

CRUDE OIL PREDICTION

PROJECT REPORT

Team Id: PNT2022TMID00817

Submitted by

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1. Introduction

1.1 Project Overview

Due to the inelasticity of oil demand, the rise in price will increase revenue for producers. However, oil importers will have to pay more for their oil purchases. Due to the fact that oil is the most traded commodity, the effects are quite significant. Rising oil prices can even shift economic/political power from oil importers to oil exporters. Diverse factors influence crude oil price movements.

The purpose of this Guided Project is to apply Neural Networks to predict the Crude Oil Price. By making this decision, we are able to buy crude oil at the right time. This kind of prediction is best made using time series analysis since we are predicting crude oil prices based on their past history. As a result, we will implement RNNs (Recurrent Neural Networks) with LSTMs (Long Short Term Memory).

Price forecasting can help minimise risks associated with volatility in oil prices by reducing the impact of price fluctuations on global economies. Investors, policymakers, and governments all rely on price forecasts for various purposes

1.2 Purpose

The cost of crude oil affects the global habitat, our economy, oil exploration, exploitation, and other activities directly, making it one of the most important resources in today's world. Many large and small industries, individuals, and governments rely on the prediction of oil prices, which has become a necessity.

Due to crude oil's evaporative nature, predicting its price becomes extremely difficult and inaccurate. Crude oil prices are affected by a variety of factors. By using artificial neural networks (ANNs), we propose a contemporary and innovative method for predicting crude oil prices.

This approach is able to continuously capture the unstable pattern of crude oil prices that has been incorporated by finding the optimal lag and number of the delay effect that controls crude oil prices.

After varying the lag over time for close and optimum results, we evaluated the root mean square error to validate our results. The results obtained using the proposed model were significantly better than those obtained using the previous model.

2. Literature Survey

2.1 Existing Problem

Crude oil, one of the world's most important commodities, accounts for one-third of global energy consumption. From transportation fuels to plastics, it is a starting material for most products we use every day. Price forecasting can assist in minimizing risks associated with oil price volatility by reducing the impact of fluctuations on global economies.

Various stakeholders, including governments, public and private enterprises, policymakers, and investors, rely heavily on price forecasts. From the equilibrium between demand and supply, crude oil's price should be predictable based on economic theory, where demand forecasts are usually derived from GDP, exchange rates, and domestic prices, while supply forecasts are derived from past production and reserve data.

Usually, oil demand can be predicted easily, but supply is heavily affected by political activity, such as cartelization by OPEC to regulate prices, technological advancements that allow more oil to be extracted, and wars and other conflicts that can affect supply unpredictably.

Economic models that incorporate supply and demand parameters and their determinants are referred to as structural models. Despite structural models being the most logical way to model industrial product prices, crude oil is influenced by many other factors. Among these factors is the fact that crude oil's price is determined by the futures market, which allows the purchase of a predefined amount of oil at a specified price in the future.

