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# **Crude Oil Price Prediction Report**

## **Abstract**

Crude oil is amongst the most important resources in today's world, it is the chief fuel and its cost has a direct effect on the global habitat, our economy and oil exploration, exploitation and other activities. Prediction of oil prices has become the need of the hour, it is a boon to many large and small industries, individuals, the government. The evaporative nature of crude oil, its price prediction becomes extremely difficult and it is hard to be precise with the same. Several different factors that affect crude oil prices. We propose a contemporary and innovative method of predicting crude oil prices using the artificial neural network (ANN). The main advantage of this approach of ANN is that it continuously captures the unstable pattern of the crude oil prices which have been incorporated by finding out the optimal lag and number of the delay effect that controls the prices of crude oil. Variation of lag in a period of time has been done for the most optimum and close results, we then have validated our results by evaluating the root meansquare error and the results obtained using the proposed model have significantly outperformed.

*Keywords:* Artificial Neural Network, Crude Oil Price, Prediction Model, Optimal Lag

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## **1. Introduction**

Crude oil is a yellow-black naturally occurring liquid found in geological formations beneath the Earth's surface, it can be separated into various kinds of consumer fuels through the process of fractional distillation. Crude oil is amongst the most important energy resources on earth right now. So far, it remains the world's leading fuel, with nearly one-third of global energy consumption. Petroleum products are also made of refined crude oil. Encouraging usage of fossil fuels is getting highly unpopular as they're irrefutably responsible for global warming, and other severe impacts on ecosystems. A conscious effort to phase-out fossil fuels is being made throughout the world to act upon the climate crisis. Petroleum is of utmost importance to industries, civilization, it accounts for a significant percentage of the world's energy consumption which makes it an underlying factor in world politics and international relations. Current estimates suggest that the world usage of Petroleum ranges up to 95 million barrels per day.

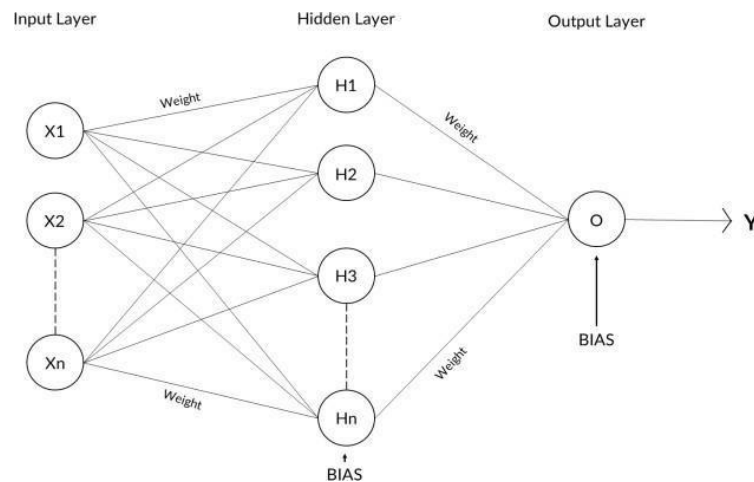
Crude oil price prediction has a scope larger than we can think of, the forecasting used is relevant for big and small industries along with the government benefitting from the predicted prices, but due to the evaporative nature of oil, it becomes very challenging to achieve accuracy. In the current scenario where technology is taking over our lives and efforts are being made to minimize human labour the Artificial Neural Network Technique has become one of the most effective methods used for prediction of any data. In this paper, we propose a technique which can be used to forecast the oil prices using the Artificial Neural Network (Sigmoid Function with the Learning Algorithm). Prices of the crude oil and the economy have a strong correlation along with the economic and political factors affecting the crude oil price.

This work proposes a model to determine the lag in a given data set. Lag calculation in any prediction model is extremely important as it makes you one step ahead, in any prediction model the maximum impact is due to the previous year's values, hence lag values carry a lot of information of the future series of price and time. ANN has some major advantages that make it extremely suitable for a prediction model, ANNs can model non-linear and complex relationships between input and output. ANN can also generalize, after learning from the inputs it can infer relationships without seeing the data or the input. ANN also gains knowledge from hidden relationships in the data without imposing any fixed relationships in the data, hence making it a reliable method for making predictions.

There are innumerable ways and approaches which are being used and have been used for predicting the prices of crude oil, one of the common methods is the one based on intuitions wherein the experiences, knowledge and opinions of experts and professionals who have worked for a long time in this industry is used to predict the prices for the coming future. A lot of economists and analysts also work on forecasting the crude oil cost, they use data transformation and regression which include autoregressive moving average (ARMA) models and vector autoregressive (VAR) models with a different value for the input each time and then plot the graph with their predicted prices taking in the major economic factors into account. Another and one of the most common techniques which are used is by accepting the current statistics and prices and assuming it to be the same for future without any change at all in the prices, however, such a prediction never works now as the nature of oil is extremely volatile.

