CRUDE OIL PRICE PREDCTION

A PROJECT REPORT

Submitted by

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Of

BACHELOR OF ENGINEERING

In

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Loyola INSTITUTE OF TECHNOLOGY AND SCIENCE

KANYAKUMARI

CONTENT

Source Code:

Github & Project Demo Link:

1.INTRODUCTION:

Nowadays, Long Short Term Memory (LSTM) and Recurrent Neural Networks (RNN) are using for sequence-based problems such as Question-answering, Speech recognition, Text classification, Rhythm learning, Grammar learning, Handwriting recognition, Human action recognition, Behavior recognition of robots, Predicting subcellular localization of proteins, Time series anomaly detection, several prediction tasks in the area of business process management, Power demand forecasting, Semantic parsing, Object Co-segmentation, Airport passenger management, and Short-term traffic forecast. Here LSTM is used for forecasting the price of Crude oil.

1.1 Project overview:

Crude oil is the world's leading fuel, and its prices have a big impact on the global environment, economy as well as oil exploration and exploitation activities. Oil price forecasts are very useful to industries, governments and individuals. Although many methods have been developed for predicting oil prices, it remains one of the most challenging forecasting problems due to the high volatility of oil prices. In this paper, we propose a novel approach for crude oil price prediction based on a new machine learning paradigm called stream

learning. The main advantage of our stream learning approach is that the prediction model can capture the changing pattern of oil prices since the model is continuously updated whenever new oil price data are available, with very small constant overhead.

1.2Purpose :

Crude oil is one of the most important commodities in the world, accounting for one-third of global energy consumption. It is a starting material for most of the products that we use in everyday life, ranging from transportation fuels to plastics. Crude oil price fluctuations have a far reaching impact on global economies and thus price forecasting can assist in minimising the risks associated with volatility in oil prices. Price forecasts are very important to various stakeholders: governments, public and private enterprises, policymakers, and investors. According to economic theory, the price of crude oil should be easily predictable from the equilibrium between demand and supply, wherein demand forecasts are usually made from GDP, exchange rates and domestic prices, and supply is predicted from past production data and reserve data. Predicting demand for oil is usually straightforward, however supply is heavily affected by political activity such as cartelisation by OPEC to regulate prices, technological advances leading to the extraction of higher amounts of oil, and wars and other conflicts which can affect supply unpredictably.

2.LITERATURE SURVEY:

Many economists realized the necessity to formulate models that could accurately forecast the price of oil, following the oil embargo and the exploitation of the oil prices after the Arab–Israel conflict of 1973. Since then, multiple oil forecasting models have been published. This paper will extensively review one specific model, the Target Capacity Utilization Rule as well as other models. Our paper uses the TCU rule with regression to forecast the crude oil prices with the data from 1987 to 2017. In addition, we develop several other new forecasting models in this paper.

Target capacity utilization rule

The basic idea of the Target Capacity Utilization (TCU) rule assumes that the Organization of Petroleum Exporting Countries (OPEC) can adjust the oil price according to its capacity utilization rate due to the world's dependency on oil supply from OPEC. When used to forecast oil price, the TCU rule is often combined with recursive simulation, one of the system simulation methods.

Although it makes economic sense, the application of it lacks sound economic theory as a foundation. Many economists can only explain the application of the TCU rule by the "rule of thumb."

Baumol and Quandt (1964) pointed out that humans rarely behave as economic theories suggest. In contrast, their behaviors are largely influenced by experiences, an idea also noted by Sterman (1987, 1989). It is difficult to model human behavior. Moreover, the distortion, misuse, lagged dissemination, and different interpretation of information also violate the basic assumptions in traditional economic models. Therefore, the behaviors can be predicted if the experiences are understood. If the observed variables can be quantified, the procedure is easy, the cost is affordable, and the result can be replicated, the use of rule of thumb is a feasible way to predict behavior. Unlike an economic model, a rule of thumb is used to determine the function, not a best solution. This function is also called a behavior function under the system simulation method. Additionally, the system simulation method does not have the same assumptions that the economic models include, making more suitable for today's crude oil market (Powell 1990).

2.1 Existing problem:

Data collected from the official website of FEDERAL-RESERVE-BANK-OF-ST. LOUIS. It has Data of Crude oil price from 2015. The price of crude oil is in Dollars. By collecting data from

FEDERAL-RESERVE-BANK-OF-ST. LOUIS. There is no need to perform a lot of Data Pre-processing .Predicting Stock Prices using LSTM is the reference about predicting the stock price. The key points that are observed here are, how the Pre-processing has done and which normalization technique they have used to transfer the data . The key points observed here are the Methodology they used, how they got the results using it, and what is the epochs and timestamps they used . Also, observed the layers in LSTM that they have used, which activation function is used and what is the loss function that they used . It has been observed that they have modified the neural network in such a way that what are all the changes they have done and how they havemade changes and how can make changes in our neural network . And also observed that, how they have projected the results and what visualization graphs they have used to project the results .

2.2 REFERENCES :

[1] The input Data is collected from https://fred.stlouisfed.org/series/DCOILBRENTEU .
[2] Predicting Stock Prices Using LSTM Murtaza Roondiwalal Harshal Patel2, Shraddha Varma3 Undergraduate Engineering Students, Department of Information Technology, Mumbai University https://pdfs.semanticscholar.org/3f5a/cb5ce4ad79f08024979149767da6d35992ba.pdf

[3] Long Short-Term Model for Brent Oil Price Forecasting Harsh Salvi1, Avdhi Shah2, Manthan Mehta3, Prof. Stevina Correia4 1, 2, 3, 4Student, 4Faculty, Department of Information Technology, Dwarkadas J. Sanghvi College of Engineering, Mumbai, India http://ijraset.com/fileserve.php?FID=25667

[4] Crude Oil Prediction Using LSTM Nidhi Moitra, Priya Raj, Sanidhya Saxena, Rohit Kumar Department of Information Science and Engineering Dayanand Sagar Academy of Technology and Management Bengaluru, India https://www.ijisrt.com/assets/upload/files/IJISRT20FEB503_(1).pdf

[5] Crude Oil Price Prediction Using LSTM Networks Varun Gupta, Ankit Pandey https://publications.waset.org/10008992/crude-oil-price-prediction-using-lstm-networks

[6] A modified neural network model for predicting the crudeoil price Author links open overlay panel Mohammad RezaMahdianiEhan https://www.sciencedirect.com/science/article/pii/S1822801116300121

