CRUDE OIL PRICE PREDICTION

(TEAM ID : PNT2022TMID51321)

PROJECT REPORT

Submitted by

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1. INTRODUCTION

1.1. Project Overview

Crude oil is amongst the most important resources in today'sworld, it is the chieffuel 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 extremelydifficult and it is hard to be precise with the same. Severaldifferent 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. We have used HTML, Javascript.CSS, Python,Flask.

1.2. Purpose

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 pricefluctuations have a far reachingimpact on globaleconomies and thus price forecasting can assist in minimizing 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 reservedata. Predicting demandfor oil is usually straightforward, however supply is heavily affected by political activity such as cartelization 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

2.1. EXISTINGPROBLEM

I. CRUDE OIL PRICEPREDICTION USING ARTIFICIAL NEURALNETWORK

“ Nalini Gupta, ShobhitNigam* School of LiberalStudies, Pandit DeendayalPetroleum University, Gandhinagar, India”

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 extremelydifficult and it is hard to be precise with the same. Severaldifferent 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 resultsobtained using the proposed model have significantly outperformed.

II. CRUDE OIL PRICEPREDICTION USING ARTIFICIAL NEURALNETWORK QUANTATIVE (ANN-Q) MODEL

"S. N. Abdullah, X. Zeng, Schoolof Computer Science,The University of Manchester, OxfordRoad, Manchester, M13 9PL United Kingdom"

The volatility of crude oil market and its chain effects to the world economy augmented the interest and fear of individuals, public and private sectors. Previous statistical and econometric techniques used for prediction, offer good results when dealing with linear data. Nevertheless, crude oil price series deal with high nonlinearity and irregular events. The continuous usage of statistical and econometric techniques for crude oil price prediction might demonstrate demotions to the prediction performance. Machine Learning and

Computational Intelligence approach through combination of historical quantitative data with qualitative data from experts' view and news is a remedy proposed to predict this. This paper will discuss the first part of the research,focusing on to (i) the development of Hierarchical Conceptual (HC) model and (ii) the development of Artificial Neural Networks-Quantitative (ANN-Q)model

III. ARTIFICIAL INTELLIGENCE OF OIL PRICE FORECASTING

"Neha Sehgal1· Krishan K. Pandeyk Received:19 September 2014 / Accepted:8 May 2015 © Springer-Verlag BerlinHeidelberg 2015 "

Artificial intelligent methodsare being extensively used for oil price forecasting as an alternate approach to conventional techniques. There has been a whole spectrum of artificial intelligent techniques to overcome the difficulties of complexity and irregularity in oil price series. The potential of AI as a design tool for oil price forecasting has been reviewed in this study. The following price forecasting techniques have been covered: (i) artificial neural network, (ii) support vector machine, (iii) wavelet, (iv) genetic algorithm, and (v) hybridsystems. In order to investigate the state of artificial intelligent models for oil price forecasting, thirtyfive research papers (published during2001 to 2013) had been reviewed in form of table (for ease of comparison) based on the following parameters: (a) input variables, (b) input variablesselection method, (c) data characteristics (d) forecasting accuracy and (e) model architecture. This review reveals procedure of AI methods used in complexoil price relatedstudies. The review further

extended above overview into discussions regarding specific shortcomings that are associated with feature selection for designing input vector, and then concluded with future insighton improving the current state-of-the-art technology

IV. Intelligent Prediction of Crude Oil Price Using Support VectorMachines

“Adnan Khashman(Senior Member, SMIEEE)The Intelligent SystemsResearch Group (ISRG)Near East University Lefkosa, Mersin 10, Turkey E- mail: khashman@ieee.org Nnamdi I. Nwulu (Student Member ,MIEEE) Dept. of Electrical & Electronic Engineering Near East University Lefkosa, Mersin 10, Turkey E-mail:ninwulu@ieee.org”

The price of crude oil is tied to major economic activities in all nationsof the world, as a change in the price of crude oil invariably affects the cost of other goods and services. This has made the prediction of crude oil price a top priority for researchers and scientists alike. In this paper we present an intelligent system that predicts the price of crude oil. This system is based on Support Vector Machines. Support Vector Machines are supervised learners founded upon the principle of statistical learning theory. Our system utilized as its input key economic indicators which affect the price of crude oil and has as its outputthe price of crude oil. Data for our systemwas obtained from the West Texas Intermediate (WTI) dataset spanning24 years and experimental results obtained were very promising as it proved that support vector machines could be used with a

high degree of accuracy in predicting crude oil price

2.2.REFERENCE

i. CRUDE OIL PRICE PREDICTION USINGARTIFICIAL NEURALNETWORK
http://creativecommons.org/licenses/by-nc-nd/4.0

ii. CRUDE OIL PRICE PREDICTION USING ARTIFICIAL NEURALNETWORK QUANTATIVE (ANN-Q) MODEL https://doi.org/10.1109/IJCNN.2010.5596602

iii. ARTIFICIAL INTELLIGENCE OF OIL PRICE FORECASTING https://www.researchgate.net/publication/277921251

iv. OIL PRICE PREDICTION USING EML https://ieeexplore.ieee.org/document/5738868

2.3.PROBLEM STATEMENTDEFINITION

i. Crude oil price fluctuations have a far-reaching impact on global economies and thus price forecasting can assist in minimizing the risks associated with volatility in oil prices.Price forecasts are very importantto various stakeholders: governments, public and private enterprises, policymakers, and investors.

