PROJECT REPORT

CRUDE OIL PRICE PREDICTION

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Project Title	Crude Oil Price Prediction

Abstract:

Artificial Intelligence (AI) is trending field of digital tech and it is playing a major role in industries 4.0 starting with automation, here in our objective. we Artificial neural network (ANN) of deep learning to predict the price of crude oil from previously available real time data.

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.

1.Introduction:

Crude oil is the world's demanding requirement, and its prices have a big impact on the global environment, economy as well as major raw material to produce energy, transportation, and fuel coverage. 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.

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.

2. Literature Survey:

1)Prediction Model for Crude Oil Price Using Artificial Neural Networks

The prediction model based on artificial neural network (ANN) to forecast and compared with least square method (LSM). The results show that on the short term, the best prediction model for ANN of four, three, two and one hidden layers, respectively. The ANN of one - four hidden layers is found to be able to forecast better than the LSM.

METHODOLOGY

This presents a hybrid methodology to forecast crude oil monthly prices. The model consists of combination of three separate components that they extract rule-based system. These three components work disjointedly, and then intergraded together to get the final results. They claimed that nonlinear integration of these three models has outperformed any single one. However, there are several issues in this system. For example, the rule base system of the text mining model 3 depends on the knowledge base which developed by human experts.

This process is not only controversial, but also unreliable, experts opinions vary on the same problem. Moreover, neither the rules nor the knowledge base was made available to the public. LSM arise when fitting a parameterized function to a set of measured data points by minimizing the sum of the squares of the errors between the data points and the function. LSM based methods have received considerable attention for crude oil price forecasting. These models have been used to deal with the nonlinearity of crude oil price.

The methodology of this study is based on four layers feedforward network with backpropagation algorithm. The goal is to forecast crude oil prices. Convergence, the ability of the model to perform with new data and Satiability, consistency of the network output are main requirements for any successful ANN. The points are successfully, a large number of considerations need to be taken into account, the size and frequency of the data, network architect, the number of hidden neurons, and activation function.

3.IDEATION REPORT:

To solve the prediction of crude oil which involves various factors like supply, demand, geo location etc.

Brainstorm

Sivaprasath

- Implementing ML algorithms to predict the future prices of crudeoil.
- Crude oil market is one of the most important the market.
- Oil price are not only driven by economic variables but also
- There was a strong positive relationship between the oil price andthe interest rates.
- Depends on the imports and exports.
- Also depends on the country economy

Devanand

- Find similar patterns in past incident with current situation todetermine the price
- By knowing demand needed and supply gone rate, calculate theprice
- Indian economy depends on crude oil its fast growth
- The impact of crude oil prices on interest rates andinflation in the international context
- crude oil prices have been decreasing significantly

Gowtham

- The oil prices is influenced not only the fundamentals of supplyand demand
- The risk of crude oil price shocks from unexpected events ispredicted
- COVID-19- crude oil price dependence analysis application ofANN model
- crude oil prices have been decreasing significantly

Hariharan M

- Deep learning techniques for the forecast
- Use the history of crude oil prices for forecasting
- the oil price fluctuations have a direct effect on the nation 'seconomy
- Crude oil price has always been volatile affecting the performance of the economy

GROUP IDEAS

GROUP -1

Indian economy depends on crude oil, its fast growth. Crude oil price have always been volatile affecting the performance ofthe economy Indian stock market and concluded there was a long term relationship.

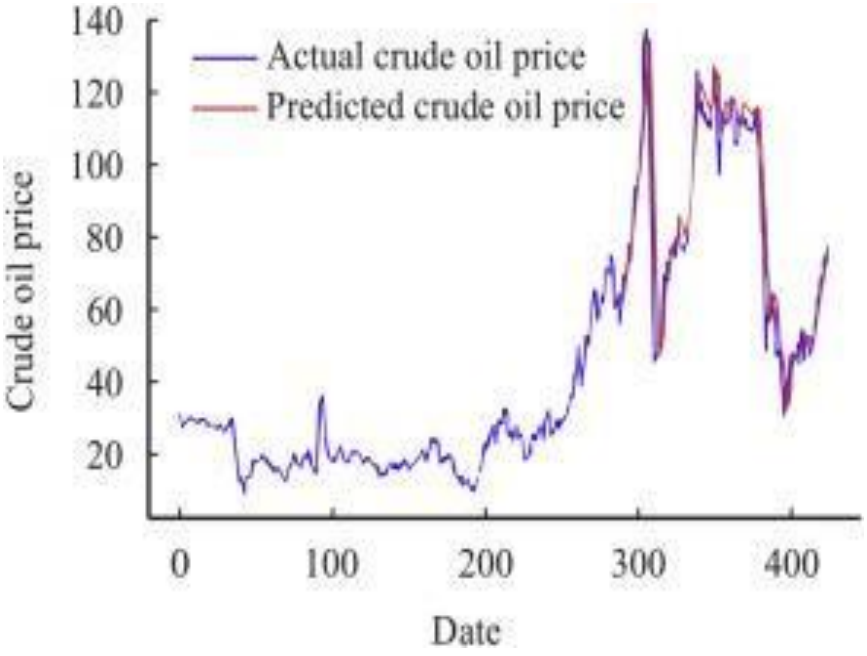
GROUP-2

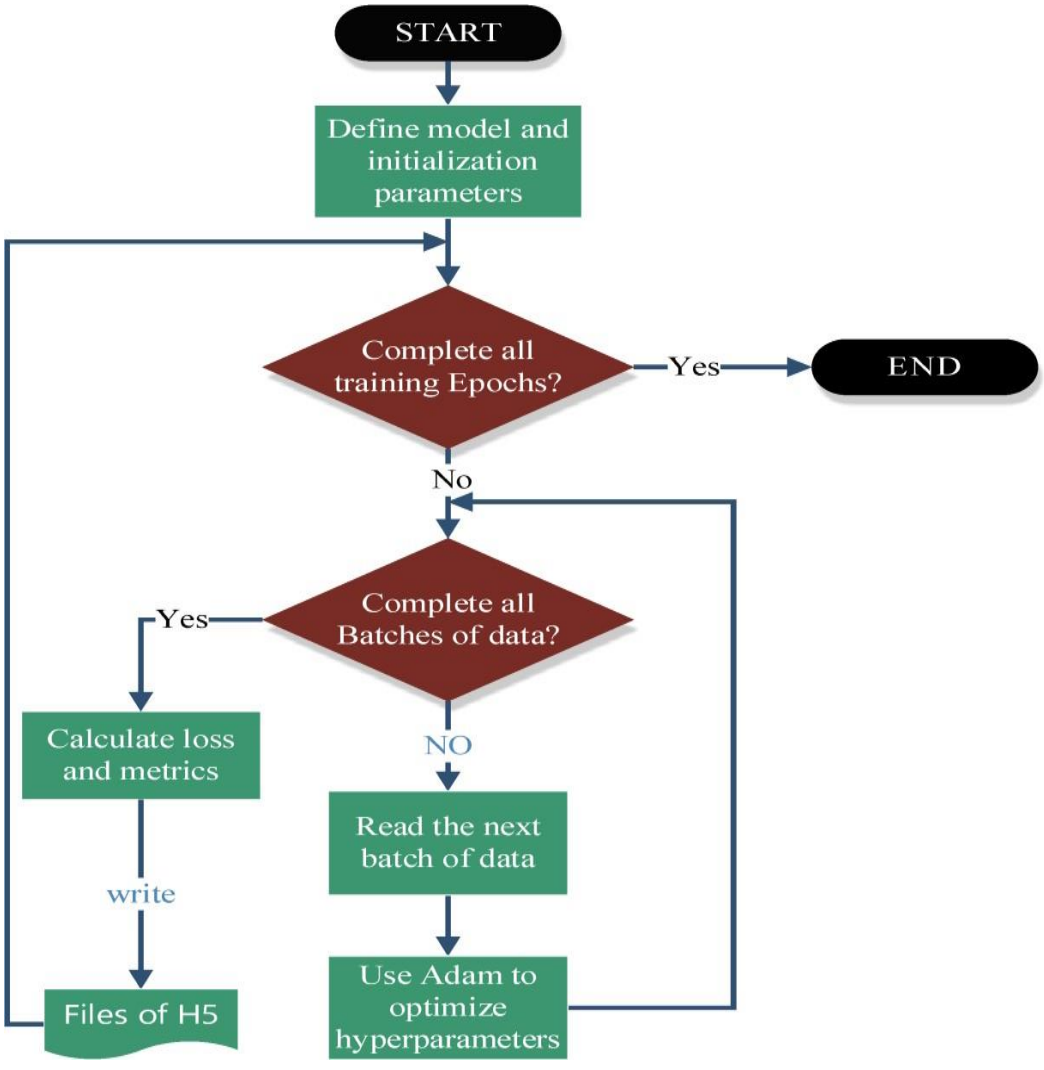
One of the method of application of is ANN Model. The back propagation rule using problem ANN is the most popular nonlinear AI model used to predict crude oilprice

