PROPOSED SOLUTION FOR CRUDE OIL PRICE PREDICTION

PROBLEM STATEMENT:

Oil demand is inelastic, therefore the rise in price is good news for producers because they will see an increase in their revenue. Oil importers, however, will experience increased costs of purchasing oil. Because oil is the largest traded commodity, the effects are quite significant. A rising oil price can even shift economic/political power from oil importers to oil exporters. The crude oil price movements are subject to diverse influencing factors. This Guided Project mainly focuses on applying Neural Networks to predict the Crude Oil Price. This decision helps us to buy crude oil at the proper time. Time series analysis is the best option for this kind of prediction because we are using the Previous history of crude oil prices to predict future crude oil. So, we would be implementing RNN (Recurrent Neural Network) with LSTM (Long Short-Term Memory) to achieve the task.

SOLUTION DESCRIPTION:

Recurrent Neural Networks:

RNN are different from feedforward networks. They use their internal memory to predict things. They are very good at tasks at which humans are not good at such as handwriting recognition and speech recognition. They were initially developed in 1980. These networks make use of sequential information available to them. Traditionally, we assumed that inputs do not depend on each other. But that was not a valid assumption. As if we want to predict the next words in a sentence, we must know the previous words. They can be

thought of having a memory which stores the information for future use. There exist various extensions of RNN. One of them is the Bidirectional RNN. In these networks, output at time t may depend on future inputs as well. The other popular variant of the RNN is the deep RNN. In these recurrent networks, there exist multiple layers per time step.

LSTM Networks:

The most popular and widely used type of RNN is the LSTM and these types of recurrent networks have been used for this study. These networks learn order dependence in sequence prediction problem. The LSTM networks are able to solve two major issues encountered in RNN i.e., vanishing gradients and exploding gradients. The key to the solution of these problems were the internal structure that has been used in LSTM. In this, there exists one input layer, one hidden layer and one output layer. This most simple architecture of LSTM networks is known as vanilla LSTM which performs very well in all sequence related prediction problems.

Data retrieval and pre-processing:

In data retrieval, datasets can be fetched such of news data, black gold price data and market data. Dataset from news can be retrieved through headlines as it is easier to obtain and justifies in one line. Factors that affect the prediction are export business, stock market and later business.

Methodology:

LSTM based architecture has been used for prediction of crude oil price movements. The proposed architecture consists of four layers of LSTM layers followed by a dense layer with ten neurons and

at the end dense layer with only one neuron. All the inputs to the proposed network were normalized to achieve the best results.

Libraries Required:

Make sure that the following libraries are installed on your working machine before proceeding further

- Keras
- Tensorflow
- Numpy
- Pandas

NOVELTY:

In the era of big data, deep learning for predicting crude oil price has become even more popular than before. We collected 2 years of data from world global data and proposed a comprehensive customization of feature engineering and deep learning-based model for predicting price of crude oil. The proposed solution is comprehensive as it includes pre-processing of the crude oil dataset, utilization of multiple feature engineering techniques, combined with a customized deep learning-based system for crude price prediction. We conducted comprehensive evaluations on frequently used machine learning models and conclude that our proposed solution outperforms due to the comprehensive feature engineering that we built. The system achieves overall high accuracy for crude oil price prediction. With the detailed design and evaluation of prediction term lengths, feature engineering, and data pre-processing methods, this work contributes to the stock analysis research community both in the financial and technical domains.

SOCIAL IMPACT:

Crude oil price prediction has long been the subject of research because of the importance of accuracy of prediction and the difficulty in forecasting. Traditionally, forecasting has involved linear models such as LSTM and RNN using standardized numerical data such as corporate financial data and crude oil price data. However, we know little about which characteristics of crude oil price affect the accuracy of predictions and to what extent. The purpose is to analyse the effects of crude oil price characteristics on crude oil price prediction via RNNs. To this end, we define the characteristics of crude oil price and identify significant differences in prediction performance for each characteristic. The results reveal that the accuracy of prediction is improved by utilizing solid lines, colour, and a single image without axis marks. Based on these findings, we describe the implications of making predictions only with which are unstructured data, without using large amounts of standardized data. Finally, we identify issues for future research.

BUSINESS MODEL:

Crude oil price prediction is of course based on data, but when using AI, you are delving into the world of big data. That means that you have more data and more detail to your data. You are then able to take into account each customer's specific individual behaviour and therefore have a more precise price prediction. Learning from mistakes is one of the most valuable things you can do as a human. The thing is that, when it comes to predicting, AI is much better at learning and adjusting than we are. This is not only due to the speed with which a computer can understand and re-evaluate data but also because it is unbiased. Model management (which is minimizing the gap between reality and predicating) is a key element to a good AI-powered crude oil price prediction. When we analyse the prediction and reality we might compare and adjust a tenfold of combinations. With AI the number of combinations that can be made between result data and predicting data. It is therefore concluded that AI creates more and better improvements than we could do manually.

SCALABILITY OF SOLUTION:

Crude oil price forecasting plays a significant role in world economy and its accurate prediction has significant benefits for the economic conditions of a country. In this direction, an effort has been in this paper. This paper has proposed an LSTM based network for better prediction of crude oil prices. The results obtained from the work are quite encouraging. The results indicate that large lookups do not necessarily improve the accuracy of the predictions of crude oil prices. It has been found that lookups up to the value of 10 are ideal for crude oil price prediction purposes. It has also been found that just increasing the number of LSTM layers do not have much impact on the accuracy of the results. Here it can be 90% accurate in price prediction. In future work, current market and political conditions can also be taken into consideration in crude oil price forecasting for even better results.