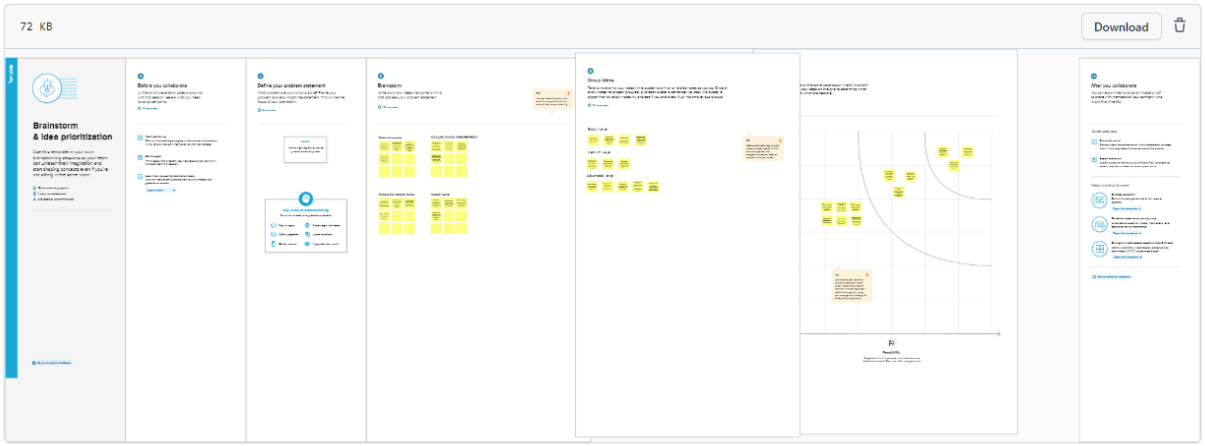
ii. Unlike most products, oil prices are not determined entirely by supply,demand, and market sentiment toward the physical product oil futures contracts, which are tradedheavily by speculators, play a dominantrole in price determination.

iii. Natural gas and electricity prices have soared to new records, incentivizing gas-to-oil switching in some countries. Crude oil is one of the most upstream for world nations.

3.IDEATION AND PROPOSED SOLUTION

3.1.Empathy Map Canvas

3.2.Ideation and Brainstorming



3.3Proposed Solution

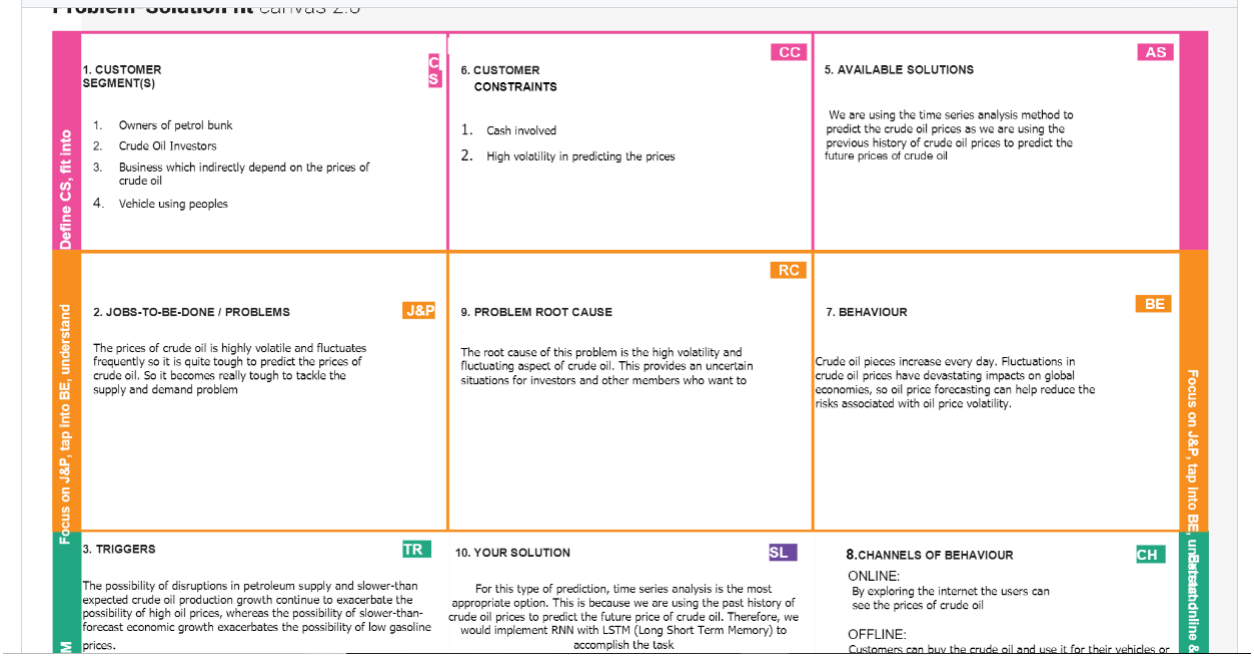
Project Design Phase-I
Proposed Solution Template

Date	19 September 2022
Team ID	PNT2022TMID51321
Project Name	Project – Crude oil price prediction
Maximum Marks	2 Marks

Our Proposed Solution :

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	Oil prices play a major role in determining the global economies but determining it is really tough. We are trying to solve this
2.	Idea / Solution description	The crude oil price can be easily predicted by using the counterbalance between supply, and demand using past data. We are predicting it using Python, RNN, and Deep learning.
3.	Novelty / Uniqueness	The main objective of our project is to apply Neural Networks to predict crude oil prices. By making this decision, we can buy crude oil at the right time. In order to make this kind of prediction, time series analysis is the best option since we are using the past history of crude oil prices to make predictions about the future. To accomplish the task, we would implement RNN (Recurrent Neural Network) with LSTM (Long Short Term Memory).
4.	Social Impact / Customer Satisfaction	Oil price changes have important consequences for the global economy, so we try to use our model to predict it in order to help the economy and businesses around the world.
5.	Business Model (Revenue Model)	Our revenue model is focused on 1. Pay per month model 2. Pay per year model
6.	Scalability of the Solution	The time series analysis method is used to predict crude oil prices on the basis of previous historical data. We believe that we can provide better and more accurate predictions of crude oil prices, so we tend to satisfy the customer, which in turn makes us more scalable.

3.4/Problem Solution Fit



4.REQUIREMENT ANALYSIS

4.1Functional requirement

Project Design Phase-II
Solution Architecture(Functional & Non-functional)

Date	19 September 2022
Team ID	PNT2022TMID51321
Project Name	Project – Crude oil price prediction
Maximum Marks	4 Marks

Functional Requirements:

Following are the functional requirements of the proposed solution.