GROUP-3

Crude oil have more impact on the industrial on the industrial productionCOVID-19 crude oil dependence analysis. The oil prices are influenced not only the fundamentals of supply anddemand

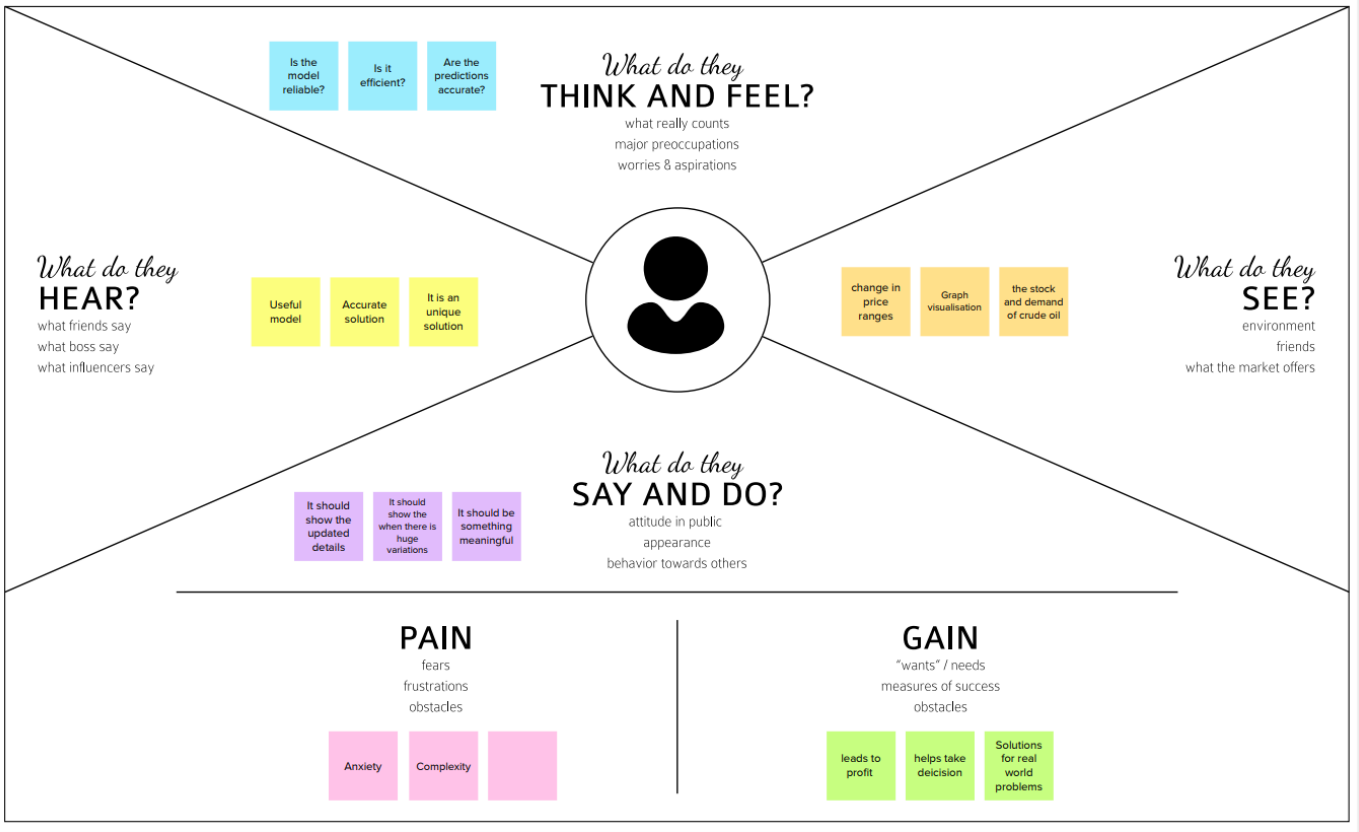
IDEA PRIORITISATION





4. EMPATHY MAP:

Build empathy and keep your focus on the user by putting yourself in their shoes.



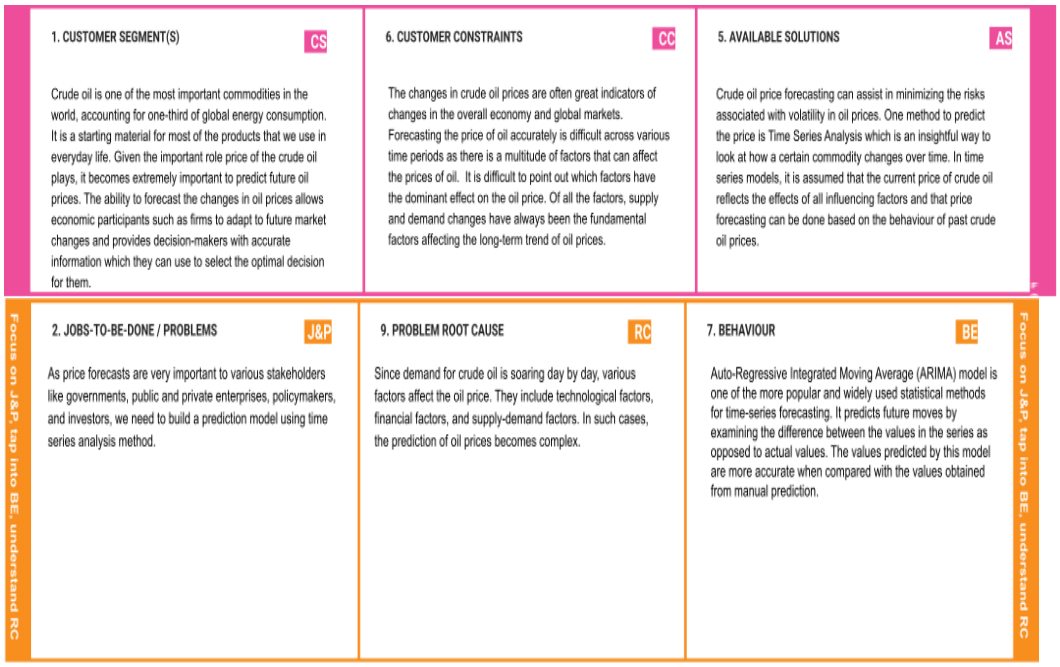
5. PROPOSED SOLUTION:

S. No.	Parameter	Description
1	Problem Statement (Problem tobe Solved)	To help the investors, public and private organizations to find a way to predict the crude oil price so that they can understand theoscillations of the crude oil prices and also to help them understand the impact on global economics and minimize the risk associated with the transient nature of crude oil prices.
2	Idea / Solution description	The issues identified are overcome in our proposed solution by predicting the price of crude oil by utilizing several Deep Learning Algorithms. The algorithms are implemented in various fields such as the Opening, Closing and the Mean Price of Crude Oil. A Multivariate Analysis Model is planned to be built in the future to visualize how the price of crude oil changesconcerning the other commodities.

3	Novelty / Uniqueness	We divide crude oil price forecasting approaches into three categories: (1) heuristic approaches; (2) econometric models;and (3) machine learning techniques. Heuristic approaches for oil price prediction include professionaland survey forecasts, based on professional knowledge, judgments, opinion and intuition. Econometric models are the most widely used approaches for oil price prediction, which include autoregressive moving average (ARMA) models and vector autoregressive (VAR) models, with possibly different input variables. Machine learning techniques were proposed for oil price prediction, such as artificial neural networks, and support vector machines.
4	Social Impact / Customer Satisfaction	As crude oil is a major source of fuel, predicting its price wouldprovide a clear-cut view of its trend. Governments, Private Enterprises and other institutions can stock it accordingly to prevent scarcity and sudden price rises. If the organizations cananticipate it and take the action accordingly, they would be ableto overcome the issues during critical situations.
5	Business Model (RevenueModel)	The stakeholders involved are governmental and private organisations who can get themselves prepared from unpredictable situations by finding a solution for this problemstatement.
6	Scalability ofthe Solution	To improve the precision of the solution we need to include more factors which are either affecting directly or indirectly theprice of the crude oil.

6.Solution Fit

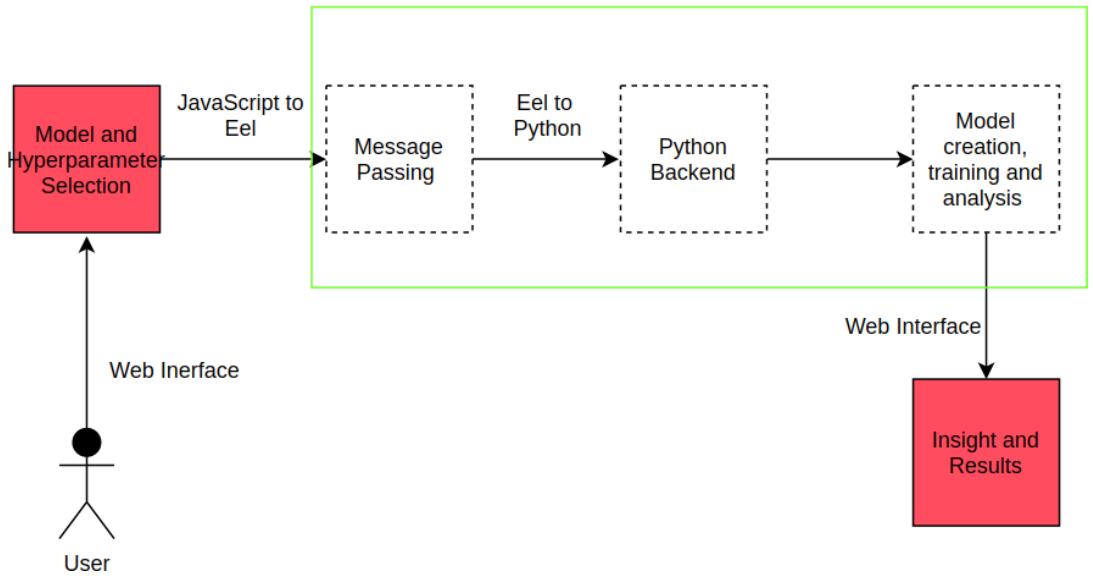
PROPOSED SOLUTION FIT:



6. SOLUTION ARCHITECTURE:

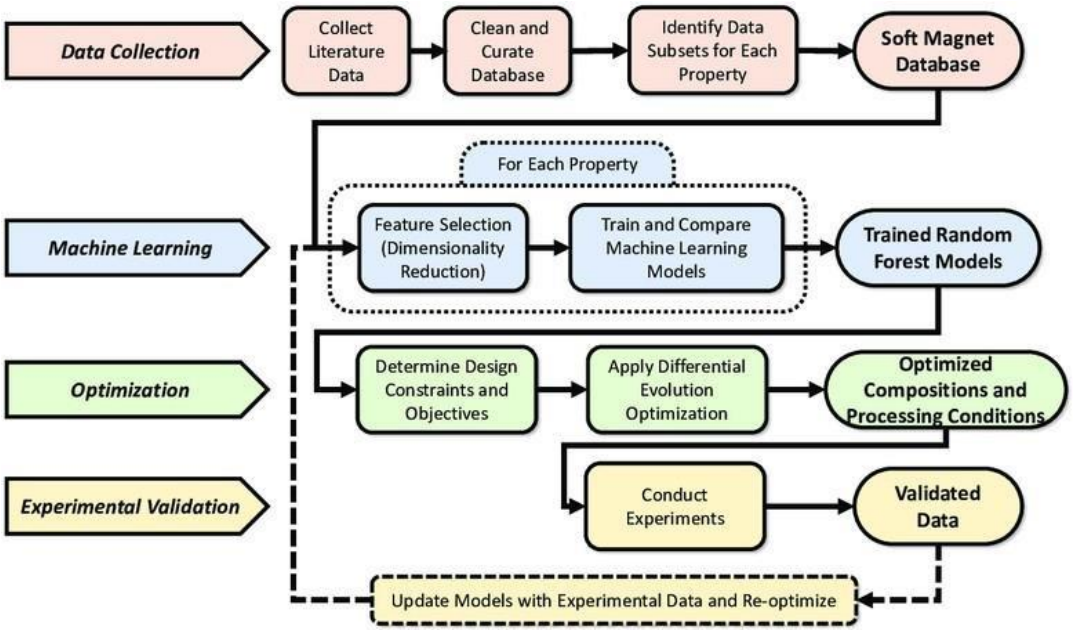
1 INTERFACE VIEW

This section describes the interfaces that will be required to the external system integrationtouch points