2.2 References

1. Sehgal, N.; Pandey, K.K. Artificial intelligence methods for oil price forecasting: A review and evaluation. *Energy Syst.* 2015, 6, 479–506.
2. Shuang Gao, Yalin Lei. "A new approach for crude oil price prediction based on stream learning" , *Geoscience Frontiers*, 2017
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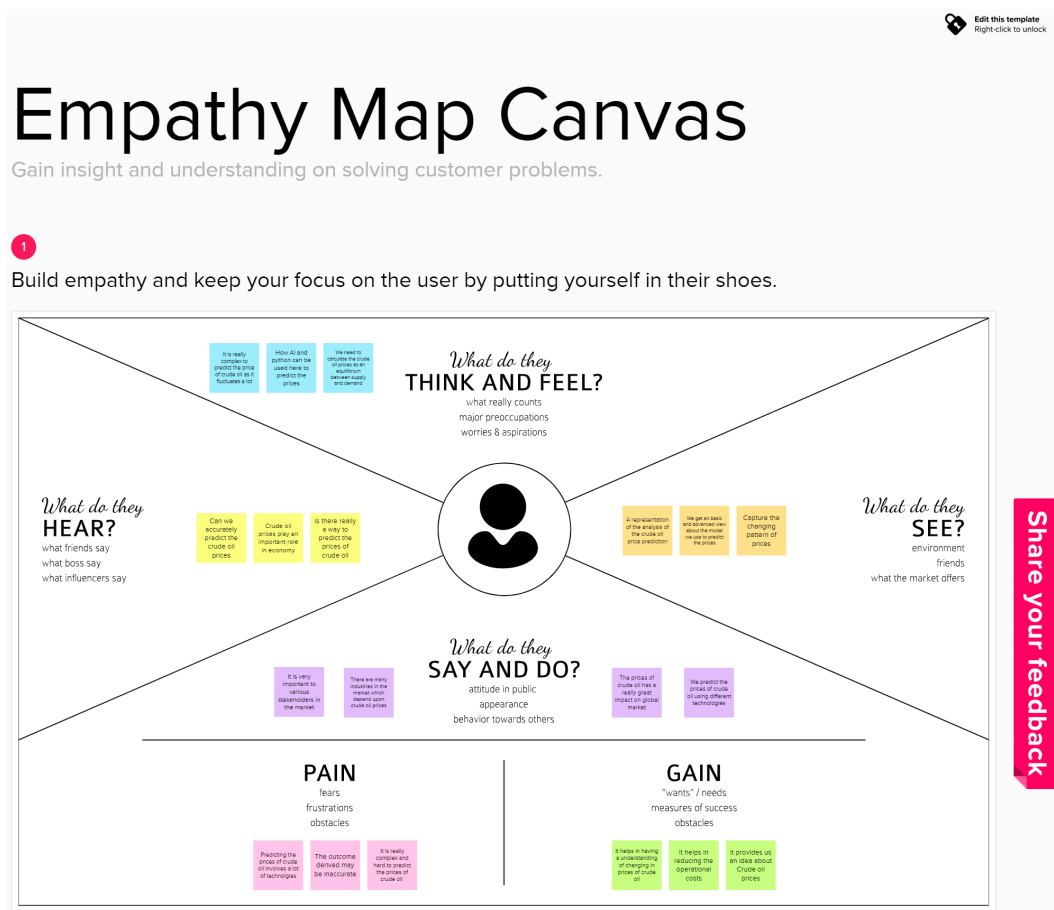
2.3 Problem Statement Definition

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

3. Ideation & Proposed Solution

3.1 Empathy Map Canvas


Empathy maps are simple easy-to-digest visuals that convey knowledge about a user's attitude and behavior. Team members can use it to better understand their users with the help of this tool. Understanding the true problem and the person experiencing it is essential for creating an effective solution. Through the process of creating the map, participants gain a better understanding of how the user sees the world, his or her goals, and the challenges he or she faces.



3.2 Ideation & Brainstorming

Brainstorming fosters a creative thinking process that leads to problem solving by providing a free and open environment. We prioritise volume over value, welcome out-of-the-box ideas, and encourage all participants to collaborate in order to develop a rich amount of creative solutions.

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



Brainstorm & idea prioritization

Use this template in your own brainstorming sessions so your team can unleash their imagination and start shaping concepts even if you're not sitting in the same room.

- 🕒 10 minutes to prepare
- 🕒 1 hour to collaborate
- 👤 2-8 people recommended

➔

Before you collaborate

A little bit of preparation goes a long way with this session. Here's what you need to do to get going.

🕒 10 minutes

A Team gathering
Define who should participate in the session and send an invite. Share relevant information or pre-work ahead.

B Set the goal
Think about the problem you'll be focusing on solving in the brainstorming session.

C Learn how to use the facilitation tools
Use the Facilitation Superpowers to run a happy and productive session.

[Open article](#) ➔

1


Define your problem statement

What problem are you trying to solve? Frame your problem as a How Might We statement. This will be the focus of your brainstorm.

