

LITERATURE SURVEY

Survey 1 :

Crude oil price prediction: A comparison between AdaBoost-LSTM and AdaBoost-GRU for improving forecasting performance

Author : Ganiyu Adewale Busari

Abstract :

We proposed a hybrid model that combined AdaBoost algorithm with GRU and compare its forecasting performance with the existing AdaBoost-LSTM model. The proposed work is the first that applied to the crude oil prices prediction. Comparison of the analysis results of the models are presented with the benchmarked models, that is, LSTM and GRU. The evaluation metrics considered are both scale –dependent metrics, that is, MAE and RMSE and scale-independent metrics, that is, MAPE and WMAPE. We also applied Scatter index as normalized RMSE. The proposed method, AdaBoost-GRU outperforms the single methods and AdaBoost-LSTM ensemble model in this study.

Survey 2 :

Forecasting Crude Oil Prices: a Deep Learning based Model

Author : Yanhui Chen, Kaijian He, Geoffrey K.F. Tso

Abstract :

With the popularity of the deep learning model in the engineering fields, it has attracted significant research interests in the economic and finance fields. In this paper, we use the deep learning model to capture the unknown complex nonlinear characteristics of the crude oil price movement. We further propose a new hybrid crude oil price forecasting model based on the deep learning model. Using the proposed model, major crude oil price movement is analyzed and modeled. The performance of the proposed model is evaluated using the price data in the WTI crude oil markets. The empirical results show that the proposed model achieves the improved forecasting accuracy.

Survey 3 :

Forecasting the price of crude oil

Author : Ramesh Bollapragada, Akash Mankude, V.Udayabhanu

Abstract :

Crude oil is the mixture of petroleum liquids and gases that is extracted from the ground by oil wells. It is an important source of fuel and is used in the production of several products. Given the important role price of the crude oil plays, it becomes extremely important for managers to predict future oil price while making operational decisions such as: when to purchase material, how much to produce and what modes of transportation to use. The goal of this paper is to develop a forecasting model to predict the oil prices that aid management to reduce operational costs, increase profit and enhance competitive advantage. We first analyze the primary theories related to the forecast of oil price followed by the reviews of two main streams of forecast theory, which are Target Capacity Utilization Rule (TCU) and Exhaustible Resources Theory. We implement a Target Capacity Utilization Rule recursive simulation model and test it on the historical data from 1987 through 2017 to predict crude oil prices for 1991 through 2017. We tried several variations of the base model and the best method produced MAD, MSE, MAPE and MPE of 12.676, 280.92, 0.2597, 0.028, respectively. We further estimated the forecasts of the oil prices at a monthly level based on our yearly forecast of oil prices from our best method. The calculated MAD, MSE, MAPE and MPE values are 5.66, 82.1163, 0.1246 and 0.038, respectively, which shows our model is promising again at a monthly level.

Survey 4 :

Analysis and forecasting of crude oil price based on the variable selection-LSTM integrated model

Author : Quanying Lu , Shaolong Sun , Hongbo Duan and Shouyang Wang

Abstract :

In recent years, the crude oil market has entered a new period of development and the core influence factors of crude oil have also been a change. Thus, we develop a new research framework for core influence factors selection and forecasting. Firstly, this paper assesses and selects core influence factors with the elastic-net regularized generalized linear Model (GLMNET), spike-slab

lasso method, and Bayesian model average (BMA). Secondly, the new machine learning method long short-term Memory Network (LSTM) is developed for crude oil price forecasting. Then six different forecasting techniques, random walk (RW), autoregressive integrated moving average models (ARMA), elman neural Networks (ENN), ELM Neural Networks (EL), walvet neural networks (WNN) and generalized regression neural network Models (GRNN) were used to forecast the price. Finally, we compare and analyze the different results with root mean squared error (RMSE), mean absolute percentage error (MAPE), directional symmetry (DS). Our empirical results show that the variable selection-LSTM method outperforms the benchmark methods in both level and directional forecasting accuracy.