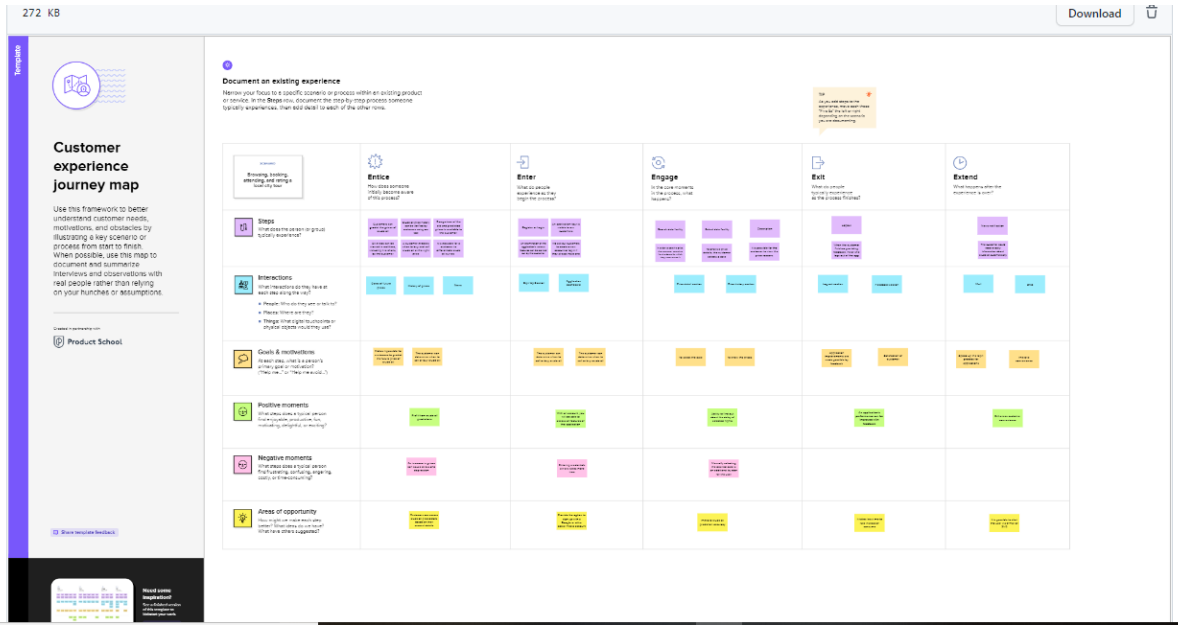
FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	Registration through Mobile number Registration through Gmail
FR-2	User Confirmation	Confirmation via Email Confirmation via OTP
FR-3	login	User can login through registered email ID/Mobile number

Non-functional Requirements:

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

FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	UI is user-friendly .we represent the data in charts which uses clear understanding of price activity
NFR-2	**Security**	We follow certain security protocols like using user credentials , OTP verification
NFR-3	**Reliability**	The Data which represented in web app is so accurate and predicting the right data
NFR-4	**Performance**	The performance in this project is determined through “how accurately you can predict the price of the crude oil “
NFR-5	**Availability**	The web app is available to all devices(Android , Mac , windows etc.,)
NFR-6	**Scalability**	According to user base the project scalability is done

4.2.Customer Journey



5.PROJECT DESIGN

5.1.Data Flow Diagram

Project Design Phase-II
Data Flow Diagram & User Stories

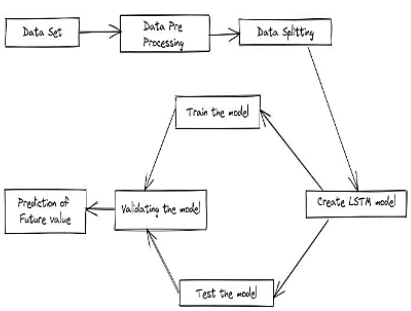
Date	15 October 2022
Team ID	PNT2022TMID51321
Project Name	Crude Oil Price Prediction
Maximum Marks	4 Marks

Data Flow Diagrams:

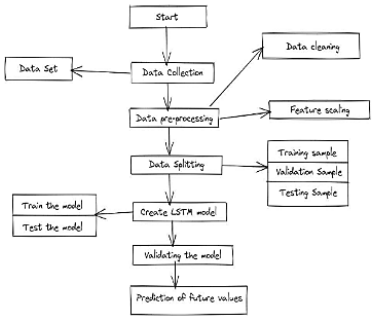
A Data Flow Diagram (DFD) is a traditional visual representation of the information flows within a system. A neat and clear DFD can depict the right amount of the system requirement graphically. It shows how data enters and leaves the system, what changes the information, and where data is simplified

Example: Simplifed

Flow



EXAMPLE: DFD Level 0(Industry Standard)



Use the below template to list all the user stories for the product.

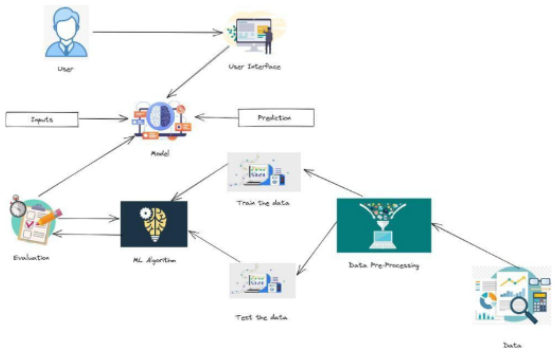
User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Retease
Customer (People)	Registration	USN-1	Users can register for the application by entering their email address, and password, and confirming the password.	The account / dashboard can be accessed by me	High	Sprint-1
		USN-2	Upon registration for the application, I will be able to do so using my Gmail account	With my Gmail account, I am able to sign up for the dashboard and access it.	Medium	Sprint-2
	Login	USN-3	My account can be accessed at any time by entering my email address and password, as I am a registered user.	My email address and password allow me to login to the site.	High	Sprint-1
	Historical data management	USN-4	It is my responsibility as a user to split the dataset to be used for training and testing.	The dataset has been split into training and testing parts.	High	Sprint-1
	Model Building	USN-5	It is my responsibility as a user to build a model and train the model. It is my responsibility to test the model to predict future prices.	We build the model, train it, and test it to make sure it is working well.	High	Sprint-1
Administrator	Login	USN-1	The Analysis page can be accessed by me as an Administrator as long as I am logged in.	Models are built, trained, and tested to ensure they work.	High	Sprint-1
	Dashboard	USN-2	Administrators have access to the Dashboard.	Details of the features can be updated.	Medium	Sprint-2
	Authentication	USN-3	I can verify the user's identity as an Administrator.	You can check your email and password.	High	Sprint-1
	Authorization levels	USN-4	It is my responsibility to determine the extent of the user's rights	Verified the user is authenticated and properly	Medium	Sprint-2

5.2.Technology Architecture

Project Design Phase-II
Technology Stack (Architecture & Stack)

