**LIERATURE SURVEY**

**Crude Oil Price Prediction using Artificial Neural Network**

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 has been done for the most optimum and close results, we then have validated our results by evaluating the root mean square error and the results obtained using the proposed model have significantly outperformed.

**Crude oil price prediction model with long short-term memory deep learning based on prior knowledge data transfer**

Energy resources have acquired a strategic significance for economic growth and social welfare of any country throughout the history. Therefore, the prediction of crude oil price fluctuation is a significant issue. In recent years, with the development of artificial intelligence, deep learning has attracted wide attention in various industrial fields. Some scientific research about using the deep learning model to fit and predict time series has been developed. In an attempt to increase the accuracy of oil market price prediction, Long Short Term 5

Memory, a representative model of deep learning, is applied to fit crude oil prices in this paper. In the traditional application field of long short term memory, such as natural language processing, large amount of data is a consensus to improve training accuracy of long short term memory. To improve the prediction accuracy by extending the size of training set, transfer learning provides a heuristic data extension approach. Moreover, considering the equivalent of each historical data to train the long, short-term memory is difficult to reflect the changeable behaviours of crude oil markets, a very creative algorithm named data transfer with prior knowledge which provides a more availability data extension approach (three data types) is proposed. For comparing the predicting performance of initial data and data transfer deeply, the ensemble empirical mode decomposition is applied to decompose time series into several intrinsic mode functions, and these intrinsic mode functions are utilized to train the models. Further, the empirical research is performed in testing the prediction effect of West Texas Intermediate and Brent crude oil by evaluating the predicting ability of the proposed model, and the corresponding superiority is also demonstrated.

**Global crude oil price prediction and synchronization-based accuracy evaluation using random wavelet neural network**

In the present paper, a new neural network is developed to improve the prediction accuracy of crude oil price fluctuations. The proposed model combines wavelet neural network (WNN) with random time effective function. WNN is a predictive system with the ability to implement strong nonlinear approximation. The random time effective function is applied to formulate the varied impact of historical data on current market, which endows historical data with time-variant weights to make them affect differently on the training process of WNN. Besides, the multiscale composite complexity synchronization (MCCS) is used as the new method to evaluate the predictive performance. The empirical experiments are implemented in predicting crude oil prices and moving average absolute return 6

series of WTI and BRE. Through comparing with the traditional back propagation neural network (BPNN), support vector machine (SVM) and WNN models, the empirical results demonstrate that the proposed model has a higher accuracy in crude oil price fluctuations predicting and is advantageous in improving the precision of prediction.

**Crude oil price prediction using complex network and deep learning algorithms**

Crude oil price prediction is a challenging task in oil producing countries. Its price is among the most complex and tough to model because fluctuations of price of crude oil are highly irregular, nonlinear and varies dynamically with high uncertainty. This paper proposed a hybrid model for crude oil price prediction that uses the complex network analysis and long short-term memory (LSTM) of the deep learning algorithms. The complex network analysis tool called the visibility graph is used to map the dataset on a network and K-core centrality was employed to extract the non-linearity features of crude oil and reconstruct the dataset. The complex network analysis is carried out to pre-process the original data to extract the non-linearity features and to reconstruct the data. Thereafter, LSTM was employed to model the reconstructed data. To verify the result, we compared the empirical results with other research in the literature. The experiments show that the proposed model has higher accuracy and is more robust and reliable.

**Crude Oil Price Prediction with Decision Tree Based Regression Approach**

Crude oil is an essential commodity for industry and the prediction of its price is crucial for many business entities and government organizations. While there have been quite a few conventional statistical models to forecast oil prices, we find that there is not much research using decision tree models to predict crude oil prices. In this research, we develop decision tree models to forecast crude oil 7

prices. In addition to historical crude oil price time series data, we also use some predictor variables that would potentially affect crude oil prices, including crude oil demand and supply, and monthly GDP and CPI during the period 1992 through 2017 with a total of 312 observations. In this research, we use decision tree models to predict crude oil price. We find that the decision tree models developed in this research are expected to have higher forecasting accuracy than that of such benchmark models as multiple linear regression and time series autoregressive integrated moving average.