Survey 5 :

Development of Crude Oil Reference Material Certified for the Concentrations of Sulfur, Iron, Nickel, Vanadium and Magnesium

Authors : B. Shehata, G. G. Mohamed, M. A. Gab-Allah

Abstract :

The creation of a natural-matrix reference material for measuring the amounts of sulphur, iron, nickel, vanadium, and magnesium in crude oil is discussed in this work. In order to create the candidate material, the crude oil was homogenised and packaged. The generated reference material's homogeneity and stability were examined, and gravimetric and wavelength-dispersive X-ray fluorescence (WD XRF) spectroscopy were used to characterise the sulphur content. Atomic absorption spectrometry (AAS) and inductively coupled plasma-optical emission spectrometry (ICP-OES) techniques were used to characterise the contents of iron, nickel, vanadium, and magnesium. Atomic absorption spectrometry (AAS) and inductively coupled plasma-optical emission spectrometry (ICP-OES) techniques were used to characterise the contents of iron, nickel, vanadium, and magnesium. The candidate reference material has good homogeneity and stability, according to statistical analysis of the data. The degree of agreement between characterization methods was sufficiently high to permit certification. Using a technique established by the National Institute for Standards and Technology, which involves merging data from two or more independent analytical methods, the certified values and their related uncertainties were statistically determined. crude oil has been developed by multiple analytical methods. Statistical analysis of the data showed that the reference material is sufficiently homogenous and stable. This reference

material will be a useful tool for validation of the analytical methods, for quality control in crude oil analysis and for establishing traceability of the measurement results to the SI unit.

Survey 6 :

Detection And Classification of images using Detection Line

Authors : Haibing Wu and Xiaodong Gu (2015)

Abstract :

In this study, they present an application of neural networks and image processing techniques for detecting and classifying images. Images were segmented by a detection line (DL) method. Six geometric features (i.e., the principal axis length, the secondary axis length, axis number, area, perimeter and compactness of the image), 3 color features (i.e., the mean gray level of image on the R, G, and B bands). The methodology presented herein effectively works for classifying image to an accuracy of 90.9%.

Survey 7 :

Classification and Grading of Image Using Texture Based Block-Wise Local Binary Patterns

Authors : Paul Viola, Michael Jones (2001)

Abstract :

They proposed approach makes use of global textural feature viz., Local Binary Pattern for feature extraction. Initially, an image is divided into k number of blocks. Subsequently, the texture feature is extracted from each k blocks of the image. The k value is varied and has been fixed empirically. For experimentation purpose, the bird dataset is created using 4 different classes and experimentation is done for whole image and also with different blocks like 2, 4 and 8. Grading of Bird is done using Support Vector Machine classifier. Finally, the performance of the grading system is evaluated through metrics like accuracy, precision, recall and F-measure computed from the confusion matrix. The experimental results show that most promising result is obtained for 8 blocks of the image.

Survey 8 :

Linear and Non-Linear Modelling of Nigerian Crude Oil Prices

Authors : Wiri Leneenadogo ,Sibeate Pius U.

Abstract :

The time plot's revelation of the series' upward and downward movement leads one to speculate that it displays a pattern of regime switching known as the cycle of expansion and contraction. The Augmented Dickey-Fuller test was employed to check for stationarity at lag one. Seven models were estimated for the linear model (univariate linear ARIMA (p, d, q)) and two models were estimated for the non-linear model (univariate non-linear MS-AR). AIC (2.006612), SC (2.156581), and the highest log-likelihood of (-150.5480) for the crude oil were used. Hamilton (2003) shows that the drops in real GDP in the US in response to various disruptions to crude oil production over the course of the second half of the twentieth century were greater than the factor share argument would predict. Thus, our results also have important implications for central tenants of macroeconomics such as business cycle theories. Hendry and Juselius (2000) suggested that "the impact of structural change in the world oil market is [a potential source] of non stationarity". Oil production contains a unit root, through the transmission mechanism to real income via energy prices, business cycle theories describing output fluctuations as temporary deviations from long-run growth would lose their empiric noted, if real output contains a unit root, this "challenges a broad spectrum of macroeconomic theories designed to produce and understand transitory fluctuations"

Survey 9 :

Quality and chemistry of crude oil

Authors : Ghulam Yasin, Muhammad Iqbal Bhangar, Tariq Mahmood Ansari, Syed Muhammad Sibtain Raza Naqvi, Muhammad Ashraf, Khizar, Farah Naz Talpur