🕒 5 minutes

PROBLEM




We are figuring out a way to predict crude oil prices



Key rules of brainstorming

To run a smooth and productive session

🗣️ Stay in topic.	💡 Encourage wild ideas.
⏸️ Defer judgment.	👂 Listen to others.
🗣️ Go for volume.	👁️ If possible, be visual.





Step 2: Brainstorm, Idea Listing and Grouping

2

Brainstorm

Write down any ideas that come to mind that address your problem statement.

10 minutes

TIP
You can select a sticky note and hit the pencil (switch to sketch) icon to start drawing!

Muthu Annamalai

The customer is not aware of the product.	The customer is not aware of the product.	The customer is not aware of the product.
The customer is not aware of the product.	The customer is not aware of the product.	The customer is not aware of the product.
The customer is not aware of the product.	The customer is not aware of the product.	The customer is not aware of the product.

KOULURU NANDA KISHORE REDDY

The customer is not aware of the product.	The customer is not aware of the product.	The customer is not aware of the product.
The customer is not aware of the product.	The customer is not aware of the product.	The customer is not aware of the product.
The customer is not aware of the product.	The customer is not aware of the product.	The customer is not aware of the product.

Pathakumari Charan Kumar

The customer is not aware of the product.	The customer is not aware of the product.	The customer is not aware of the product.
The customer is not aware of the product.	The customer is not aware of the product.	The customer is not aware of the product.
The customer is not aware of the product.	The customer is not aware of the product.	The customer is not aware of the product.

Mukesh Kumar

The customer is not aware of the product.	The customer is not aware of the product.	The customer is not aware of the product.
The customer is not aware of the product.	The customer is not aware of the product.	The customer is not aware of the product.
The customer is not aware of the product.	The customer is not aware of the product.	The customer is not aware of the product.



3

Group ideas

Take turns sharing your ideas while clustering similar or related notes as you go. Once all sticky notes have been grouped, give each cluster a sentence-like label. If a cluster is bigger than six sticky notes, try and see if you can break it up into smaller sub-groups.

20 minutes

Basic Level

The customer is not aware of the product.	The customer is not aware of the product.	Identify the problem, define a user.	The customer is not aware of the product.
---	---	--------------------------------------	---

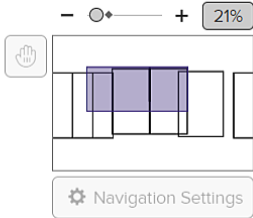
Medium Level

The customer is not aware of the product.	The customer is not aware of the product.	Identify the problem, define a user.
---	---	--------------------------------------

Advanced level

The customer is not aware of the product.	The customer is not aware of the product.	The customer is not aware of the product.	The customer is not aware of the product.
---	---	---	---

TIP
Add customizable tags to sticky notes to make it easier to find, browse, organize, and categorize important ideas as themes within your model.