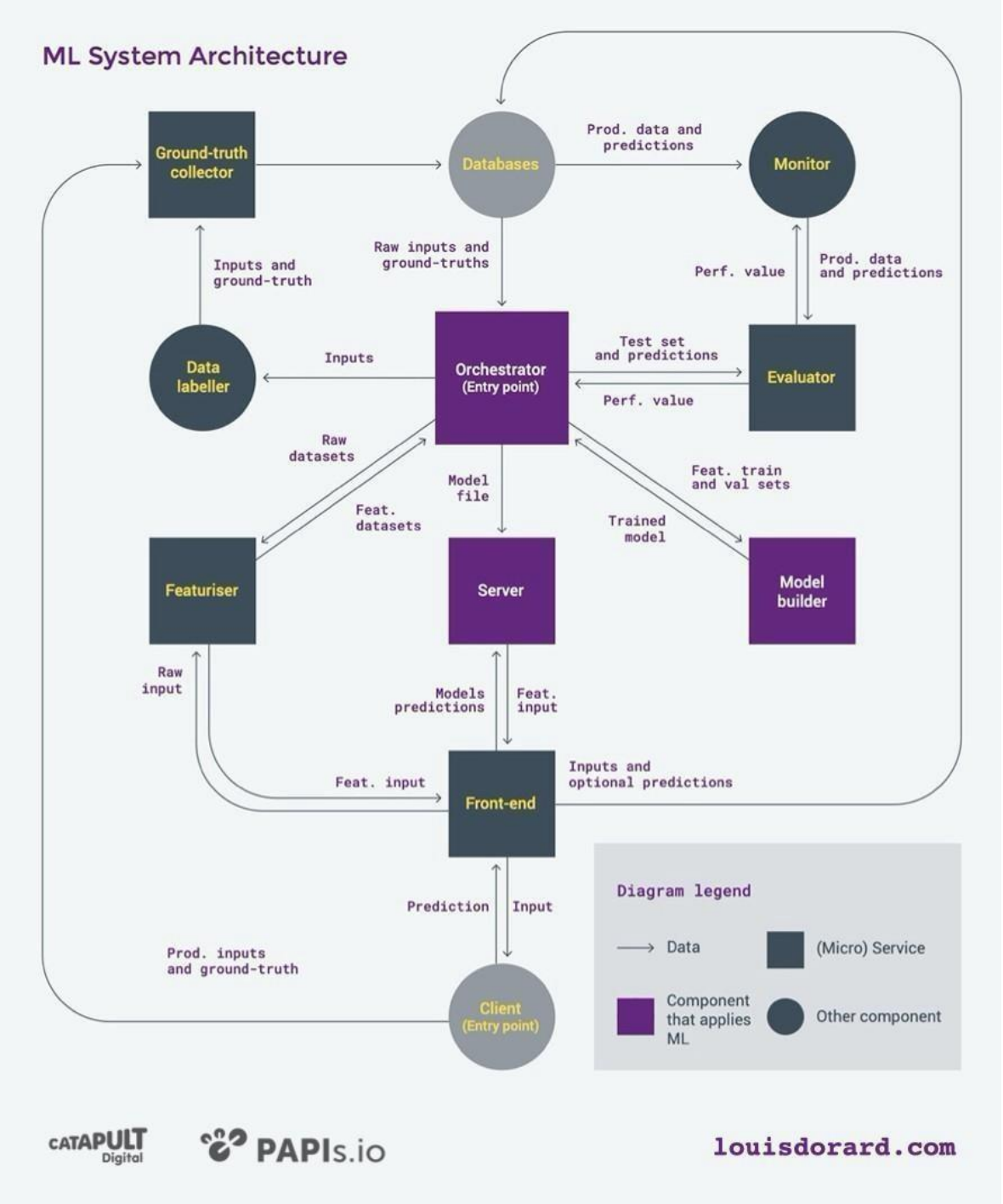


2 DESIGN VIEW

This section describes and explains any lower-level design concepts arising from the solution if required.

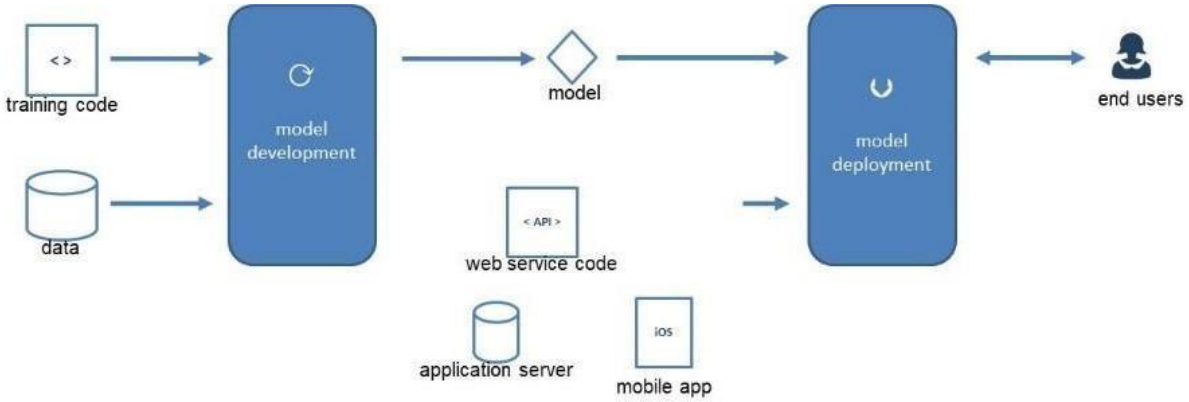


3 PHYSICAL VIEW



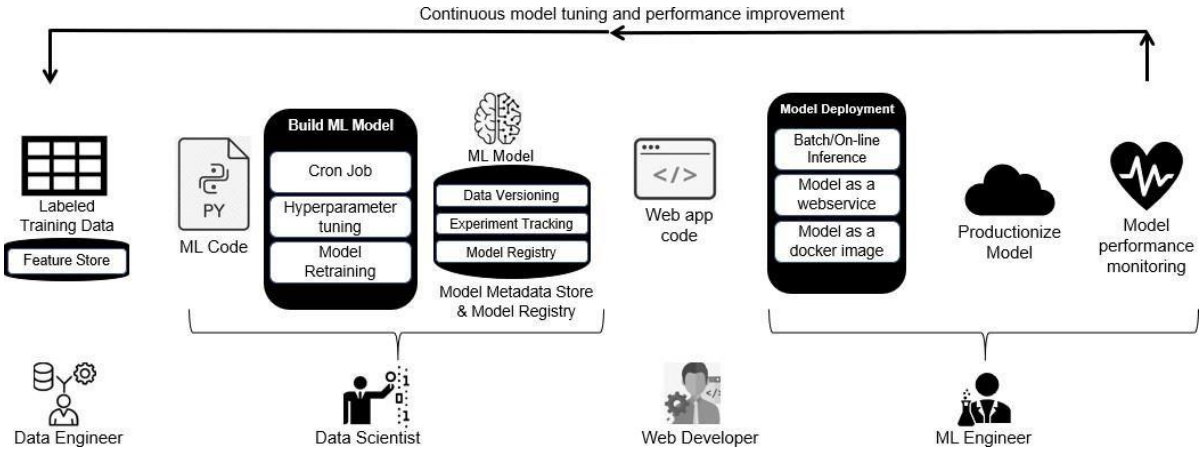
4 DEPLOYMENT VIEW

This section describes how code will be deployed in test environments and key considerations for the more complex Production go-live deployment.