Abstract :

Crude oil composition (saturates, aromatics, and polar) of samples taken from several North American oil fields Pakistan's Punjab and Sindh regions have been assessed using the ASTM (American techniques used by the Society for Testing and Material. Results from Punjab's North Region and the South Region Crude oils from (Sindh) have been contrasted with one another. A crude oil is a

naturally occurring mixture, consisting predominantly of hydrocarbons, sulphur, nitrogen and metals. Quality (Bawazeer et al., 1997) of the petroleum products is playing the major role of consumer satisfaction and speaks about the performance of the refineries. Crude oils are complex but mainly paraffinic, naphthenic and aromatic (Wang et al., 1994). Crude oils contain all normal alkenes from (Khanorkar et al., 1996) C1 to C120. However, this percentage rises to 35% in highly paraffinic and decreases to zero in highly biograded oils (Ali et al., 1989). Methane is predominant component of natural gas and alkanes ranging from pentane to pentadecane are the chief constituents of straight run (uncracked) gasoline or petrol. Above C17, the alkanes are solid wax like substances and crude oils, which contain high concentrations of paraffin wax, will be viscous and have high cloud and pour points. These Paraffins consists of isoalkanes and methyl cycloalkanes Sindh crude is superior to Punjab crude.oils because they have a low pour point, low viscosity, low specific gravity, and low sulphur content. Allbased on total, the examined samples are of the sweet variety. North region crude oils are of sweet type while some samples of South region belong to sour type crude oils. North region crude oils belong to light crude oil class while one sample of South region belongs to medium class crude oils. North region (Punjab) crude oils have more saturates aromatics and polar contents than that of South region (Sindh) crude oils.

Survey 10 :

Understanding Crude Oil Prices

Authors : James D. Hamilton NBER

Abstract :

This article describes some of the key features of the oil market and then discusses the pricing of oil, highlighting the important role of the futures market. It also notes some related issues for the oil market. Topics discussed include the role of commodity speculation, OPEC, and resource depletion. This is true in terms of both production and financial market activity. In terms of statistical regularities, the paper notes that changes in the real price of oil have historically tended to be permanent, difficult to predict, and governed by very different regimes at different points in time. From the perspective of economic theory, we review three separate restrictions on the time path of crude oil prices that should all hold in equilibrium. The first of these arises from storage arbitrage, the second from financial futures contracts, and the third from the fact that oil is a depletable resource. We also discuss the role of commodity

futures speculation. In terms of the determinants of demand, we note that the price elasticity of demand is challenging to measure but appears to be quite low and to have decreased in the most recent data. Income elasticity is easier to estimate, and is near unity for countries in an early stage of development but substantially less than one in recent U.S. data. We also relate the challenge of depletion to the past and possible future geographic distribution of production. Our overall conclusion is that the low price-elasticity of short-run demand and supply, the vulnerability of supplies to disruptions, and the peak in U.S. oil production account for the broad behavior of oil prices over 1970-1997. Although the traditional economic theory of exhaustible resources does not fit in an obvious way into this historical account, the profound change in demand coming from the newly industrialized countries and recognition of the finiteness of this resource offers a plausible explanation for more recent developments. In other words, the scarcity rent may have been negligible for previous generations but may now be becoming relevant. Yet its pricing is relatively complex. Unquestionably the three key features in any account are the low price elasticity of demand, the strong growth in demand from China, the Middle East, and other newly industrialized economies, and the failure of global production to increase. These facts explain the initial strong pressure on prices that may have triggered commodity speculation in the price of petroleum.

