Use case:

As the most important strategic resource around the globe, crude oil is the “key” commodity for the world’s economy. Therefore, forecasting crude oil price has always been considered as a very challenging task which drew the interest of researchers, practitioners and institutions. The price of oil is essentially determined by its supply and demand, it is also strongly related to irregular and unforeseen events caused by weather, wars, embargoes and revolutions. Many other factors like Gross Domestic Production growth, stock levels inventories, foreign exchange rates, world population, political aspects and investors’ expectations can significantly affect the price of oil Furthermore, the time to ship crude oil from one country to another can affect directly their price because oil prices vary in different regions of the worldwide. All these factors can explain the nonlinear evolution and chaotic behaviour of crude oil prices and therefore the high volatility of crude oil market. The oil price fluctuations have a direct effect on the nation’s economy and therefore, it is of vital importance to predict oil price.

Refer existing solutions:

Among many and different forecasting models that have been developed to predict the "black gold" price, the traditional statistical and econometric methods are the first ones to be applied by academic researchers.

The first research about forecasting oil market is proposed by Amano (1987). The author used a small-scale econometric model for oil market prediction. Huntington (1994) utilized a sophisticated econometric model for predicting oil price in the 1980s. In another work, Gulen (1998) applied cointegration analysis to predict the WTI crude oil price. Barone-adesi et al. (1998) suggested a semi-parametric approach based on the filtered historical simulation technique to forecast oil price. Based on the GARCH properties of the oil price volatility, Morana (2001) employed a semi-parametric approach investigated by Barone-adesi et al. (1998) to short-term forecast of Brent crude oil price. In another work, Tang and Hammoudeh (2002) utilized a nonlinear regression to predict OPEC basket price. Using OECD petroleum inventory levels and relative stock inventories, Ye et al. (2002, 2005) adopted a simple linear regression model for short-term monthly prediction of WTI crude oil spot price. In a related study, Ye et al. (2006) included nonlinear variables such as low- and high- inventory variables to the linear forecasting model suggested by Ye et al. (2002, 2005) to predict short-run WTI crude oil prices. Using OECD stocks, non-OECD demand and OPEC supply, Zamani (2004) applied econometrics forecasting methodology to short term quarterly WTI crude oil spot price. Lanza et al. (2005) investigated crude oil and product prices by utilizing the error correction models. Sadorsky (2006) applied multiple univariate and multivariate statistical models such as GARCH, TGARCH, AR, and BIGARCH to daily forecast of volatility in petroleum futures price returns. Slightly more recent, Dees et al. (2007) developed a linear model of the world oil market to predict oil demand, supply, and prices focusing mainly on OPEC behavior. Murat and Tokat (2009) investigated the relationship between futures and spot crude oil prices and therefore tested the ability of futures prices to forecast spot price movements using random walk model. Cheong (2009) adopted ARCH models to forecast crude oil markets. On the other hand, more recent studies have applied GARCH as well as different models of the GARCH family to predict oil price. For example, Narayan and Narayan (2007) and Agnolucci (2009) used GARCH model to forecast spot and futures crude oil prices. In a related research, Mohammadi and Su (2010) compared the forecasting results of various GARCH-types models in order to predict the crude oil price. Kang et al. (2009) proposed CGARCH, FIGARCH and IGARCH models to forecast volatility of crude oil markets. For the same purpose, Wei et al. (2010) extended the study of Kang et al. (2009) by applying linear and nonlinear GARCH-class models.

As results of the application of linear techniques, a significant error has been demonstrated between actual and predicted oil prices. With these models, several exogenous variables have been employed to predict oil price, however; inventory, supply and demand are the mostly used factors. Supply and demand are relatively inelastic to price changes, subsequently, an inventory adjustment can be slow to happen which explains the major part of the difference between real and forecasted prices, especially for the short run (Hamilton, 2008). On the other hand, traditional statistical and econometric techniques are usually able to capture only linear process in data time series (Weigend and Gershenfeld, 1994). However, the oil prices behaviour is characterized by a high nonlinearity and irregularity. Therefore, the mentioned models are not the appropriate choice to forecast the oil price.

Technical publication:

1. Prediction of crude oil prices in COVID-19 outbreak using real data

https://www.sciencedirect.com/science/article/pii/S0960077922002004#:~:text=It%20has%20been%20showed%20that,to%2022%25%20%5B28%5D.

2. Crude Oil Price Prediction using Artificial Neural Network

https://www.sciencedirect.com/science/article/pii/S1877050920305913

3. Evolutionary Neural Network model for West Texas Intermediate crude oil price prediction

https://www.sciencedirect.com/science/article/abs/pii/S0306261914013026

Research publication:

1. Predicting Crude Oil Price in Nigeria with Machine Learning Models

https://www.researchgate.net/publication/362155372_Predicting_Crude_Oil_Price_in_Nigeria_with_Machine_Learning_Models

2. Interval prediction approach to crude oil price based on three-way clustering and decomposition ensemble learning

https://www.sciencedirect.com/science/article/abs/pii/S156849462200285X

3. A Multi-recurrent Network for Crude Oil Price Prediction

https://ieeexplore.ieee.org/document/9002841