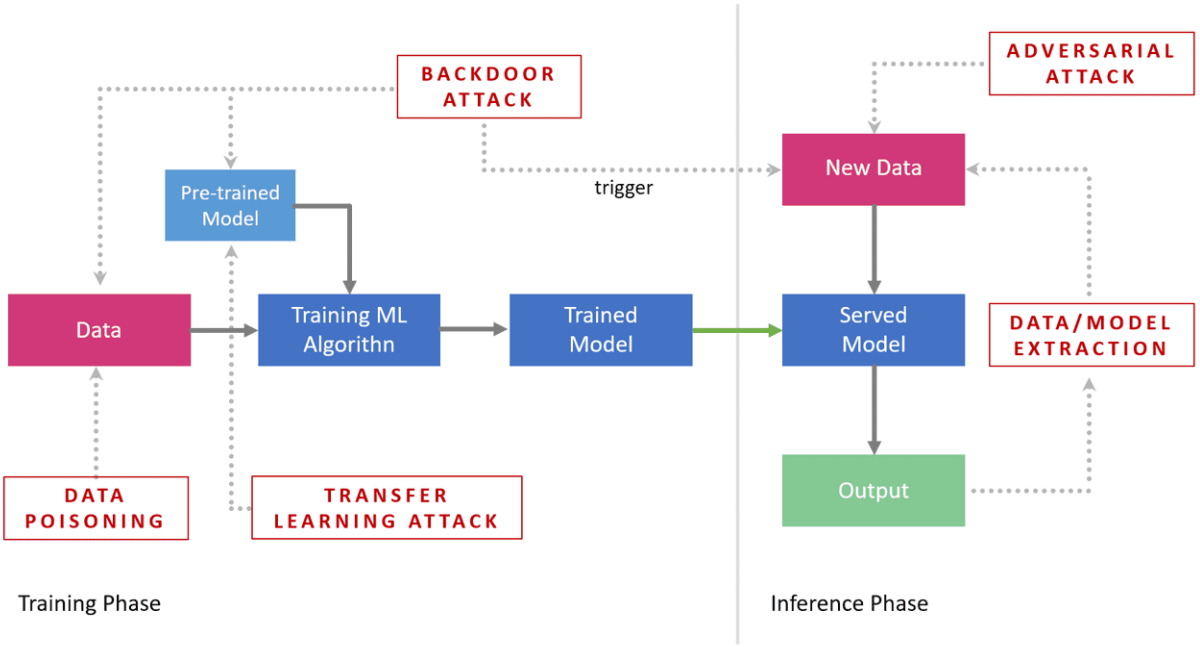
5 OPERATIONAL VIEW

This section describes how the architecture will support operational processes andactivities.



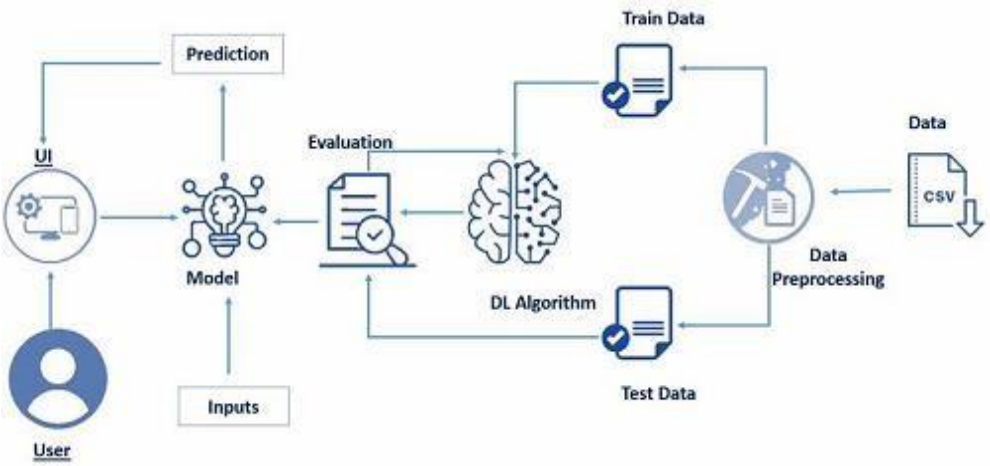
6 SECURITY VIEW

This section describes how the architecture addresses the different security aspects.



7 Architecture

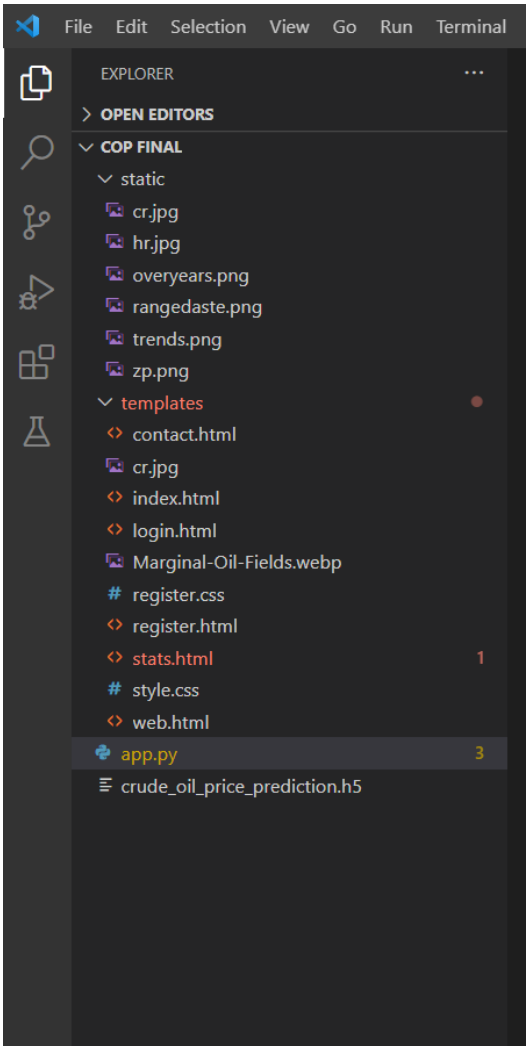
This section describes how the architecture works -



7. PROJECT MILESTONES:

TITLE	DESCRIPTION
Literature Survey & Information Gathering	Literature survey on theselected project & gathering information byreferring the, technical papers, research publications etc.
Prepare Empathy Map	Prepare Empathy Map Canvas to capture the user Pains & Gains, Prepare listof problem statements
Ideation	List the by organizing the brainstorming session andprioritize the top 3 ideas based on the feasibility & importance.
Proposed Solution	Prepare the proposed solutiondocument, which includes the novelty, feasibility of idea, business model, social impact,scalability of solution, etc.
Problem Solution Fit	Prepare problem - solution fitdocument.
Solution Architecture	Prepare solution architecturedocument.