Survey 11 :

Review JoPET Review on Chemical Separation of Crude Oil and Analysis of Its Components

Authors : Dr. Nagham Mahmood Aljamali¹ ,Nuha Salman Salih²

Abstract :

Methane, ethane, propane, and butane, which are light hydrocarbons with carbon numbers 1 to 4, are present at standard pressure and temperature in gaseous form. Pentane and the heavier hydrocarbons, however, are present in liquid form, and the hydrocarbons are solid in the heavy fractions with higher boiling points. Additionally, the composition affects the viscosity. As an illustration, some types of oil are low viscosity, while others are very high viscosity. Because of their high viscosity, some unconventional oils, like the Athabasca sands, are found in semi solid state and are typically combined with sand and water to make crude asphalt (bitumen). Oil has a strong, distinct fragrance that fluctuates in strength depending on how much sulphur is present in the chemical makeup of the substance. When exposed to ultraviolet light,

some oils may glow, especially if the oil combination contains a range of polycyclic aromatic compounds. Different petroleum derivatives emit carbon dioxide (CO₂) The circumstances and the phase diagram of the subsurface oil mixture determine the proportion of the gaseous, liquid, and solid components. A large number of papers with theoretical and practical application value have appeared. The hydrocarbons in petroleum are primarily made up of linear alkanes, with smaller amounts of cycloalkanes and aromatic hydrocarbons. Go to Based on the above collected results that were acquired by the techniques that we used for the separation and characterization of the crude oil samples in our laboratory, only two main products (fractions) have existed; diesel as a major product and gasoline as a minor product.

Survey 12 :

The Complexity of Crude Oil Prices

Authors : Ghazala OTHMAN, SZIRA Zoltán, VARGA Erika, ZÉMAN Zoltán.

Abstract :

There have been numerous research conducted on the various factors that affect crude oil prices. Initially, this price increase was also attributed to more basic causes like OPEC production cuts and an increase in demand. A small decline caused by Asian economic crisis took place in 1997-1999, but after the US economy recovered from 9/11 attacks in 2001, the price of oil started to increase dramatically. Initially, this growth in prices was also attributed to fundamental factors such as OPEC cuts in production in combination with rise in demand. Undoubtedly, both in wealthy and developing nations, there was a steady increase in global demand. For instance, China's oil demand increased by 15% in 2004, according to EIA (2017). However, the same source states that global consumption growth was modest throughout the whole analysed period and did not outpace worldwide output growth. Kaufmann (2011) emphasises that supply side fundamentals may still be to blame for the rise in oil prices even when the volume of production was not changing much. For instance, if the economy were to strengthen, there would likely be a greater likelihood that oil markets would tighten in the future, raising predicted oil prices. Higher oil futures prices would reflect this shift in expectations. Non OPEC nations are usually seen as price takers in oil production, and, on the contrary, OPEC nations are following some form of strategic behaviour. This means that sudden change in the market share of OPEC producers could generate a supply shock. In this essay, we go over three categories of variables that affect the price of crude oil. With

evolution of financial markets driving mechanism has become more complex. Moreover, we should keep in mind that different factors are responsible for long-term trend and short-term price speculations.

Survey 13 :

Crude Oil Price Prediction using Artificial Neural Network

Authors : Nalini Gupta, Shobhit Nigam

Abstract :

Predicting oil prices is now essential; it benefits many big and small businesses, people, and 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. 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.

Survey 14 :

Effective crude oil price forecasting using new text-based and big-data-driven model

Authors : Binrong Wu, Lin Wang

Abstract:

This study proposes a novel data-driven crude oil price prediction methodology using Google Trends and online media text mining. Convolutional neural network (CNN) is used to automatically extract text features from online crude oil news to illustrate the explanatory power of text features for crude oil price prediction. Specifically, our findings contribute to the methodological and theoretical insights for information processing, in that variational mode decomposition is used to construct useful time series indicators based on the outputs of CNN. Experimental results imply that the proposed text-based and

online-big-data-based forecasting methods outperform other techniques. A total of 4837 and 3883 news headlines are collected in two cases, respectively. The mean absolute percentage error of the proposed model is 0.0571 and 0.0459 for crude oil price forecasting of two cases, respectively.

Survey 15 :

A novel crude oil price trend prediction method: Machine learning classification algorithm based on multi-modal data features

Authors : HuiziHe,MeiSun,XiumingLi,Isaac AdjeiMensah

Abstract :

A novel hybrid prediction model is proposed based on VMD and ML algorithms. Five multi-modal data feature indices are established based on IMFs of prices. The forecasting accuracy is elevated by introducing multi-modal data features. Trend symbols of prices are predicted by ML multi-classifiers. Classification performs better than regression in forecasting price trend.