Date	03 October 2022
Team ID	PNT2022TMID51321
Project Name	Crude Oil Price Prediction
Maximum Marks	4 Marks

Technical Architecture:



- The data is divided into train and test datasets
- LSTM model parameters are then adjusted to achieve optimal training model parameters based on the training data input
- On the basis of historical data contained in the dataset, this dataset aims to predict future crude oil prices.
- The value of these crude oils to the refinery must be determined on the basis of a comprehensive crude oil evaluation.
- A ML algorithm that's trained on a particular dataset and tested on the same dataset will have a higher accuracy because it knows what to expect
- The user interface allows the user to see the predicted price

Table-1 : Components & Technologies:

S.No	Component	Description	Technology
1.	User Interface	Using the website interface, the user interacts with the application and gets all the information they need	HTML, CSS, JavaScript / Angular Js / React Js etc.
2.	Application Logic-1	In order to implement this logic, it is necessary to extract the desired contents from the dataset.	Python
3.	Application Logic-2	To predict the value, this logic requires training the dataset	Anaconda Jupyter or Google colab
4.	Database	A dataset is downloaded, loaded, and separated into training and testing	Anaconda Jupyter
5.	Cloud Database	Database Service on Cloud	IBM cloud,IBM Watson studio
6.	File Storage	In the cloud environment, massive amounts of data must be processed in real time and stored	IBM Block Storage or Other Storage Service or Local Filesystem
7.	Machine Learning Model	In this method, the user is able to feed a computer algorithm an enormous amount of data, which the computer will analyze and use to make recommendations and decisions based solely on the input data.	Long Short Term Memory(LSTM)

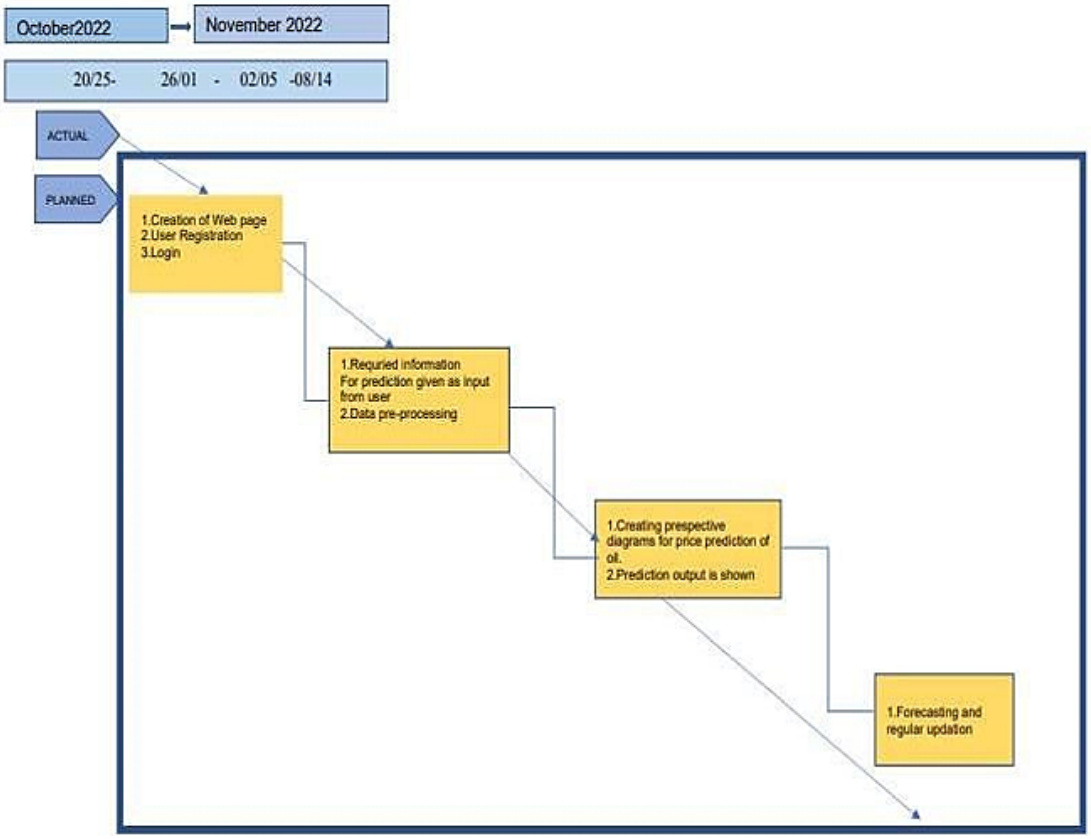
8.	Infrastructure (Server / Cloud)	Application Deployment on Local System / Cloud Local Server Configuration: Google server (Collab)	Local, Cloud Foundry, Kubernetes, etc.

Table-2: Application Characteristics:

S.No	Characteristics	Description	Technology
1.	Open-Source Frameworks	A software whose original source code is freely available for redistribution and modification by the user	Python, Google colab, Anaconda Jupyter.
2.	Security Implementations	The IBM Watson studio Application Firewall adds a number of security components not found in most recommended security frameworks. A firewall's architecture relies on a shared library that can be easily updated whenever new security threats occur.	Encryptions, Data isolation,Data protection,Transport layer security (TLS)protocol.
3.	Scalable Architecture	The Python programming language is one of the pioneers of scaling programming languages. Scalability can be improved by enabling or disabling dispatcher services on individual servers to balance the load on a given computer.	Technology used in the architecture is Python with IBM Watson studio
4.	Availability	A system's availability refers to its ability to withstand or recover from unusual circumstances, such as a computer failure. Jupyter Notebook is an interactive computing platform based on the web. Among the features of the notebook are interactive code, equations, narratives, visualizations, etc.	Technology used in the architecture is Python with IBM Watson studio
5.	Performance	This step is essential if we want to maximize our benefits with as little effort as possible. The goal of designing for capacity is to determine what hardware is required to perform optimally under the anticipated load of your system.	Technology used in the architecture is Python with IBM Watson studio

6.PROJECT PLANNING& SCHEDULING

6.1.Sprint Planning& Estimation



Project Planning Phase

Project Planning Template (Product Backlog, Sprint Planning, Stories, Story points)

Date	25 October 2022
Team ID	PNT2022TMID51321
Project Name	Crude Oil Price Prediction
Maximum Marks	8 Marks

Product Backlog, Sprint Schedule, and Estimation (4 Marks)