8. PROJECT STRUCTURE:



- Building a Flask Application by creating HTML pages stored in the templates folder and apython script app.py for server-side scripting
- app.py - contains the actual python code that will import the app and start the developmentserver.
- Crude_oil_price_prediction.h5 - This is our model weights file that will be generated whenthe model is trained.
- static - contains static files i.e., CSS, JavaScript, and images.
- templates - This is where you store your HTML templates i.e., index.html, lweb.html

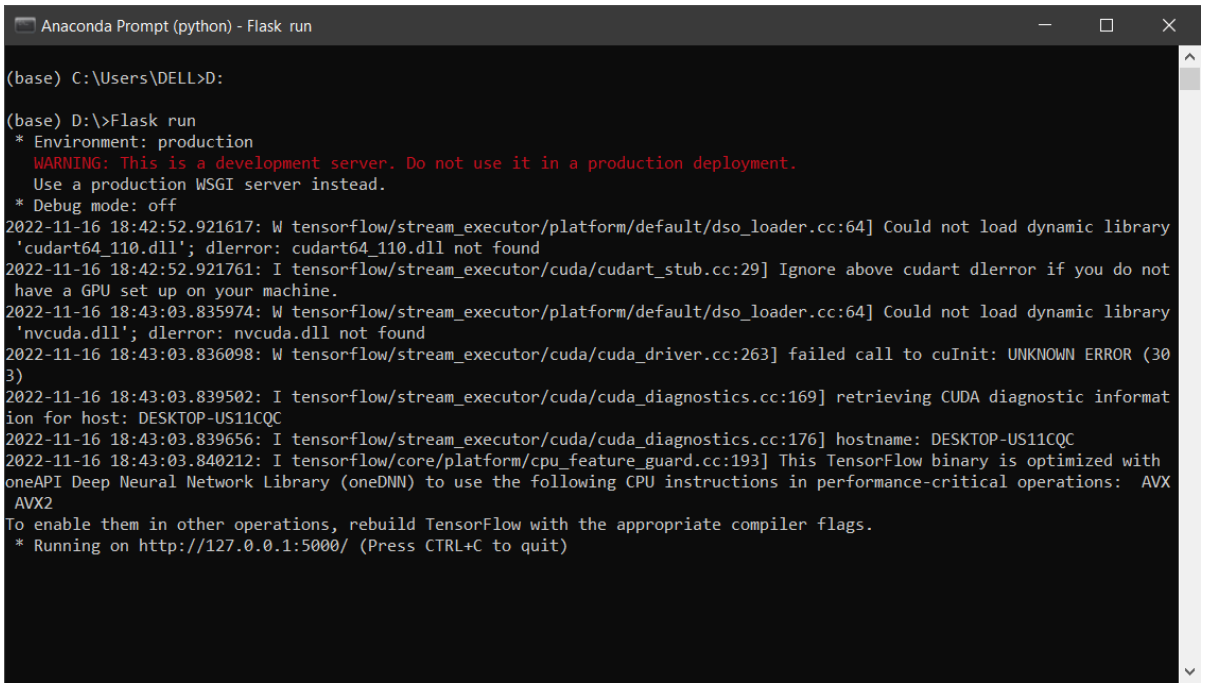
9. PYTHON CODE:

```
import numpy as np
# used for numerical analysis
from flask import Flask, render_template, request, url_for, redirect
# Flask is a application used to run/serve our application
# request is used to access the file 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
# we are loading our model from keras


app = Flask(__name__)  # our flask app
model = load_model('crude_oil_price_prediction.h5')  # loading the model in the flask app

@app.route('/', methods=['GET', 'POST'])
def home():
    error = None
    if request.method == 'POST':
        if request.form['username'] != "PNT2022TMID43400" or request.form['password'] != "7155":
            error = 'Invalid Credentials. Please try again.'
        else:
            return redirect(url_for('mains'))
    return render_template('login.html', error=error)


@app.route('/mains', methods=['GET', 'POST'])
def mains():
    return render_template('index.html')

@app.route('/stats', methods=['GET', 'POST'])
def stats():
    return render_template('stats.html')



@app.route('/about')
def home1():
    return render_template("index.html")  # rendering html template


@app.route('/predict')
def home2():
    return render_template("web.html")  # rendering html template

@app.route('/contact')
def contact():
    return render_template("contact.html")


@app.route('/login', methods=['POST'])  # route for our prediction
def login():
    a = request.form['year1']
    b = request.form['year2']
    c = request.form['year3']
    d = request.form['year4']
    e = request.form['year5']
```

```
    f = request.form['year6']
    g = request.form['year7']
    h = request.form['year8']
    i = request.form['year9']
    j = request.form['year10']  # requesting the file
    x_input = [[float(a), float(b), float(c), float(d), float(e), float(f), float(g), float(h), float(i), float(j)]]
    print(x_input)
    lst_output = model.predict(x_input)
    lst_output = np.round(lst_output[0][0], 2)
    return render_template("web.html", showcase='The Predicted crude oil price is : Rs. '+str(lst_output))


if __name__ == '__main__':
    app.run(debug=False)
```

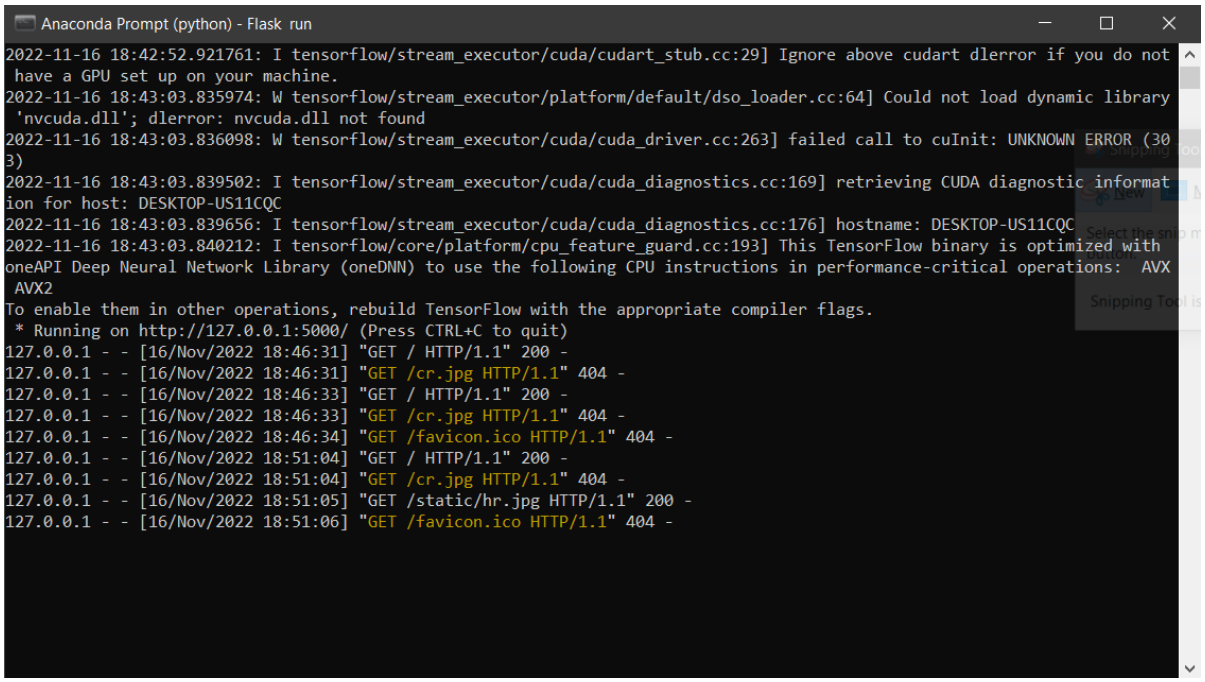
OUTPUT (Showcasing UI):

- Open Anaconda Prompt (Python) and direct the location to D drive, where app.py (a Python file) is located.