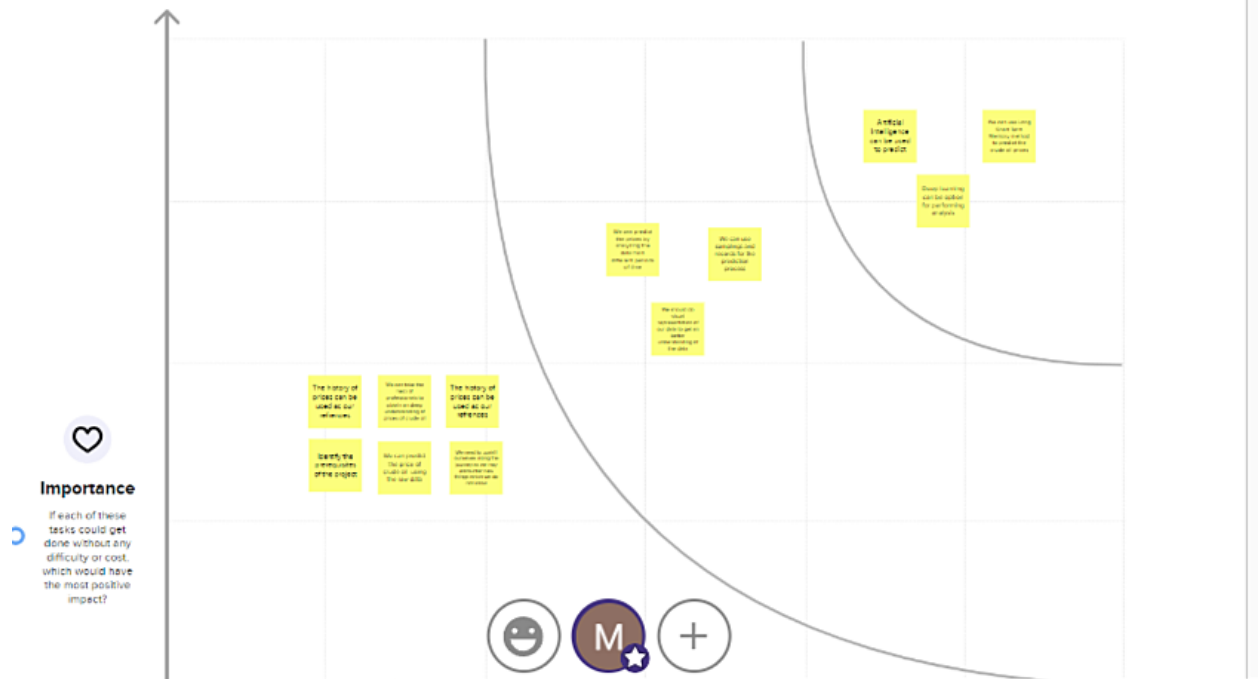
Step 3: Idea Prioritization

4

Prioritize

Your team should all be on the same page about what's important moving forward. Place your ideas on this grid to determine which ideas are important and which are feasible.

