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COMPARATIVE STUDY OF DIFFERENT FORECASTING METHODS FOR VARIATION IN GOLD PRICE

Rajul Namdeo
Department of Mechanical Engineering,
Babulal Tarabai Institute of Research & Technology, Sagar (M.P.), India

Tarun Kumar Yadav
Department of Mechanical Engineering,
Babulal Tarabai Institute of Research & Technology, Sagar (M.P.), India

***Abstract*— In this result paper, we used four different forecasting techniques i.e. moving average, weighted moving average, exponential smoothing and regression analysis method. Now, these forecasting techniques compared with each other and find the suitable forecast technique to provide accurate gold price near about original gold price in market. After calculation, we find that exponential smoothing method provide better forecasting result for gold price and these gold price help the investors to know the suitable time for buy and selling the gold.**

Keywords— **Forecasting, Moving Average, Weighted Moving Average, Exponential Smoothing, Regression Analysis, Gold Price.**

I. INTRODUCTION

Forecasting is defined as, "The process of finding a future demand by using past data or past experience."

According to Evan J. Douglas, "Demand forecasting may be defined as the process of finding values for demand in future time periods [3]

Various application of forecasting is as follows:-

- Supply Chain Management
- Economic forecasting
- Earthquake forecasting
- Technology forecasting
- Weather forecasting, etc.

II. EFFORTS BY VARIOUS RESEARCHERS

[1] Syed Misbah Uddin, Aminur Rahman, Emtiaz Uddin Ansari (2017), ***"comparison of some statistical forecasting techniques with GMDH predictor: a case study",*** the aim of this research to determine the accurate models for forecasting the cement demand. In this research monthly sales data of cement from ranging Jan 2007 to Feb 2016 is used and also Group Method of Data Handling (GMDH) model used to forecasting the cement demand. The time series smoothing techniques such as exponential smoothing, double exponential smoothing, moving average, weightage moving average and regression method were also used in this research.

Then, the original data were compared to the forecast produced by the time series model and GMDH model and for comparing the forecasting accuracy mean absolute deviation (MAD), mean absolute percentage error (MAPE) and mean square error (MSE) were also calculated. These comparison shows that the GMDH provide better result than other statistical models based on MAD, MAPE and MSE.

[2] Alessio Azztti (2016), ***"Forecasting Gold Price: A Comparative Study",*** this research evaluates the correctness of various existing forecasting techniques and models to provide accurate gold prices forecast. It was found that ARIMA model provided the best forecast of prices over 36 month forecasting horizons as compared to other models. ARIMA model provided better result to metal such as silver, platinum, palladium and rhodium as well.

III. METHODOLOGY

A. Moving Average Method – Moving average may be defined as the average of a fixed number of items in the series, which move through the series by dropping the top item of the previous averaged group and adding the next item below in each successive average. Adding all the value for a certain number of successive periods and then dividing the sum obtained by the number of items include compute moving average.[5]

B. Weighted Moving Average - Weighted moving average method allows any weights to be placed on each element of the data, provide that sum of all weights equals 1.[4]

The general, forecasting for the t^{th} period is given by,

$$F_t = w_1 \times D_{t-1} + w_2 \times D_{t-2} + \cdots + w_n \times D_t$$

Where

$w_1, w_2, \ldots, w_n$ = weights given to the actual data for periods t-1, t-2, …., t-n respectively.

$D_1, D_2 \ldots\ldots D_{t-n}$ = actual data for periods t-1, t-2, ….., t-n respectively.

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C. Exponential Smoothing Method - It is based on the forecast and the actual demand for the previous period and a smoothing constant α which lies between 0 and 1. [4]

According to this method forecast for the t_{th} period is given by the relation,

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

$$= \alpha \times D_{t-1} + (1 - \alpha) \times F_{t-1}$$

D. Regression Analysis - Regression can be defined as a functional relationship between two or more correlated variables. One variable is known or assumed and used to forecast the value of un-known variable. The relationship is usually developed from the observed data. The relationship between variables appears to be linear the regression is called linear regression.[4]

The linear regression line is of the

$$Y = a + bX$$

Where,

Y = Dependent variable, which is need to be forecast
X = Independent variable
a = Intercept on y-axis
b = Slope of the line