[7] Y. Jeevan Nagendra Kumar, Dr. T. V. Rajini Kanth, “GIS-MAP Based Spatial Analysis of Rainfall Data of Andhra Pradesh and Telangana States Using R”, International Journal of Electrical and Computer Engineering (IJECE), Vol 7, No 1, February 2017, Scopus Indexed Journal, ISSN:**2088-8708**

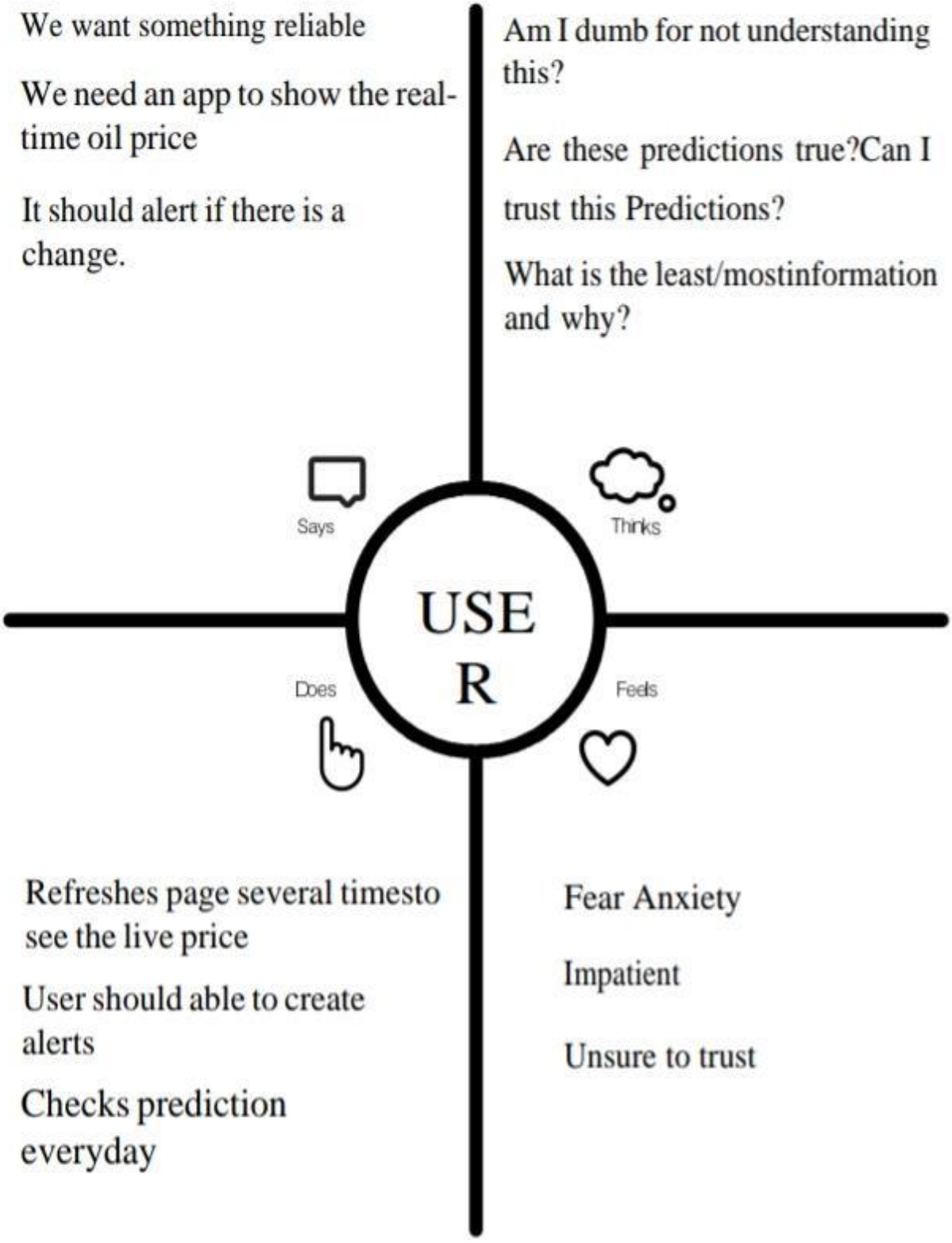
2.3 Problem Statement Definition:

Crude oil is amongst the most important energy resources on earth right now. So far, & 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 say 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 individuals, etc and all price forecasts are very useful to industries governments and Individuals. Although many methods have been developed for predicting oil prices, it remains one of the most challenging forecasting problems due to the high volatily of oil prices. So due to that factor we should develop techniques which might improve the oil price predictions and try to overcome the nonlinearity and irregular events of crude oil using Artificial Intelligence.

3.IDEATION & PROPOSED SOLUTION:

The proposed system uses a simple AI model and data collected for a period of time to use it as the AI knowledge and using that knowledge to predict the price of the crude oil as accurately as possible.

3.1 Empathy Map Canvas :



3.2 Ideation & Brainstorming:

Brainstorming provides a free and open environment that encourages everyone within a team to participate in the creative thinking process that leads to problem solving. Prioritizing volume over value, out-of-the-box ideas are welcome and built upon, and all participants are encouraged to collaborate, helping each other develop a rich amount of creative solutions.

Step-1: Team Gathering, Collaboration and Select the Problem Statement.

Step-2: Brainstorm, Idea Listing and Grouping.

Step-3: Idea Prioritization.