20 minutes



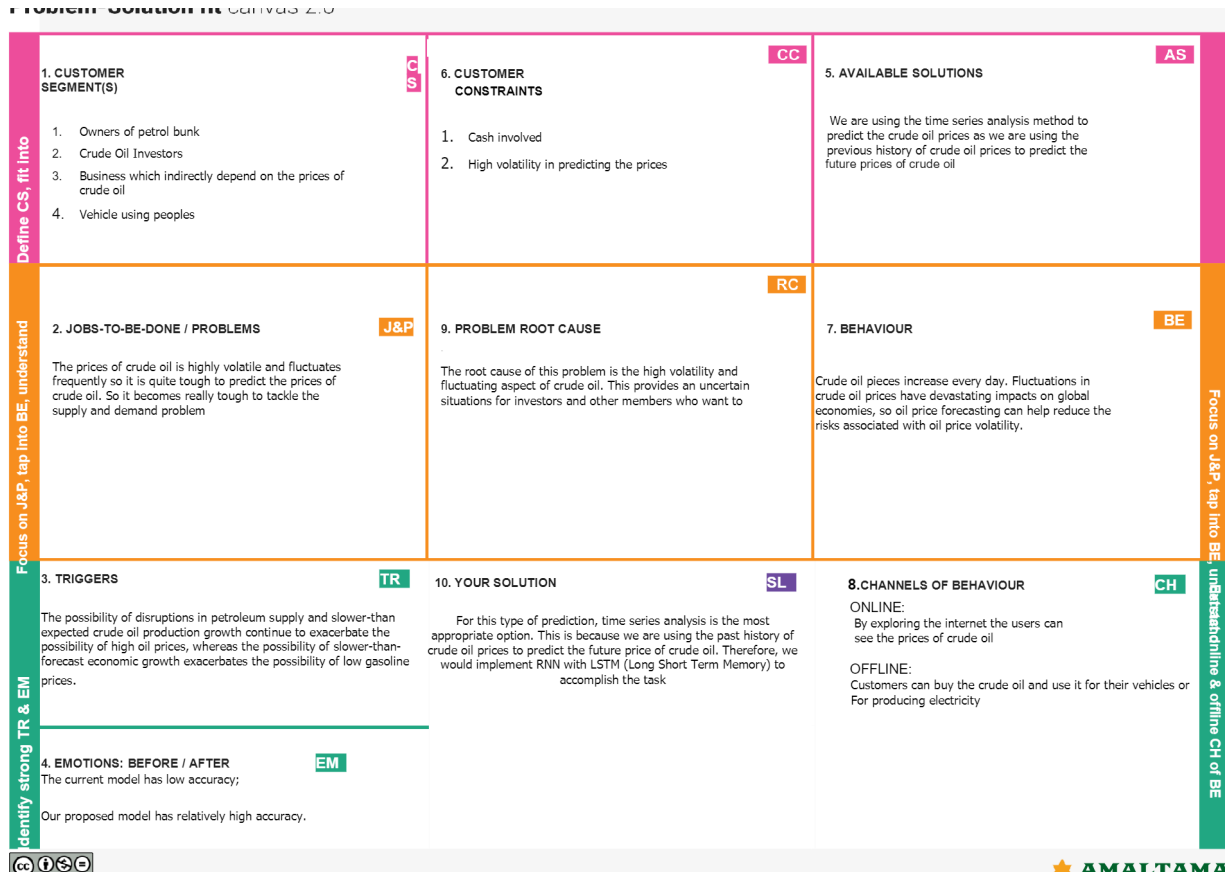
3.3 Proposed Solution

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. We have tried to incorporate time series analysis method to predict the prices of crude oil
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 <ol style="list-style-type: none">1. Pay per month model2. 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.
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3.4 Problem Solution Fit

A Problem-Solution Fit is simply the finding of a problem in your customer's life and the realization of a solution for it that actually solves the problem. Entrepreneurs, marketers, and corporate innovators can identify behavioral patterns and recognize what works and why



4. Requirement Analysis

4.1 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/Mobilenumber

4.2 Non-Functional Requirements

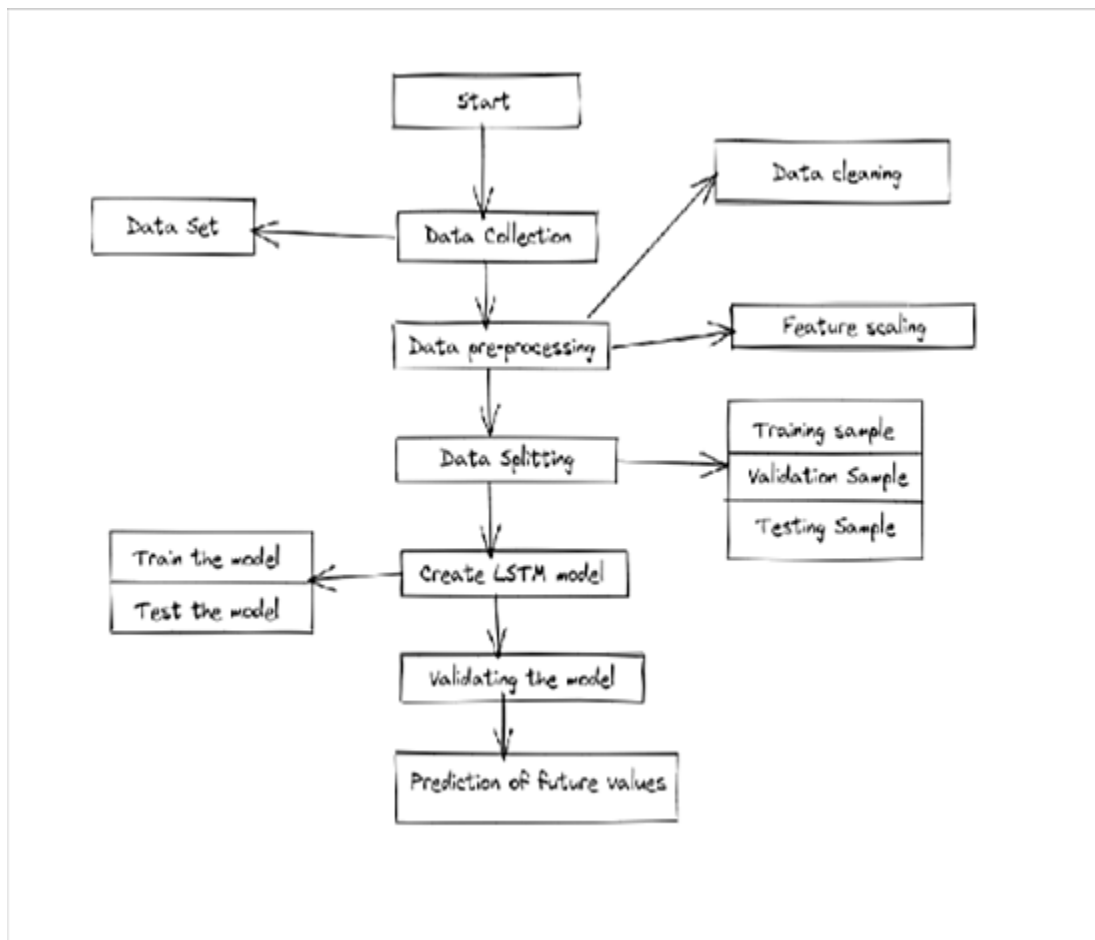
Following are the non-functional requirements of the proposed solution.