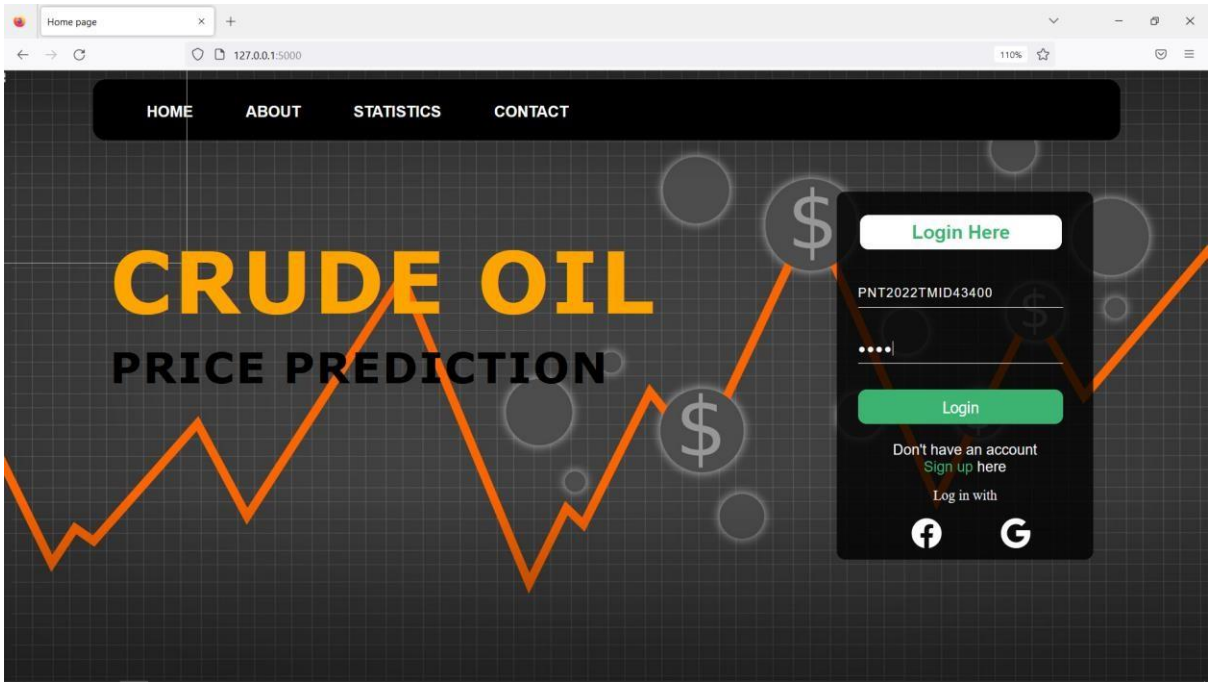


- Copy the link: http://127.0.0.1:5000/ and paste it in URL on Local Browser.

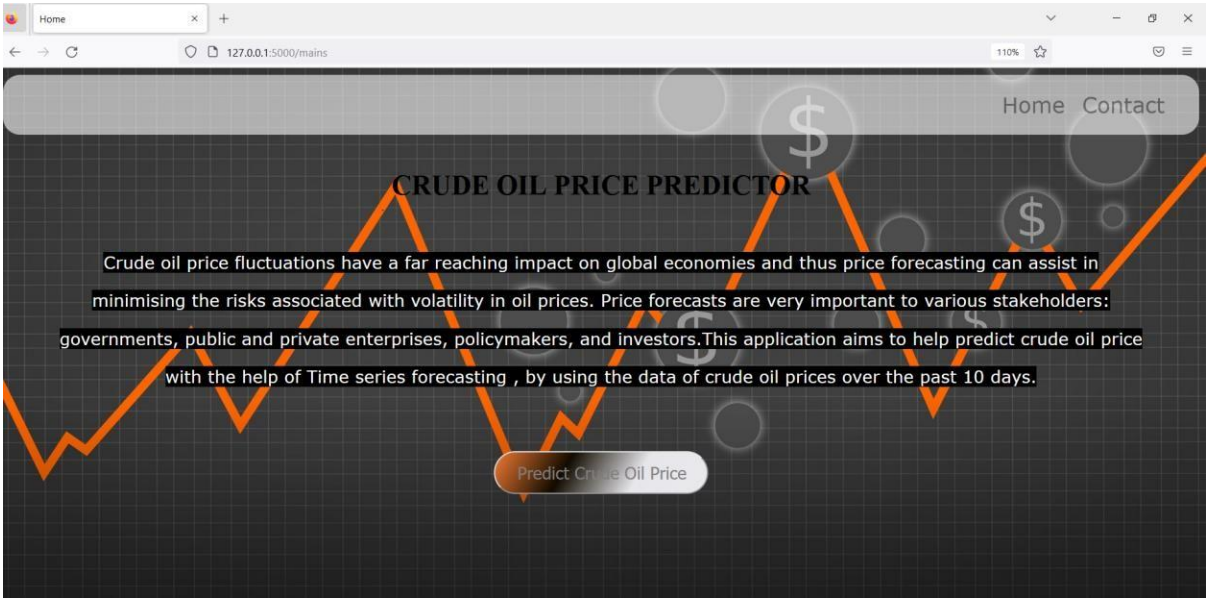
- Application Running Successfully in Local Browser on Flask using Anaconda Prompt:



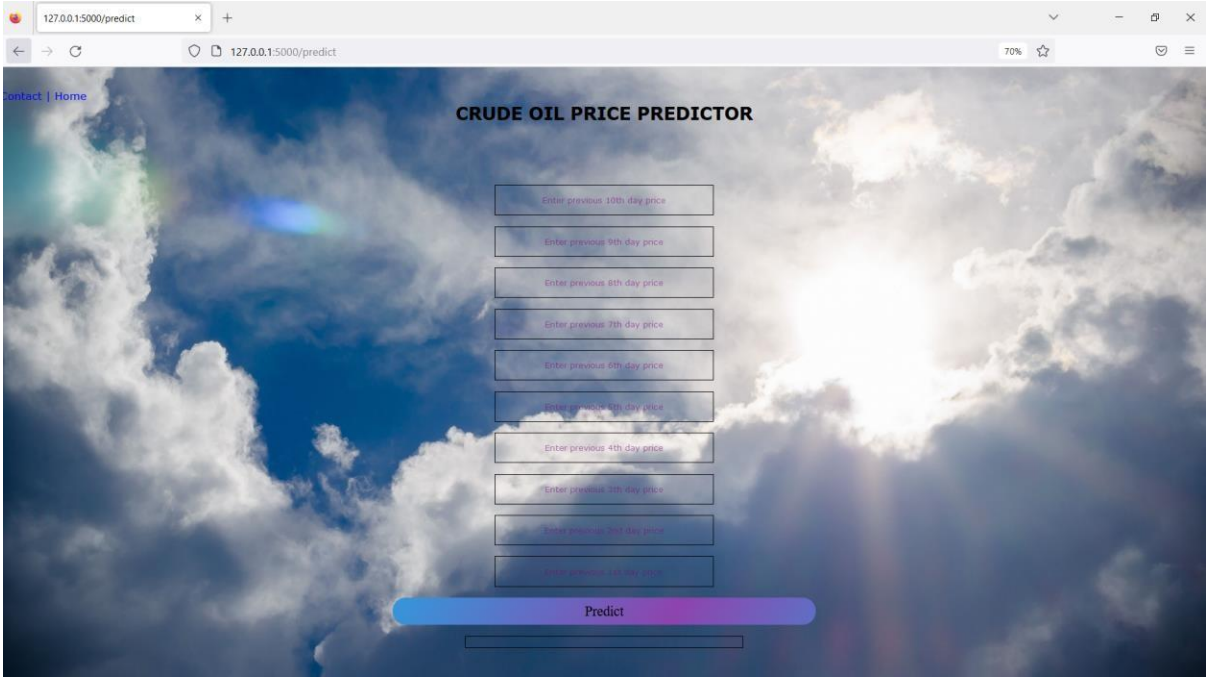
- Logging in with user and password

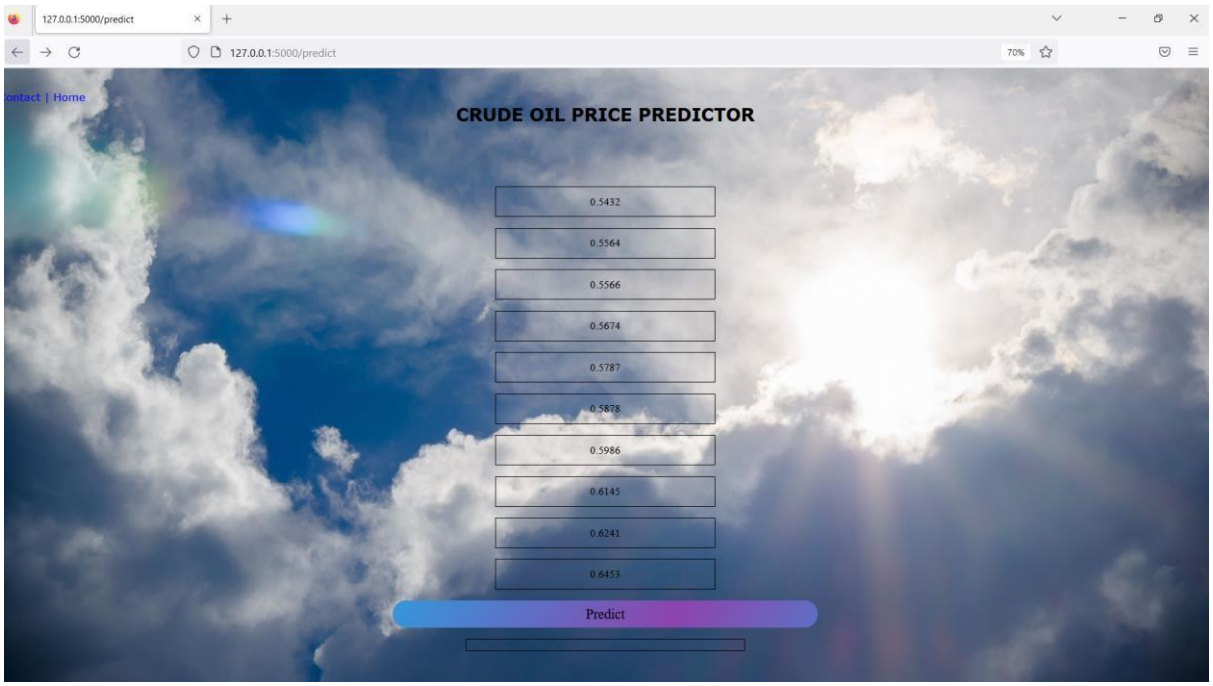


- Log in Home Page after Successful login:

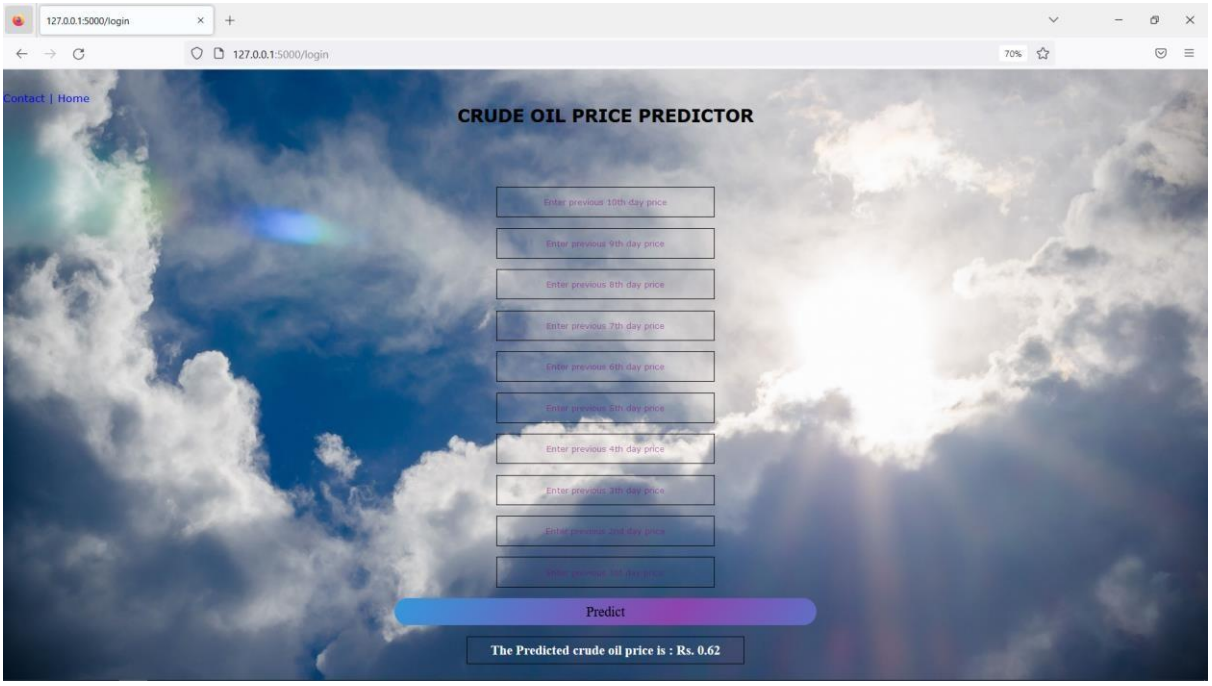


- Click Predict crude Oil price
- Price Prediction Page will be displayed: Enter the last ten days' Oil price to predict the next day's price:





- Predicted Crude Oil Price will be displayed.



10. CONCLUSION:

This project of predicting Crude Oil price is game changer for the world economy because it creates large part of gross margin for majority of the product that is prevailing , so we have been able to predict the crude price by training the data in IBM cloud in LSTM model and using Recursion Neural Network (RNN) in possible manner which is proving 92% efficiency that creates an revolutionary model.