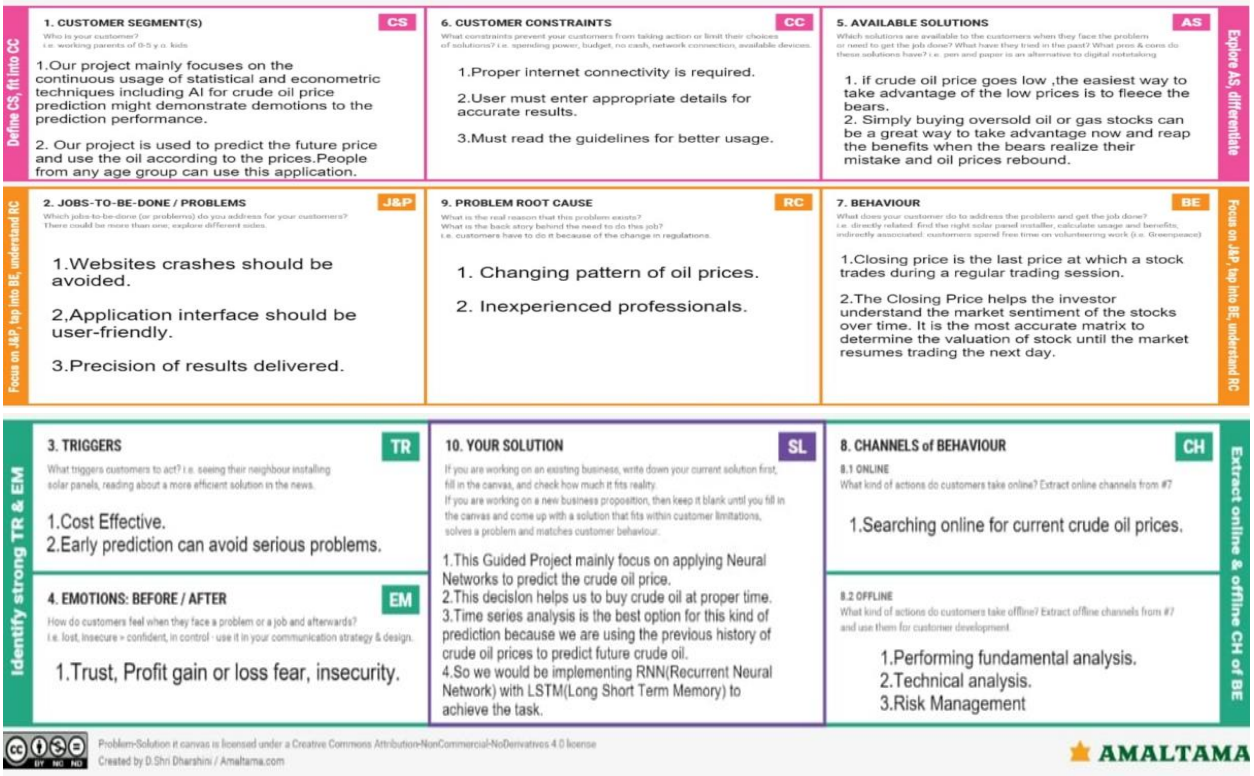
3.3 Proposed Solution:

S.NO	Parameter	Description
1.	Problem Statement (Problem to be solved)	Crude oil is the world's leading fuel, and its prices have a big impact on the global environment its forecasts are very useful to governments, the industry is individuals. The continuous usage of statistical and econometric techniques including AI for crude oil price prediction might demonstrate demotions to the prediction performance.

2.	Idea / Solution description	In order to predict future crude oil using historical data on crude oil, RNN is utilised with long short-term memory. The effectiveness of the cost is calculated using the mean squared error. Using the pricing information in the WTO crude oil materials, the proposed model's performance is assessed.
3.	Novelty / Uniqueness	➢ Crude oil price variations have a significant impact on the world's economies, thus price forecasting can help reduce the risks brought on by this volatility. ➢ For a variety of stakeholders, including governments, public and private businesses, legislators, and investors, price projections are crucial.
4.	Social Impact / Customer Satisfaction	➢ It is used to predict the future price and use the oil according to the prices. ➢ This price directly influences a variety of items, and its variations have an impact on the capital markets. ➢ In addition to being influenced by economic factors, major events can have an impact on oil prices.

5.	Business Model (Revenue Model)	➢ It can help decision makers – either firms, private investors, or individuals – when choosing to buy or sell the crude oil. ➢ crude oil is one of the most profitable trading commodities for traders. ➢ RNN and LSTM models are used as the benchmark model to predict crude oil prices.
6.	Scalability of the Solution	➢ PCA, MDS, and LLE methods are used to reduce the dimensions of the data ➢ Improve the accuracy of the RNN and LSTM models.

3.4 Problem Solution fit:



4.REQUIREMENT ANALYSIS :

According to economic theory, the price of crude oil should be easily predictable from the equilibrium between demand and supply, wherein demand forecasts are usually made from GDP, exchange rates and domestic prices, and supply is predicted from past production data and reserve data.

4.1 Functional Requirement:

Following are the functional requirements of the proposed solution.

FR NO.	Functional requirement(Epic)	Sub Requirement(Story/Sub-Task)
FR-1	User Registration	Registration through Form.
FR-2	User Confirmation	Confirmation via SMS.
FR-3	Fetching input data	Give the model the input data.
FR-4	Generating Results	Prediction of Oil Prices.

4.2 Non-Functional Requirements:

Following are the non-functional requirements of the proposed solution.

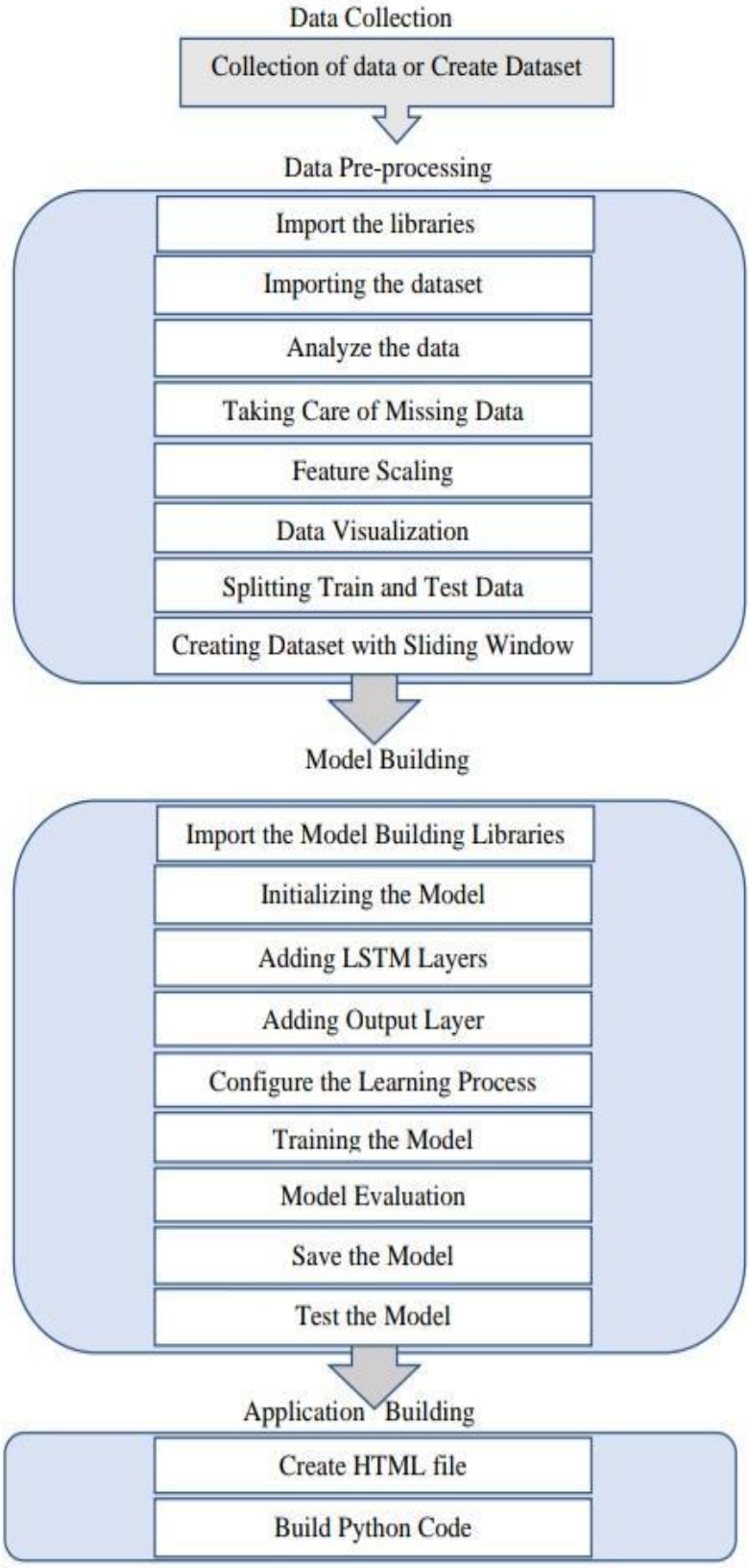
NFR No.	Non-Functional Requirement	Description
NFR-1	Usability	user interfaces are easy to use.
NFR-2	Security	Sensitive data is protected.
NFR-3	Reliability	Because there is very little variance from the