FR No.	Non-Functional Requirement	Description
NFR-1	Usability	UI is user-friendly .we represent the data in charts whichuses clear understanding of price activity
NFR-2	Security	We follow certain security protocols likeusing 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 projectis determined through “how accurately you can predict the price ofthe crude oil “
NFR-5	Availability	The web appis available to all devices(Android , Mac , windows etc.,)
NFR-6	Scalability	According to user basethe project scalability is done

5. Project Design

5.1 Data Flow Diagram

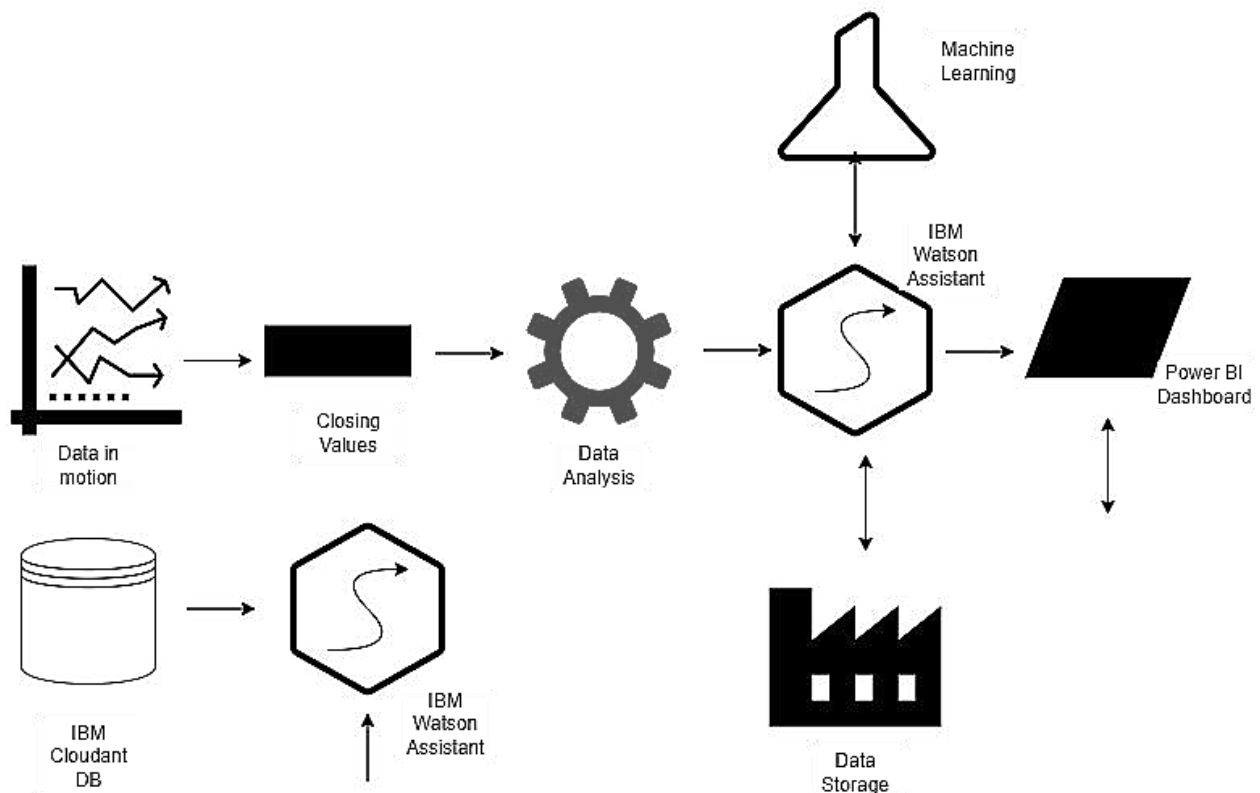
Data Flow Diagrams(DFDs) are traditional visual representations of how information flows within a system. It is possible to illustrate the right amount of the system requirement graphically with a neat and clear DFD. It explains how data enters and leaves the system, what changes the information, and where it is stored.



