basis of Forecasting

Forecasting by its nature uses data from the past period to forecast the future projection of the company. Historical data includes your organization`s financial statements and any information you believe has relative predictive value to the future success of your company. Historical data doesn`t have to solely come from your company; it can also be historical macroeconomic data, such as the Consumer Confidence Index, interest rates, housing starts or any other economic variable you believe has an effect on your business based on your business experience and observations.

Moving Average Method

A moving average method uses a number of most recent historical actual data values to generate a forecast. The moving average for ' n' number of periods in the moving average is calculated as :

This method uses the average of a number of adjoining data points or periods. The averaging process uses overlapping observations to generate

averages. The term “ moving” refers to the way averages are calculate the forecast moves up or down the time series to pick observations to calculate an average of a fixed number of observations. In our ten periods on the question the moving averages method would use the average of the most recent ten observations of the data in the time series as the forecast for the next period.

The moving average is commonly used with time series data to smooth out the short-term fluctuation and highlights long term trends or cycles. The threshold between Long-term and short-term term depends on the application and the parameter of the moving average will be set accordingly. For example it usually used in the technical analysis of financial data like stock prices and return various stock or trading volume A moving average also called rolling average, is an average price movement indicator, showing average value of the data within specific time frame.

Moving average levels are interpreted as resistance in a rising market, or support in a falling market. Here a support level means a price rank where the price tends to find “ support” as it is going down. The price is more likely to “ bounce” off this level rather than break through it. A resistance level is the opposite of a support level and is an upper extreme where the price tends to find resistance as it is going up.

Modern graphical analytic programs calculate wide range of different Moving Average types and offer assortment of their visualization styles. A time frame for calculation could be set as short, intermediate or long term. For long term trend the 200-days average is most popular; for medium term -

50-days average and for short term - 10 days average. Following types of rolling averages are used more often than others: a simple moving average (SMA); a weighted moving average (WMA) and an exponentially moving average (EMA).

Types of moving average method

Simple moving average method it is used to estimate the average of a demand time series and remove the effects of random fluctuation. It is most useful when demand has no pronounced trend or seasonal fluctuations. In this method if we use ' n' period moving averages, the average demand for the ' n' most recent time periods is calculated and used as forecast for the next time period. For the next period, after the demand is known, the older demand from the previous average is replaced with the most recent demand and the average is recalculated.

Weighted moving average method in this method each historical demand in the moving average can have its own weight and the sum of the weight equals one. For example, in a 5 period weighted moving average model, the most recent period might be assigned a weight 0. 50, the second most recent period might be assigned a weight of 0. 30, 0. 20, 0. 10, and for third most period with a weight of 0. 05.

$$\text{WMA}_M = \frac{n p_M + (n-1) p_{M-1} + \dots + 2 p_{M-n+2} + p_{M-n+1}}{n + (n-1) + \dots + 2 + 1}$$

The advantage of weighted average method is that it allows emphasis on recent demand over earlier demand.

Exponential Smoothing Method It is a sophisticated weighted moving method that is still relatively easy to understand and use. It requires only three items of data: period's forecast, the actual demand for this period and ' $\hat{\alpha}$ ' which is referred to as smoothing constant and having a value between 0 and 1.

The formula of the ESM is as follows:

$$F_t = F_{t-1} + \hat{\alpha} (A_{t-1} - F_{t-1})$$

Where F_t = Forecast for the period (t)

F_{t-1} = Forecast for the previous period (t-1)

A_{t-1} = Actual demand for the previous period (t-1)

$\hat{\alpha}$ = Smoothing constant (value varies from 0 to 1)

Selecting a smoothing constant is basically a matter of judgment or trial and error.

Commonly used values of $\hat{\alpha}$ range from 0.05 to 0.5.

Feature Moving average method:-

Smoothing data Moving average help in smoothing or smooth function on the original sequence, the original sequence of fluctuation is weakened, and the average interval number N bigger, stronger on series smoothing effect.

Odd and Even Moving average time interval number N is odd, only a moving average, the moving average as the middle moving average terms in a trend representative value; and when the moving average term N is even, the moving average value represents the middle position of the even level, not

on a time, is in need of an adjacent two average value of the moving average, it can make the average value of a certain period of time, this is called shift is average, also become the center of moving average.

Seasonal changes When the series include seasonal change, moving average interval number should be consistent with the seasonal variation of N length, in order to eliminate the seasonal variation; if the sequence contains a cycle of change, from the terms N and cycle length should be basically the same average, cycle fluctuation elimination can be better

Advantages of Moving average method:

Easily understandable The moving average model assumption is that the most accurate prediction of future demand is a simple (linear) combination of past demand moving average method is easy to understand than any other method. This method smooths the data and makes it easier to spot trend..

Simple and Easy Calculation Moving average is calculated by taking the arithmetic mean of a given set of values. They are easier to use than other regression models. For example, to calculate a basic 10-day moving average you would add up the closing prices from the past 10 days and then divide the result by 10.

Stable Forecasts how responsive we want the forecasting model to be to changes in the actual demand data must be balanced against our desire to suppress undesirable chance variation or noise in the data. With help of moving average can achieve such objectives.

Limitations of Moving Average Method

Equal weighing is given to each of the values used in the moving average calculation, whereas it is reasonable most reasonable data is more important to current situations.

The moving average method doesnot takes into account the data outside the average period.

The use of unadjusted moving average can lead to misguiding forecast

The moving average method to a large number of data records from the past;

Through the introduction of new data is more and more time, continuously revised average value, as predicted value.

The basic principle of moving average method is through the moving average to eliminate irregular time series of changes and other changes, thus revealing the long-term trend of time series.

Solution to the Given Problem

Year

No. of Cars

3 Year Moving Total

3 Year Moving Average

1

1324

2

1605

3

1486

4415

1471. 67

4

1567

4658

1552. 67

5

1687

4740

1580.00

6

1021

4275

1425.00

7

1424

4132

1377.33

8

986

3431

1143.67

9

1529

3939

1313.00

10

1425

3940

1313.33