		prediction, the testing is highly dependable.
NFR-4	Performance	Using LSTM networks gives highly performance.
NFR-5	Availability	The system tested with 4 datasets and the system operating properly.
NFR-6	scalability	LSTM network model works efficiently for large number of users.

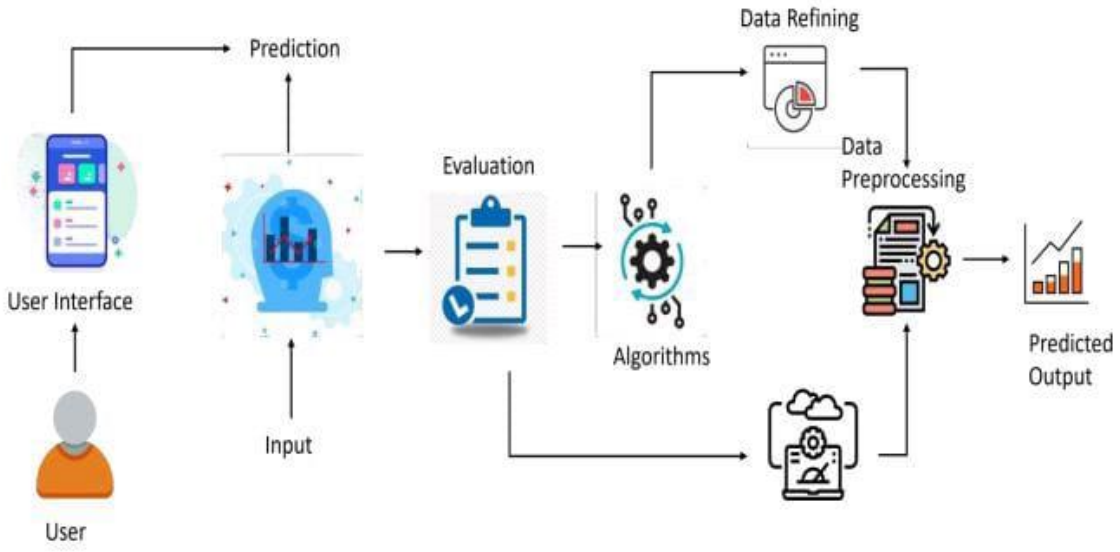
5.PROJECT DESIGN :

Project design the main aim of this structure incorporated in study can fetch out data from economic news and propose this sets into prognosticate model. Major phases in formulated system include data collection and pre-processing, feature and factor selection and price appraisal and prediction. In the initial hand, news, financial and market data are gathered and processed. In Further aspect, unstructured documents are modified into structured extract by CNN classification.

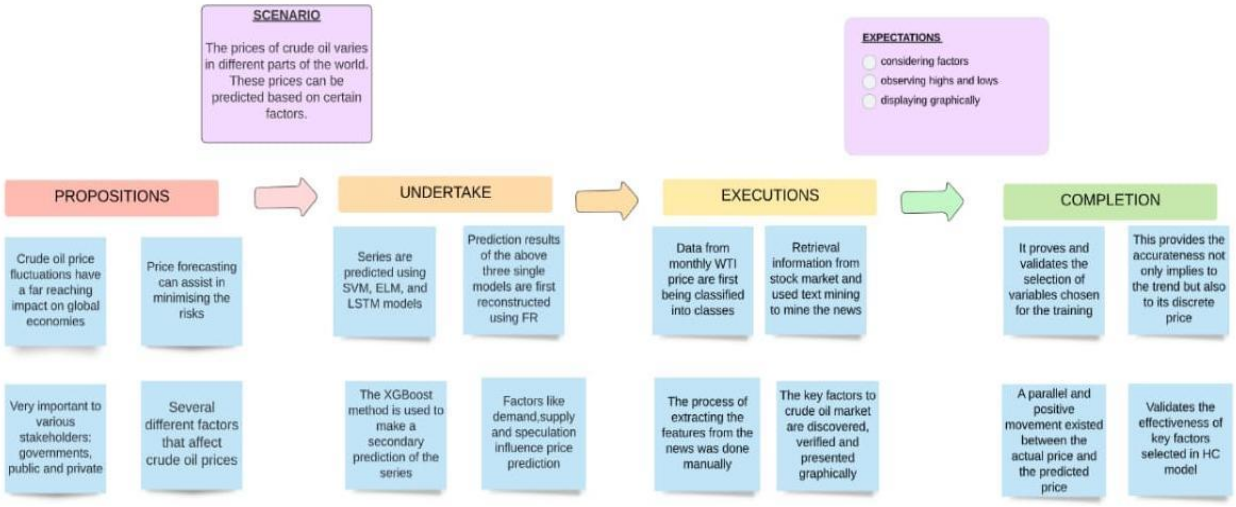
5.1 Data Flow Diagrams:


Data Collection
Collection of data or Create Dataset
Data Pre-processing
Import the libraries
Importing the dataset
Analyze the data
Taking Care of Missing Data
Feature Scaling
Data Visualization
Splitting Train and Test Data
Creating Dataset with Sliding Window
Model Building
Import the Model Building Libraries
Initializing the Model
Adding LSTM Layers
Adding Output Layer
Configure the Learning Process
Training the Model
Model Evaluation
Save the Model
Test the Model
Application Building
Create HTML file
Build Python Code

5.2 Solution & Technical Architecture:



5.3 User Stories:



6.PROJECT PLANNING AND SCHEDULING:

TITLE	DESCRIPTION	DATA
6.PROJECT PLANNING AND SCHEDULING	Literature survey on the selected project & gathering information by referring the, technical papers, research publications etc.	21 OCTOBER 2022
Prepare Empathy Map	Prepare Empathy Map Canvas to capture the user Pains & Gains, Prepare list of problem statements	19 OCTOBER 2022
Ideation	List the by organizing the brainstorming session and prioritize the top 3 ideas based on the feasibility & importance.	21 OCTOBER 2022
Proposed Solution	Prepare the proposed solution document, which includes the novelty, feasibility of idea, business model, social impact, scalability of solution, etc.	19 OCTOBER 2022
Problem Solution Fit	Prepare problem - solution fit document.	19 OCTOBER 2022
Solution Architecture	Prepare solution architecture document.	19 OCTOBER 2022

Customer Journey	Prepare the customer journey maps to understand the user interactions & experiences with the application (entry to exit).	20 OCTOBER 2022
Solution-Requirement	Prepare the solution requirement document.	20 OCTOBER 2022
Data Flow Diagrams	Draw the data flow diagrams and submit for review.	20 OCTOBER 2022
Technology Architecture	Prepare the technology architecture diagram.	20 OCTOBER 2022
Prepare Milestone & Activity List	Prepare the milestones & activity list of the project.	29 OCTOBER 2022
Project Development - Delivery of Sprint-1, 2, 3 & 4	Develop & submit the developed code by testing it.	IN PROGRESS...

6.2 Sprint delivery Schedule:

Use the below template to create product backlog and sprint schedule

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority
Sprint-1	Registration	USN-1	As a user, I can register for the application by entering my email, password, and confirming my password.	10	High
Sprint-1		USN-2	As a user, I will receive confirmation email once I have registered for the application	10	High
Sprint-1	Login	USN-3	As a user, I can log into the application by entering email & password.	15	High
Sprint-2	Input Necessary Details	USN-4	As a user, I can give Input Details to Predict Likeliness of crude oil	15	High
Sprint-2	Data Pre-processing	USN-5	Transform raw data into suitable format for prediction.	15	High
Sprint-3	Prediction of Crude Oil Price	USN-6	As a user, I can predict Crude oil using machine learning model.	20	High
Sprint-3		USN-7	As a user, I can get accurate prediction of crude oil	5	Medium
Sprint-4	Review	USN-8	As a user, I can give feedback of the application.	20	High

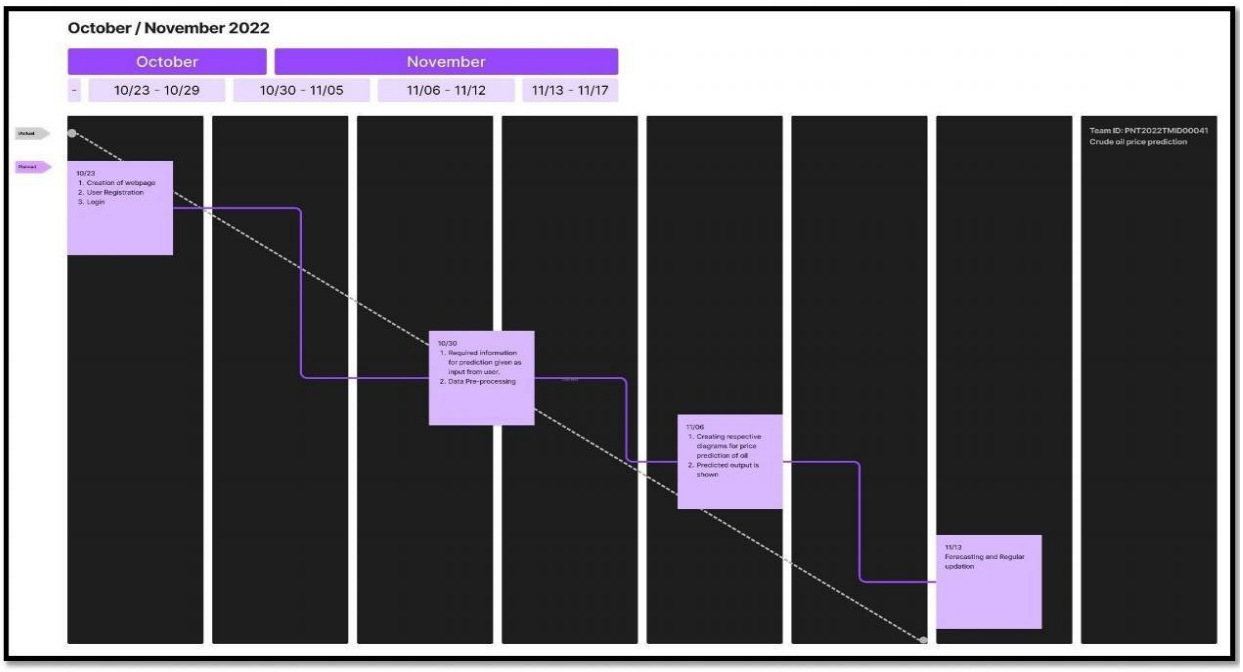
Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned End Date)	Sprint Release Date (Actual)
Sprint-1	20	6 Days	29 0ct 2022	05 Nov 2022	20	05 Nov 2022
Sprint-2	20	6 Days	29 Oct 2022	05 Nov 2022		
Sprint-3	20	6 Days	07 Nov 2022	12 Nov 2022		
Sprint-4	20	6 Days	14 Nov 2022	19 Nov 2022		

Velocity:

Imagine we have a 10-day sprint duration, and the velocity of the team is 20 (points per sprint). Let's calculate the team's average velocity (AV) periteration unit (story points per day)

$$AV = \frac{sprint\ duration}{velocity} = \frac{20}{10} = 2$$

Burndown Chart:



7.CODING AND SOLUTIONING:

7.1 Feature 1

```
<!DOCTYPE html>
<html>
  <head>
    <title>Registration Form</title>
    <link rel="stylesheet"
    href="register.css" type="text/css">
  </head>
  <body>
    <div class="main">
      <div class="register">
```

```
<h2>Register Here</h2>
<form id="register" method="post">
   <label>First Name : </label>
   <br>
   <input type="text" name="fname"
   id="name" placeholder="Enter Your First Name">
   <br><br>
   <label>Last Name : </label>
   <br>
   <input type="text" name="lname"
   id="name" placeholder="Enter Your last Name">
   <br><br>
   <label>Your Age : </label>
   <br>
   <input type="number" name="age"
   id="name" placeholder="How Old Are You">
   <br><br>
   <label>Email : </label>
   <br>
   <input type="email" name="email"
   id="name" placeholder="Enter Your Valid Email">
   <br><br>
   <label>Gender : </label>
   <br>
        
   <input type="radio" name="gender"
   id="male">
```

```
                 
                <span id="male">Male</span>
                     
                <input type="radio" name="gender"
                id="female">
                 
                <span id="female">Female</span>
                <br><br>
                <input type="submit" value="Submit"
                name="submit" id="submit">
            </form>
        </div>
    </div>
  </body>
</html>
```

7.2 Feature 2

```
*{
  margin: 0;
  padding: 0;
}
body{
  background:url(cr.jpg);
  background-position: center;
  background-size: cover;
}
```

```
div.main{
    width: 400px;
    margin: 100px auto 0px auto ;
}
h2{
    text-align: center;
    padding: 20px;
    font-family: Arial;
}
div.register{
    background-color: rgba(0, 0, 0, 0.5);
    width: 100%;
    font-size: 20px;
    border-radius: 10px;
    border: 1px solid rgba(255, 255, 255, 0.3);
    box-shadow: 2px 2px 15px
    rgba(0,0,0,0.3);
    color:#ff7200
}
form#register{
    margin: 40px;
}
label{
    font-family: Arial;
    font-size: 18px;
}
input#name{
```

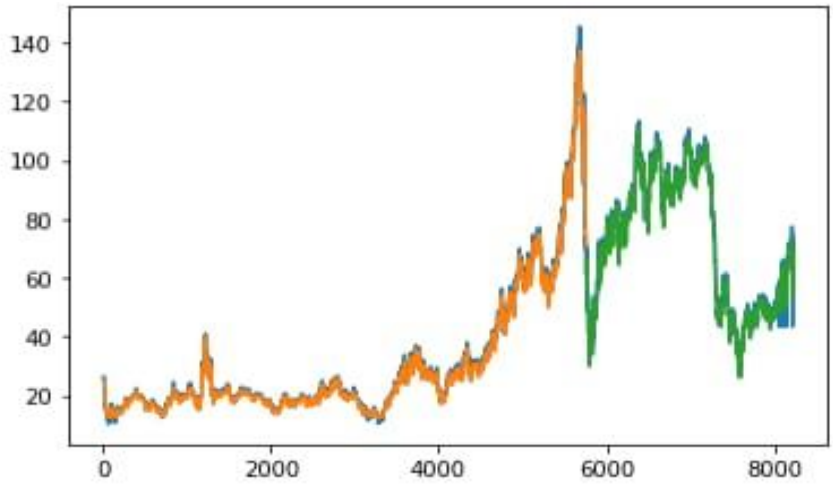
```
    width: 300px;
    border: 1px solid #ff7200;
    border-radius: 3px;
    outline: 0;
    padding: 7px;
    background-color: #000;
    box-shadow: inset 1px 1px 5px
    rgba(0, 0, 0, 0.3);
}
input#submit{
    width: 240px;
    height: 40px;
    background: #ff7200;
    border: none;
    margin-top: 30px;
    font-family: Arial;
    font-size: 18px;
    font-weight: bold;
    border-radius: 10px;
    cursor: pointer;
    color: #fff;
    transition: 0.4s ease;
    margin-bottom: 20px;
}
label,h2{
    text-shadow: 1px 1px 5px rgba(0, 0, 0, 0.3);
}
```

```
span{
   color: #000;
   text-shadow: 1px 1px 5px rgba(0, 0, 0, 0.3);
}
```

8.TESTING:

8.1 TEST CASES

The test cases are window of closing prices, where the window size is 3. The test cases are sent to the model and the prediction is compared with the original closing price. The loss metric is used to analyze the performance of the model. Figure 8.1 shows the result after the testing. The blue line in the bottom shows the true closing prices. The orange lines denote the prediction using the training data. The green line denotes the prediction based on testing data.