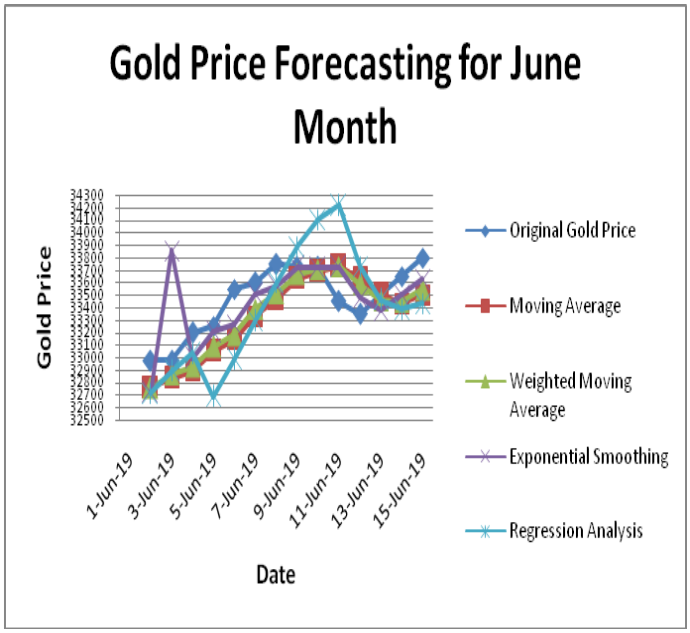
IV. DATA COLLECTION

Data collection of previous 8th months is shown in Appendix - A.

V. RESULT TABLE

Gold Price Forecasting For June 2019					
Date	Original Gold Price	Moving Average	Weighted Moving Average	Exponential Smoothing	Regression Analysis
1-Jun-2019	32975	32758.33	32752.5	32719.17	32717.86
2-Jun-2019	32975	32833.33	32865	33853.33	32889.29
3-Jun-2019	33200	32891.67	32925	32994.17	33032.14
4-Jun-2019	33250	33050	33087.5	33202.5	32689.29
5-Jun-2019	33550	33141.67	33180	33263.33	32982.14
6-Jun-2019	33600	33333.33	33390	33509.17	33289.29
7-Jun-2019	33750	33466.67	33515	33573.33	33596.43
8-Jun-2019	33725	33633.33	33665	33721.67	33889.29
9-Jun-2019	33725	33691.67	33707.5	33715.83	34107.14
10-Jun-2019	33450	33733.33	33730	33721.67	34217.86
11-Jun-2019	33350	33633.33	33587.5	33478.33	33732.14
12-Jun-2019	33500	33508.33	33455	33378.33	33460.71
13-Jun-2019	33650	33433.33	33445	33500.83	33389.29
14-Jun-2019	33800	33500	33545	33628.33	33432.14
15-Jun-2019	33850	33650	33695	33770	33617.86

VI. RESULT GRAPH



VII. CONCLUSION

The aim of this research to forecast the gold price and also compare the different types of forecasting techniques i.e. moving average, weighted moving average, exponential smoothing and regression analysis method. For this purpose, four different types of forecasting techniques were used and these forecasting techniques compare with each other. Then, we find the best suitable forecasting method for gold price. After observation we find that, exponential smoothing method gives the better gold price forecasting.

VIII. ACKNOWLEDGEMENT

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APPENDIX - A. Previous 8th Month Gold Rate

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Date	Oct. (2018)	Nov. (2018)	Dec (2018)	Jan (2019)	Feb (2019)	March (2019)	April (2019)	May (2019)
1	30601	32350	31160	32325	33950	33450	32425	32750
2	30589	32100	31160	32500	33990	33425	32625	32300
3	31036	32100	31750	32575	33990	33425	32425	32425
4	31154	32125	31725	32300	33960	33375	32550	32475
5	31154	32400	31825	32350	33950	32900	32650	32475
6	31645	32125	31850	32350	33925	32550	32650	32550
7	31645	32130	32050	32525	33900	32525	32650	32575
8	31649	32150	32300	32575	33925	32975	32900	32800
9	31380	32125	32300	32825	33910	33050	32900	32950
10	31381	32175	32875	32800	33910	33050	32925	32875
11	31997	32175	32825	32850	33800	32650	32800	32950
12	31816	31950	32600	32825	33450	32700	32740	32950
13	31842	31800	32575	32825	33675	33100	32425	33250
14	31842	31825	32500	33200	33700	32750	32700	33400
15	32278	31650	32475	33250	33975	32800	32680	33250
16	32152	31625	32475	33375	33950	32825	32675	33150
17	31990	31625	32300	33350	33950	32825	32575	33050
18	32089	32400	32100	33100	34100	32475	32525	33925
19	32084	31450	31975	33050	34225	32900	32450	32900
20	31910	31425	32175	33050	34500	32850	32500	32650
21	31910	31375	32250	33000	34000	32925	32500	32600
22	31914	31350	32050	33125	34050	33050	32650	32650
23	32271	31600	32050	33150	33975	32950	32600	32700
24	32066	31300	32225	33000	33975	32950	32780	32625
25	32095	31150	32325	33225	33850	32975	32850	32675
26	32156	31150	32275	33425	33875	32900	32950	32675
27	31932	31225	32450	33425	33775	32600	32950	32600
28	31932	31100	32600	33500	33550	32775	32930	32450
29	32012	31225	32525	33650	-	32800	32950	32750
30	31926	31050	32525	33725	-	32750	32850	32800
31	31886	-	32375	33900	-	32750	-	32725

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