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Data Collection	USN-1	Collecting the Dataset	10	High	AJIN.J.L ABHIRAM.M.R ANANDH.G NAVINASH.M.S
Sprint-2	Data Pre-processing	USN-2	Data Pre-processing	7	Medium	AJIN.J.L ABHIRAM.M.R ANANDH.G NAVINASH.M.S
Sprint-3	Model Building	USN-3	Prepare the model by importing thenecessary libraries, adding the layers, and compiling it.	10	High	AJIN.J.L ABHIRAM.M.R ANANDH.G
Sprint-3	Model Building	USN-4	The data classification model is trained using RNNs and other systems.	7	Medium	AJIN.J.L ABHIRAM.M.R ANANDH.G NAVINASH.M.S
Sprint-4	Application Building	USN-5	Deploy the model in the IBM cloudand build the system	10	High	AJIN.J.L ABHIRAM.M.R ANANDH.G NAVINASH.M.S
Sprint-4	Training and testing	USN-6	Testing the model's performanceand training it	7	Medium	AJIN.J.L ABHIRAM.M.R ANANDH.G NAVINASH.M.S

6.2.Sprint Delivery Schedule

Project Tracker, Velocity & Burndown Chart: (4 Marks)

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	10	6 Days	24 Oct 2022	29 Oct 2022	8	29 Oct 2022
Sprint-2	10	6 Days	31 Oct 2022	05 Nov 2022	7	05 Nov 2022
Sprint-3	10	6 Days	07 Nov 2022	12 Nov 2022	8	12 Nov 2022
Sprint-4	10	6 Days	14 Nov 2022	19 Nov 2022	7	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) per iteration unit (story points per day)

$$AV = \frac{sprint\ duration}{velocity}$$

AV = 6/10 = 0.6

7.CODING & SOLUTIONING

7.1.Feature 1

HTML CODE FOR INDEXPAGE

```
<!doctype html>

<html lang="en">

<head>

<title> Crude Oil Price Prediction</title>

<meta charset="utf-8">
```

```
<meta name="viewport" content="width=device-width, initial-scale=1, shrink-to-fit=no">

<link
href="https://fonts.googleapis.com/css?family=Lato:300,400,700&di
splay=swap"rel="stylesheet">

<link rel="stylesheet" href="https://stackpath.bootstrapcdn.com/font-
awesome/4.7.0/css/font-awesome.min.css">

<link rel="stylesheet" href="static/css/style.css">

<st

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bo

dy

{

background-image:

url("static/images/crudeoilbg.jpg");

background-repeat: no-repeat;

background-position: 0% 0%;

background-size:100% 100%;

}

</style>

</head>
```

<body class="img js-fullheight" >

<section class="ftco-section">

<h2 class="heading-section">Crude Oil Prediction</h2>

Demand for oil is inelastic, therefore the rise in price is good news for
producers because theywillsee an increase in

their revenue. Oil importers, however,will experience increased costsof purchasing oil.

Because oil is the largesttraded commodity, the effects are guided
significant. A rising oil pricecan even shift

economic political power from oil importers to oil exporters. The crude oil
price movements aresubject to diverse

influencing factors

</br></br>

```
<div class="col-md-6 col-lg-4">

<div class="login-wrap p-0">

<div class="form-group">


<a href="predict" class="form-control btn btn-primary submitpx-
3">Predict Crude OilPrice</a>



</div>

</div>

</div>

</br></br>

</div>

</div>

</section>

</body>

</html>
```

7.1.1.HTML CODE FOR PREDICTION

```
 <!doctype html>

<html lang="en">

<head>

<title> Crude Oil Price Prediction</title>

<meta charset="utf-8">

<meta name="viewport" content="width=device-width, initial-scale=1, shrink-to-fit=no">

<link
href="https://fonts.googleapis.com/css?family=Lato:300,400,700&di
splay=swap"rel="stylesheet">

<link rel="stylesheet" href="https://stackpath.bootstrapcdn.com/font-
awesome/4.7.0/css/font-awesome.min.css">


<link rel="stylesheet" href="static/css/style.css">

<st

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e>

bo

dy

{

  background-image:

  url("static/images/oil.jpg");
```

```
 background-repeat: no-
 repeat;
 background-position: 0% 0%;
 background-size:100% 100%;
}
</style>
</head>
<body class="img js-fullheight" >
<section class="ftco-section">
<div class="container">
<div class="row justify-content-center">
<div class="col-md-6 text-center mb-5">
<h2 class="heading-section">Crude Oil Prediction</h2>
</div>
</div>
<div class="row justify-content-center">
<div class="col-md-6 col-lg-4">
<div class="login-wrap p-0">
<h3 class="mb-4 text-center">Enter the crude oil price for first10 days</h3>
```

```
<form method="post"  action="predicted" class="signin-form">

<div class="form-group">


<input type="text" class="form-control" id="year" name="year" required>

</div>


<div class="form-group">

<button type="submit" class="form-control btn btn-primary submitpx-3">Submit</button>

</div>

</form>

</br></br>

<div class="social d-flex text-center">

<p class="w-100 text-center">{{showcase}} </p>

</div>

</div>

</div>

</div>

</div>
```

```
</section>

</body>

</html>
```

7.2.Feature2

7.2.1.FLASK CODE

```
import numpy as np

from flask import Flask,render_template,request

from tensorflow.python.keras.models

import load_model# This is asample

Python script.


# Press Shift+F10 to execute it or replaceit with your code.

#Press Double Shift to search everywhere for classes, files,tool windows,

actions,and settings.app = Flask(name  ,template_folder='templates',

static_url_path='/static')

model =

load_model('pr

edict.h5',)

@app.route('/')

def home():
```

```
return
render_template("index.html")
@app.route('/predict')
def home2():
return
render_template("predict
ion.html")@app.route('/p
redicted',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_i
nput).reshape(1,-1)
temp_input=list(x_in
```

put)

temp_input=temp_in

put[0].tolist()

lst_output=[]