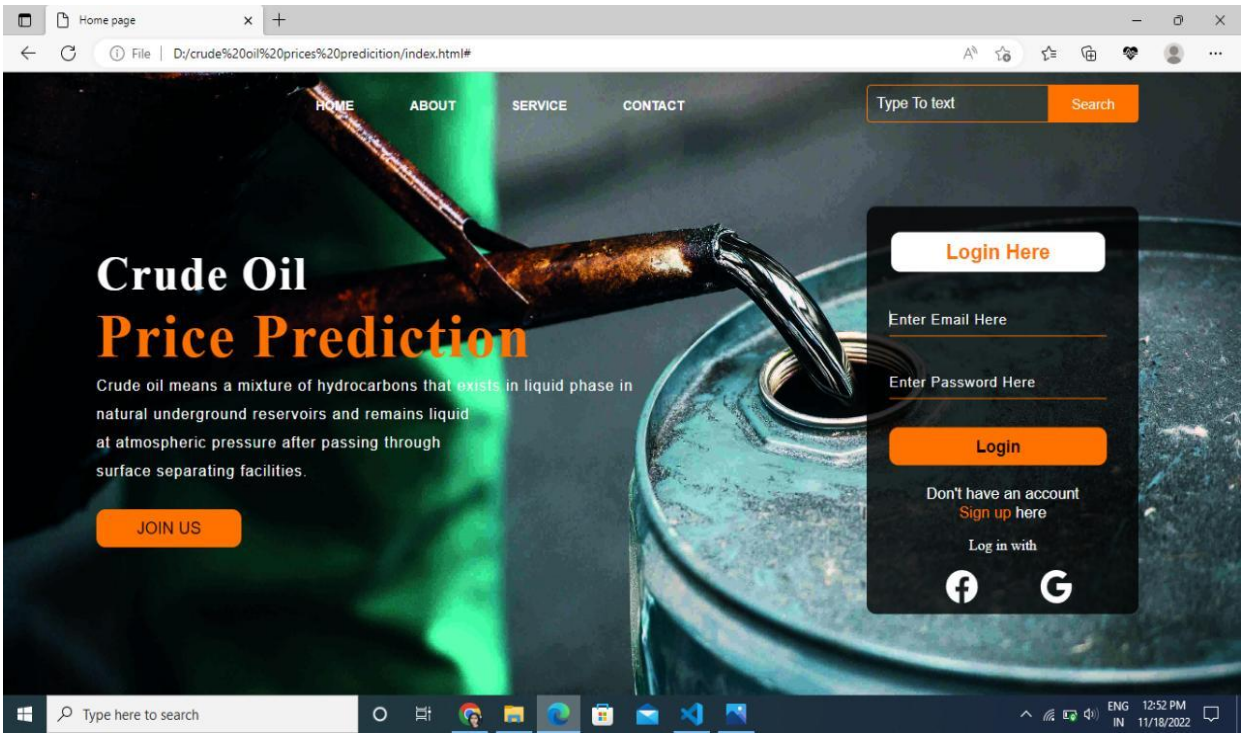


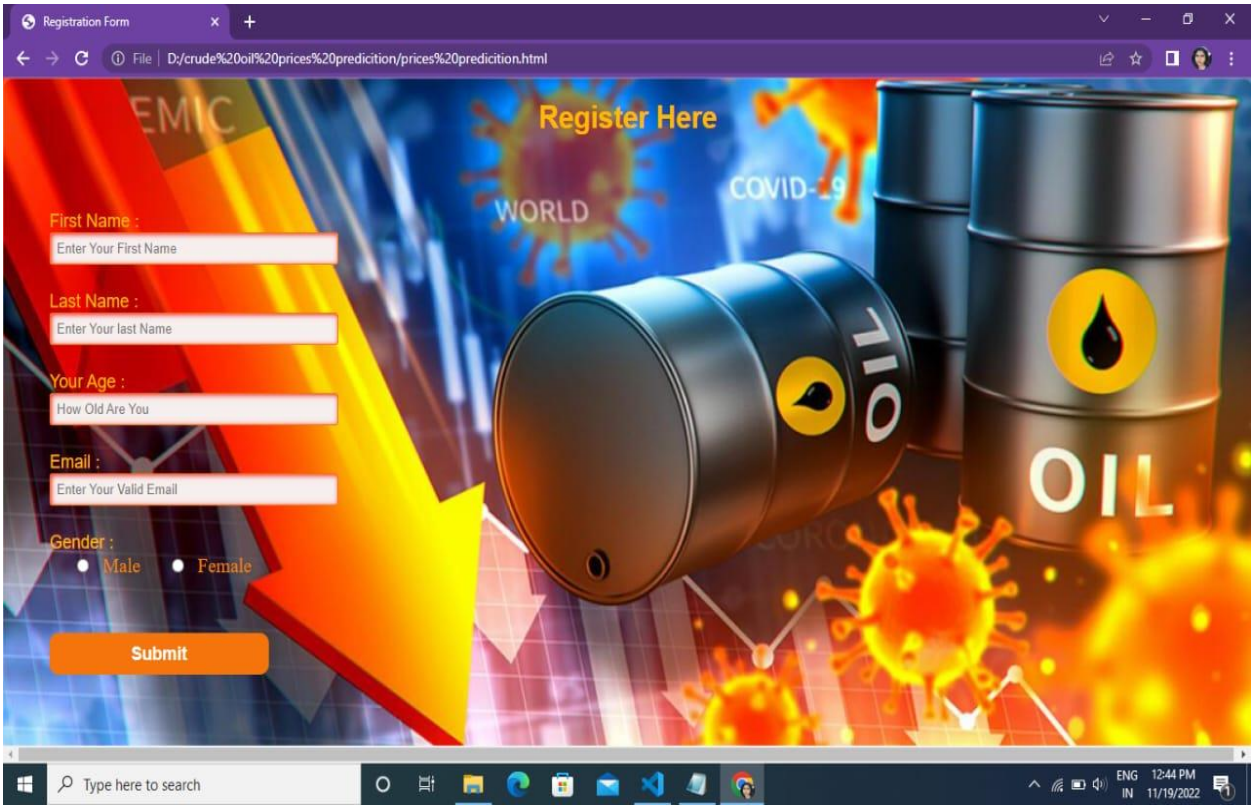
8.2 User Acceptance Testing:

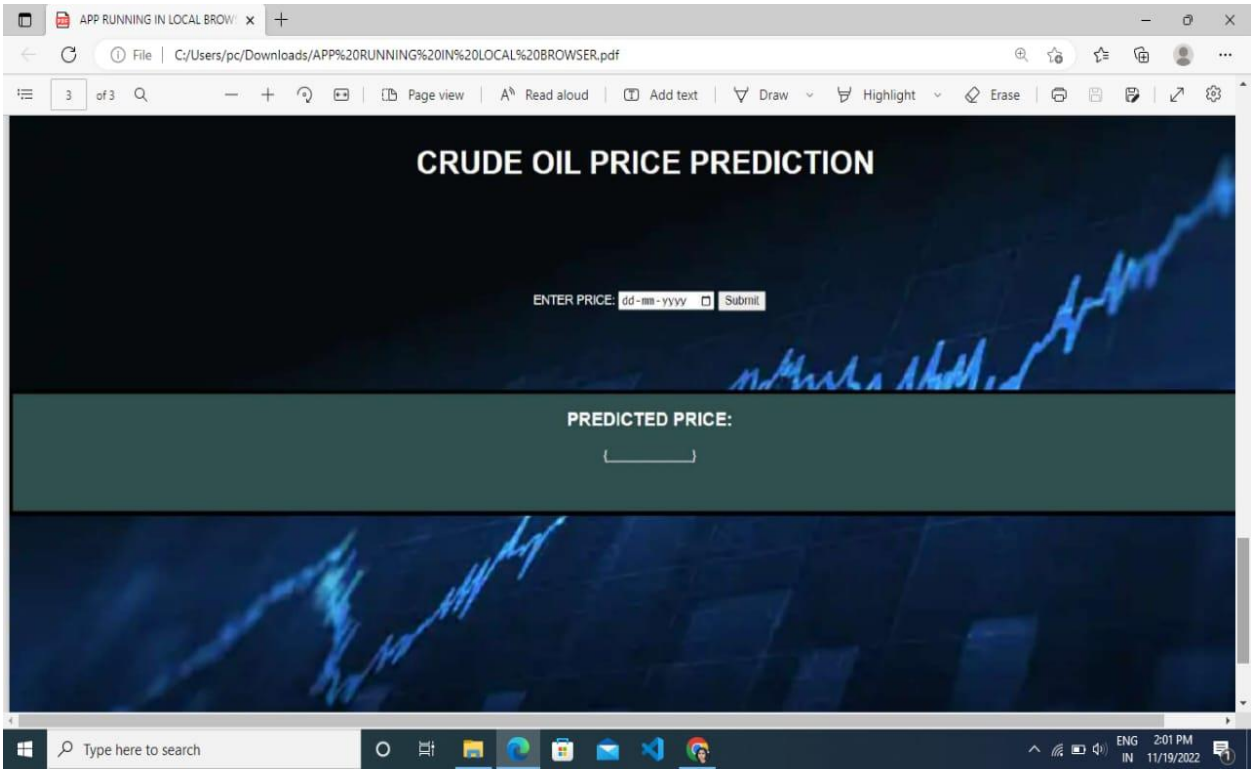
Crude oil is amongst the most important resources in today's world, it is the chief fuel and its cost has a direct effect on the global habitat, our economy and oil exploration, exploitation and other activities. Prediction of oil prices has become the need of the hour, it is a boon to many large and 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 mean square error and the results obtained using the proposed model have significantly outperformed.

9.RESULTS:

9.1 Performance Metrics:


Home page
File | D:/crude%20oil%20prices%20predicition/index.html#
HOME
ABOUT
SERVICE
CONTACT
Type To text
Search
Crude Oil
Price Prediction
Crude oil means a mixture of hydrocarbons that exists in liquid phase in natural underground reservoirs and remains liquid at atmospheric pressure after passing through surface separating facilities.
JOIN US
Login Here
Enter Email Here
Enter Password Here
Login
Don't have an account
Sign up here
Log in with
Type here to search
ENG IN 12:52 PM 11/18/2022


Registration Form
File | D:/crude%20oil%20prices%20predicition/prices%20predicition.html
Register Here
WORLD
COVID-19
First Name :
Enter Your First Name
Last Name :
Enter Your last Name
Your Age :
How Old Are You
Email :
Enter Your Valid Email
Gender :
Male
Female
Submit
OIL
Type here to search
ENG IN 12:44 PM 11/19/2022



10.ADVANTAGES & DISADVANTAGES:

Advantages :

- LSTM models have great advantages in terms of mining the long-term dependence of crude oil price sequence data. Furthermore, LSTM models can automatically search for nonlinear features and complex patterns of crude oil prices, which shows excellent forecasting performance in crude oil price prediction.
- As a very powerful prediction tool, LSTM has been widely used in prediction-related fields. Therefore, to forecast crude oil price more accurately. we have selected the LSTM model for this study.

Disadvantages :

- They became popular since they solved the issue of gradients disappearing. However, that they are unable to eliminate the problem. The issue lies in that data needs to be moved between cells for its analysis.
- Furthermore the cell is becoming extremely complex with the addition of functions (such as the forget gate) that are now part of the picture.

11.CONCLUSION:

Forecasting crude oil prices is a very challenging problem due to the high volatility of oil prices. In this paper, we developed a new oil price prediction approach using ideas and tools from stream learning, a machine learning paradigm for analysis and inference of continuous flow of non-stationary data. Our stream learning model will be updated whenever new oil price data are available, so the model continuously evolves over time, and can capture the changing pattern of oil prices. In addition, updating the model requires only a small constant time per new data example, as opposed to re-training the model using the entire training data set. The experiment results show that our stream learning model outperformed three other popular oil price prediction models over a variety of forecast time horizons.

12.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[13]. 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 Fig. 3. Original and Predicted Closing prices with time .

Nalini Gupta et al. / Procedia Computer Science 170 (2020) 642–647 647Nalini Gupta / Procedia Computer Science 00 (2018) 000–000 6 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.

13.APPENDIX:

Source Code:

```
import numpy as np
from flask import Flask,render_template,request #flask is a application
#uesd to run/serve our application
#request is used to access the files which is uploaded by the user in
#our application
#render_template is used for rendering the html pages from
tensorflow.keras.models import load_model app =
Flask(_name_)#our flask app model =
load_model('crude_oil.h5',)#loading the model in the flask app
@app.route('/')
def home() :
return render_template("index.html")
@app.route('/about')
def home1() :
return render_template("index.html")
@app.route('/predict')
def home2() :
return render_template("web.html")
@app.route('/login',methods =['POST'])
def login() :
x_input=str(request.form['year'])
```

```
x_input=x_input.split(',')
print(x_input) for i in range(0,
len(x_input)):
x_input[i] = float(x_input[i])
print(x_input)
x_input=np.array(x_input).reshape(1,-1)
temp_input=list(x_input)
temp_input=temp_input[0].tolist()
lst_output=[] n_steps=10 i=0
while(i<1):
if(len(temp_input)>10):
#print("temp_input",temp_input)
x_input=np.array(temp_input[1:])
print("{} day input {}".format(i,x_input))
x_input=x_input.reshape(1,-1) x_input =
x_input.reshape((1,n_steps, 1))
#print(x_input) yhat
=model.predict(x_input, verbose=0)
print("{} day output {}".format(i,yhat))
temp_input.extend(yhat[0].tolist())
temp_input=temp_input[1:]
```

```
#print(temp_input)

lst_output.extend(yhat.tolist())

i=i+1

else:

x_input = (x_input.reshape(1, n_steps,1)) yhat

= model.predict( x_input, verbose=0)

print(yhat[0])

temp_input.extend(yhat[0].tolist())

print(len(temp_input))

lst_output.extend(yhat.tolist()) i=i+1

print(lst_output)

return render_template("web.html",showcase = 'The next day predicted value
is:'+

str(lst_output))

#print str(x) if _name_

== '_main_' :

app.run(debug=True,port=5000)
```

GITHUB LINK:

https://github.com/IBM-EPBL/IBM-Project-13840-1659533027