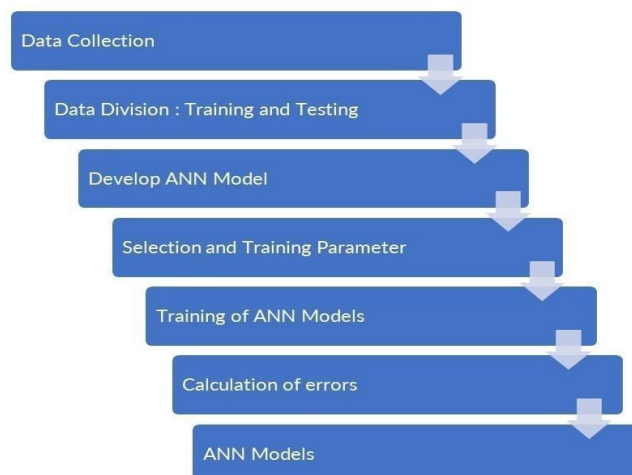
## 2. Methodology for Proposed Model

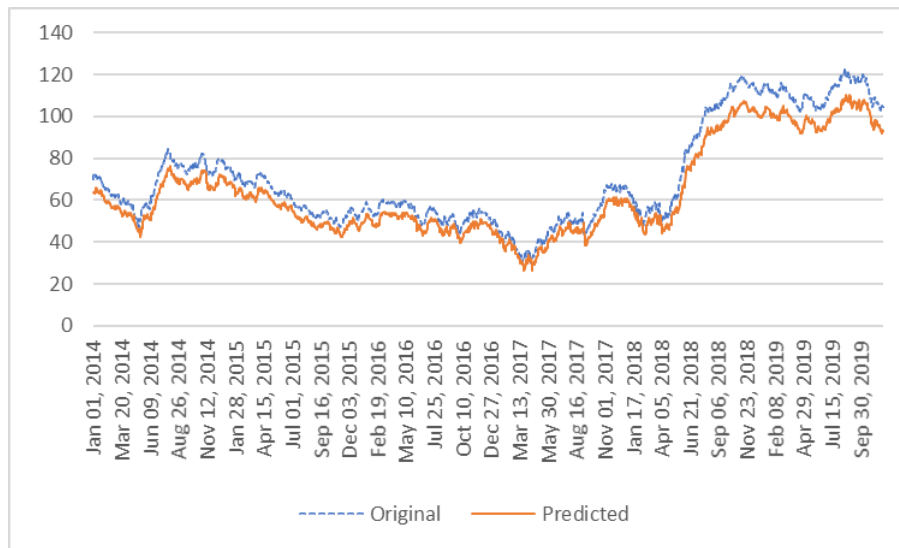
Artificial Neural Network also the connectionist systems are computing systems that are based on and are theoretically alike, but not exactly identical to, biological neural networks of a human body. An ANN performs its task by taking in examples and requires no programming with task-specific rules. The purpose of a neural network is to construct or design an output pattern when given an input pattern. An artificial neural network (ANN) has an architecture which is parallelly-distributed with large number of nodes (neurons) and connections.



Structure of the Artificial Neural Network

The ANN model development steps for our prediction are as follows:





Original and Predicted Closing prices with time

### 3. Conclusion and Future Scope

In this paper, an artificial neural network model is presented with the task of determining the most favourable lag in the crude oil price data. It is evident, the result is shown in the figure, the prediction is accurate till there is a massive and sudden change in the actual data, where it becomes challenging to predict the exact new price with the change, however, the proposed model has efficiently taken into consideration these patterns. Else ways, this also proves the theory that financial markets are unpredictable and change anytime because of known and unknown factors. This work indicates that the ANN model is an effective tool for crude oil price prediction and can be efficiently used for short term price forecasting by determining the optimal lags. The proposed model is powerful and highly suggested because investors can use it not only to initiate trades but also as an effective tool to judge various strategies relating to investments. This work is carried out on the closing price of crude oil; however, there are various other factors which also affect the crude oil prices like change in the prices and quantities (demand and supply), change in the economy and current affairs as shown by the media. The main advantage of this research is in capturing the changing pattern of these prices. In the coming future, fundamental indicators and market trends have been planned to be incorporated into a model which will help the proposed model perform more efficiently.

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