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(i<

1):

if(len(temp_input)>10

):

x_input=np.array(tem

p_input[1:]) print("{}

day input

{}".format(i,x_input))

x_input=x_input.resha

```
pe(1,-1)
x_input=x_input.resha
pe((1,n_steps,1)) yhat
=
model.predict(x_inpu
t, verbose=0)
temp_input.extend(yh
at[0].tolist())
temp_input=temp_inp
ut[1:]
lst_output.extend(yhat
.tolist())
i=i
+1
els
e:
x_input = x_input.reshape((1,n_steps,1))

yhat =
model.predict(x_inpu
t, verbose=0)
print(yhat[0])
temp_input.extend(yh
```

```
at[0].tolist())

print(len(temp_input))

lst_output.extend(yhat

.tolist())

i=i

+1

pri

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t)

return render_template("prediction.html",showcase = "the next day predicted value is
:"+str(lst_output))

# Press the green button in the

gutter to run the script.if_____

name_== '_main_':

app.run(debug

=

True,port=500

0)
```
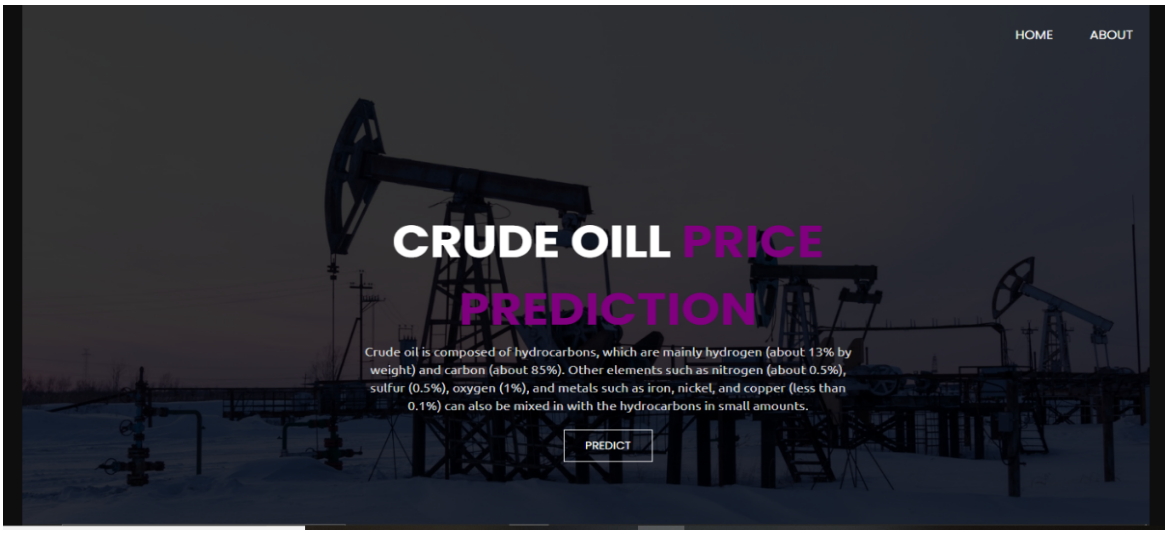
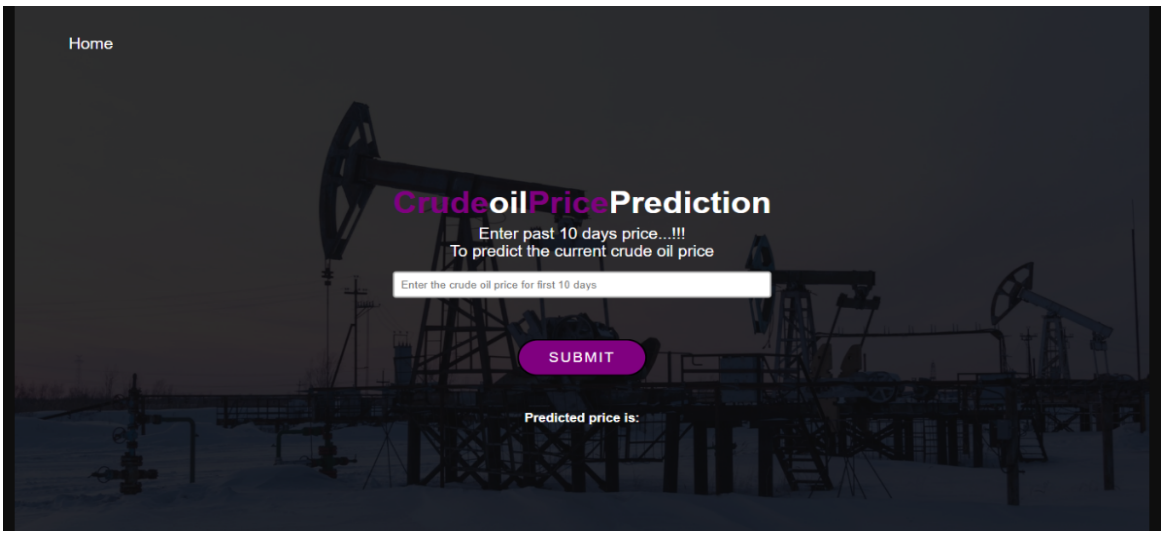

```
lst_output.exte

nd(yhat.tolist(

)) i=i+1

else:

x_input =

x_input.reshape((1,n_

steps,1)) yhat =

model.predict(x_inpu

t, verbose=0)

print(lst_output)

return render_template("prediction.html",showcase = "the next day predictedvalue is
:"+str(lst_output))

# Press the green button in the

gutter to run the script.if_____

name_== '_main_':

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

8.TESTING

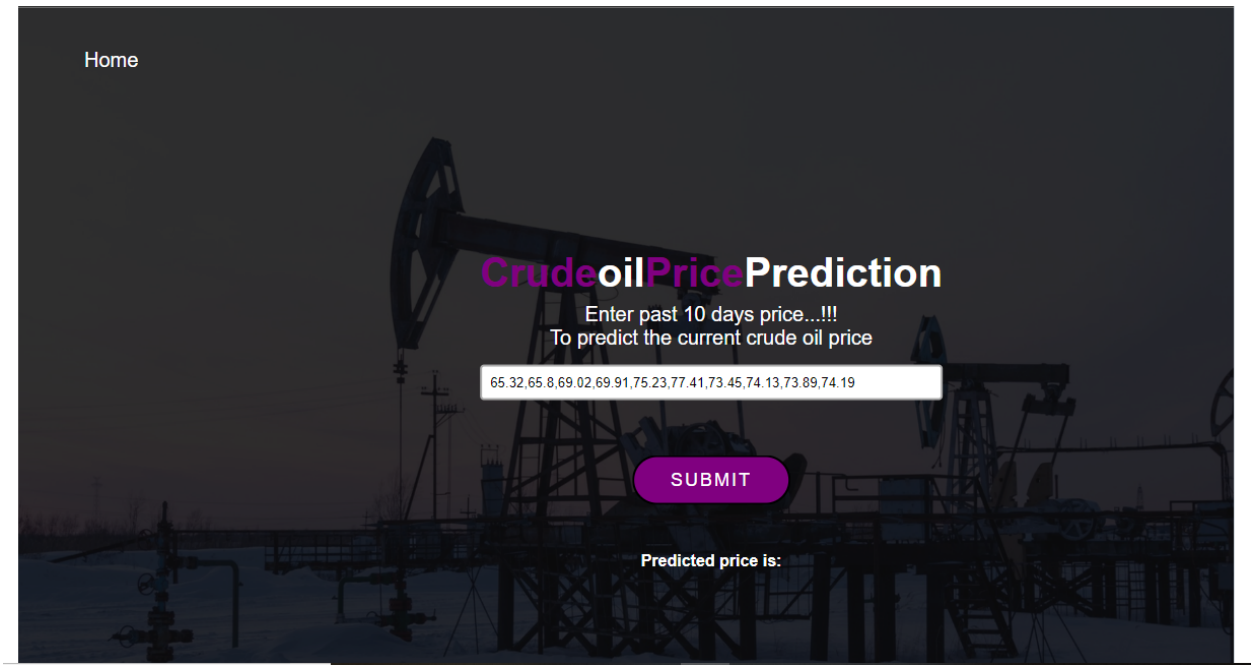
8.1Testcase

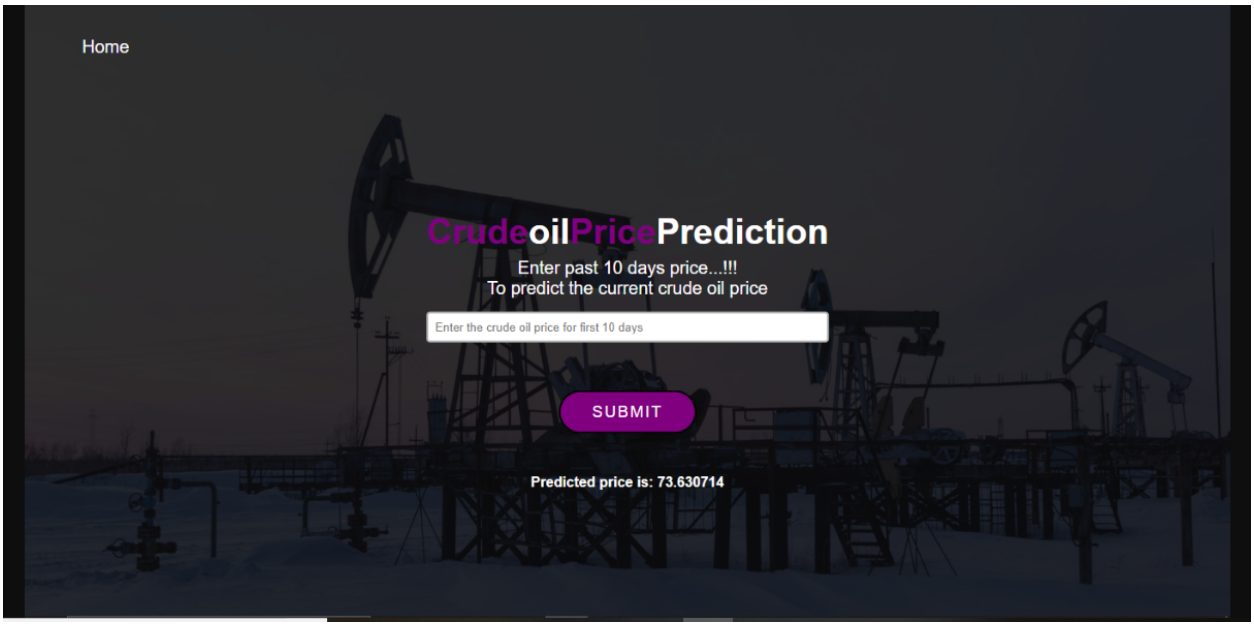
Testing is the main purpose to detecting and training the code to execute the given output to certain source to analysis the crude oil price prediction to demanding the purpose of the oil calculation to adapt the situation of the trading
,demands and market prices





8.2.User Acceptance





9.RESULT

9.1 Performance metrics

We used two standard performance metrics in the oil price prediction literature for comparing different oil price prediction models. The first metric is Mean to oil price Prediction Error (ANN). ANN of a prediction model measures the average of the squares of the prediction errors. The prediction error is thedifference between the true value and the predicted value.Let y1, y2, ..., y n be the true oil prices and 1 y , 2 y , ..., n y be the predicted oil prices under an oil priceprediction model, then the ANN of that model is:

$$\mathrm{AV} = \frac{\text{SPRINT DURATION}}{\text{VELOCITF}} = \frac{20}{10} = 2$$

10.ADVANTAGE & DISADVANTAGE

a. ADVANTAGE

i. The crude oil price is an importantindicator of the economy Oil isthe most used resource in the world.
ii. This bullish forecastis driven by the beliefthat OPEC has a limitedcapacity to increaseoil production.
iii. Full form of OPEC is organization of the petroleum exporting countries Oil has one of the highest energy Density which means that a small amount of oil can produce a large

amountof energy.

iv. The crude oil makesvery useful as its high energy densityhas made is that preferred choice of use as fuel in automobile

a. Disadvantage

i. Crude oil priceshad been suffering amid news that covid-19.

ii. Inflection rates were rising in China

iii. Burning oil producescarbon dioxide gas Lower oil prices means less drilling and exploration activity

iv. Because most of the news oil driving the economic activity is unconventional and has a higher cost per barrelthan a conventional source of oil

v. An increase in the price of crude oil means that would increase the cost of production goods.the price rise would finallybe passed on toconsumers resulting in inflation

11.CONCLUSION

Artificial Neural Network is one of the most important ways to predict a lot of reservoir parameters or functions, as well as search for new sites of infill wells, which is an important use of this technique in conjunction with simulators because of their relationship with development operations and production of oil and gas fields. Both Artificial Neural Network and Data Mask

technique gave a good and easy way for the preparation and data management in every phase of prediction and optimization technique. The constructed Artificial Neural Network model (FFNN), had good training and validating Results according to the data sets used in both of training and validation steps, and obtained good behavior after many trials and reflecting high confidence to the prediction or simulation stage. Clear and quite improvement appeared with additional cumulative oil production for the production field sector under the current study, especially with the wells M, O and P, among those elected locations of infill wells. This became a good decision maker to which of the well can we implement for the future production plan and development fieldstrategy view point. ANN used and proved to be an effective tool within prediction and optimization process, especially when dealing with developmental ideas of the oil and gas production, from the standpoint of oil reservoir management and field directorate for futurestrategic planning

12.FUTURE SCOPE

This work indicates that the ANN model is an effective tool for crude oil price prediction and can be efficiently used for short term priceforecasting 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. to investments. This work is carried out on the closing price of crude oil; however, there are various other factors which also affectthe crude oil prices like change in the prices and quantities (demand and supply), change in the economyand 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 trendshave been plannedto be incorporated into a model which will help the proposedmodel perform more efficiently.

13.APPENDIX

13.1.Source Code

HTML CODE FOR INDEX PAGE

```
<!doctype html>

<html lang="en">

<head>

<title> Crude Oil Price Prediction</title>

<meta charset="utf-8">

<meta name="viewport" content="width=device-width, initial-scale=1, shrink-to-fit=no">

<link
href="https://fonts.googleapis.com/css?family=Lato:300,400,700&di
splay=swap"rel="stylesheet">

<link rel="stylesheet" href="https://stackpath.bootstrapcdn.com/font-
awesome/4.7.0/css/font-awesome.min.css">

<link rel="stylesheet" href="static/css/style.css">

<style>


body {
```

```
background-image:
url("static/images/crudeoilbg.jpg");
background-repeat: no-repeat;
background-position: 0% 0%;
background-size:100% 100%;
}
</style>
</head>

<body class="img js-fullheight" >
<section class="ftco-section">
<div class="container">
<div class="row justify-content-center">
<div class="col-md-6 text-center mb-5">
<h2 class="heading-section">Crude Oil Prediction</h2>
</div>
</div>
<div class="row justify-content-center">
<p>
```

Demand for oil is inelastic, therefore the rise in price is good news for producers because theywillsee an increase in

their revenue. Oil importers, however,will experience increased costsof purchasing oil.

Because oil is the largesttraded commodity, the effects are guided significant. A rising oil pricecan even shift

economic political power from oil importers to oil exporters. The crude oil price movements aresubject to diverse

influencing factors

</p>

</br></br>

Predict Crude OilPrice

</br></br>

```
</div>

</div>

</section>

</body>

</html>
```

HTML CODE FOR PREDICTION

```
<!doctype html>


<html lang="en">

<head>

<title> Crude Oil Price Prediction</title>

<meta charset="utf-8">

<meta name="viewport" content="width=device-width, initial-scale=1, shrink-to-fit=no">

<link
href="https://fonts.googleapis.com/css?family=Lato:300,400,700&di
splay=swap"rel="stylesheet">

<link rel="stylesheet" href="https://stackpath.bootstrapcdn.com/font-
awesome/4.7.0/css/font-awesome.min.css">

<link rel="stylesheet" href="static/css/style.css">
```

```
<st
yl
e>
bo
dy
{
  background-image:
  url("static/images/oil.jpg");
  background-repeat: no-
  repeat;
  background-position: 0% 0%;
  background-size:100% 100%;
}
</style>
</head>
<body class="img js-fullheight" >
<section class="ftco-section">
<div class="container">
<div class="row justify-content-center">

<div class="col-md-6 text-center mb-5">
```

```
<h2 class="heading-section">Crude Oil Prediction</h2>

</div>

</div>

<div class="row justify-content-center">

<div class="col-md-6 col-lg-4">

<div class="login-wrap p-0">

<h3 class="mb-4 text-center">Enter the crude oil price for first 10 days</h3>

<form method="post"  action="predicted" class="signin-form">

<div class="form-group">


<input type="text" class="form-control" id="year" name="year" required>

</div>


<div class="form-group">

<button type="submit" class="form-control btn btn-primary submitpx-3">Submit</button>

</div>

</form>

</br></br>

<div class="social d-flex text-center">
```

```
<p class="w-100 text-center">{{showcase}} </p>

</div>


</div>

</div>

</div>

</div>

</section>

</body>

</html>
```

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```
import numpy as np

from flask import Flask,render_template,request

from tensorflow.python.keras.models

import load_model# This is asample

Python script.


# Press Shift+F10 to execute it or replaceit with your code.

#Press Double Shift to search everywhere for classes, files,tool windows,

actions,and settings.app = Flask(name  ,template_folder='templates',

static_url_path='/static')

model =

load_model('pr

edict.h5',)

@app.route('/')

def home():

return

render_template("index.html")

@app.route('/predict')


def home2():

return
```

```
render_template("predict
ion.html")@app.route('/p
redicted',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_i
nput).reshape(1,-1)
temp_input=list(x_in
put)
temp_input=temp_in
put[0].tolist()
lst_output=[]
n_
ste
```

ps

=

10

i

=0

wh

ile

(i<

1):

if(len(temp_input)>10

):

x_input=np.array(tem

p_input[1:]) print("{}

day input

{}".format(i,x_input))

x_input=x_input.resha

pe(1,-1)

x_input=x_input.resha

pe((1,n_steps,1))

yhat =

model.predict(x_inpu

```
t, verbose=0)
temp_input.extend(yh
at[0].tolist())
temp_input=temp_inp
ut[1:]
lst_output.extend(yhat
.tolist())
i=i
+1
els
e:
x_input =
x_input.reshape((1,n_
steps,1)) yhat =
model.predict(x_inpu
t, verbose=0)
print(yhat[0])
temp_input.extend(yh
at[0].tolist())
print(len(temp_input))
lst_output.extend(yhat
.tolist())
```

```
i=i

+1

pri

nt(

lst

_o

ut

pu

t)

return render_template("prediction.html",showcase = "the next day predictedvalue is
:"+str(lst_output))

# Press the green button in the

gutter to run the script.if_____

name_== '_main_':

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

13.2.GitHub & Project Demo Link

Github Link:

IBM-EPBL/IBM-Project-40571-1660631565

Project Demo Link:

https://drive.google.com/file/d/1NJaa-8__R4H6z877HvpHTI3Z2To1_Wc8/view?usp=drivesdk