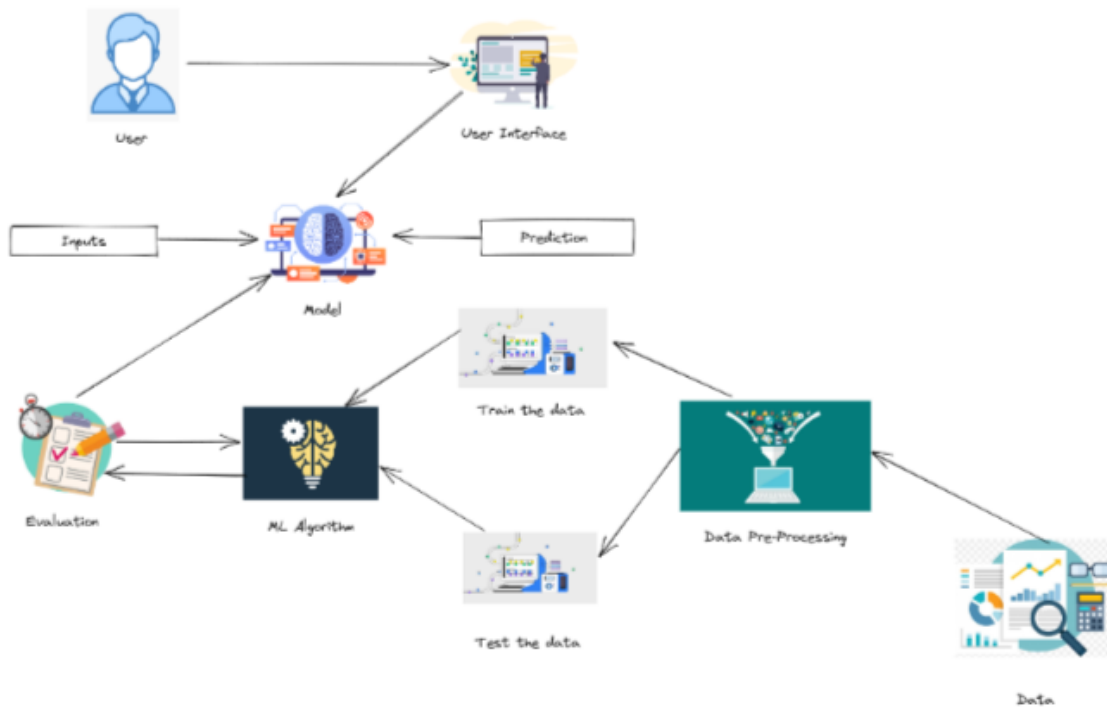
5.2 Solution & Technical Architecture

An architectural description of a solution is called a Solution architecture (SA). Enterprise solution architectures (ESAs) combine guidance from various enterprise architecture viewpoints (business, information, and technical). Solution architecture aims to achieve the following overarching goals:

- (i) Streamlining day-to-day operations
- (ii) Providing a more efficient production environment
- (iii) Lowering costs and gaining cost-effectiveness
- (iv) Providing a secure, stable, and supportable environment



Solution Architecture



Technical Architecture

5.3 User Stories

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task
Sprint-1	Data Collection	USN-1	Collecting the Dataset
Sprint-2	Data Pre-processing	USN-2	Data Pre-processing
Sprint-3	Model Building	USN-3	Prepare the model by importing the necessary libraries, adding the layers, and compiling it.
Sprint-3	Model Building	USN-4	The data classification model is trained using RNNs and other systems.

Sprint-4	Application Building	USN-5	Deploy the model in the IBMcloud and build the system
Sprint-4	Training and testing	USN-6	Testing the model's performance and training it

6. Project Planning & Scheduling

6.1 Sprint Planning & Estimation

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	Muthu Annamalai KOULURU NANDAKISHORE REDDY MukeshKumar Charan Kumar
Sprint-2	Data Pre-processing	USN-2	Data Pre-processing	7	Medium	Muthu Annamalai KOULURU NANDAKISHORE REDDY MukeshKumar Charan Kumar
Sprint-3	Model Building	USN-3	Prepare the model by importing the necessary libraries, adding the layers, and compiling it.	10	High	Muthu Annamalai KOULURU NANDAKISHORE REDDY MukeshKumar Charan Kumar

Sprint-3	Model Building	USN-4	The data classification model is trained using RNNs and other systems.	7	Medium	Muthu Annamalai KOULURU NANDAKISHORE REDDY MukeshKumar Charan Kumar
Sprint-4	Application Building	USN-5	Deploy the model in the IBM cloud and build the system	10	High	Muthu Annamalai KOULURU NANDAKISHORE REDDY MukeshKumar. Charan Kumar
Sprint-4	Training and testing	USN-6	Testing the model's performance and training it	7	Medium	Muthu Annamalai.V KOULURU NANDAKISHORE REDDY MukeshKumar. SCharan Kumar

6.2 Sprint Delivery Schedule

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

6.3 Reports from Jira

The screenshot displays the Jira Software interface for a project named 'COP'. The top navigation bar includes 'Jira Software', 'Your work', 'Projects', 'Filters', 'Dashboards', 'People', 'Apps', and a 'Create' button. The left sidebar shows navigation options: 'PLANNING' (Roadmap, Backlog, Board, Reports) and 'DEVELOPMENT' (Code, Project pages, Add shortcut, Project settings). The main content area shows the 'Backlog' for 'COP Sprint 1' (24 Oct - 29 Oct). It lists one issue, 'EOP-10 Data Collection', which is marked as 'DONE'. Below the sprint, the 'Backlog' section shows '(0 issues)' and a message 'Your backlog is empty.' A 'Quickstart' sidebar on the right offers options like 'Create a project', 'Deliver more often with scrum', 'Create an issue', 'Invite your teammates', and 'Connect your tools'.

Jira Software

Your work

Projects

Filters

Dashboards

People

Apps

Create

Q Search

COP

Software project

PLANNING

Roadmap

Backlog

Board

Reports

DEVELOPMENT

Code

Project pages

Add shortcut

Project settings

a team-managed project

Learn more

Projects / COP

Backlog

Q

MY SM

Epic

Insights

COP Sprint 1

24 Oct – 29 Oct

(1 issue)

0 0 0

Complete sprint

...

EGP-18

Data Collection

DONE

SM

+ Create issue

COP Sprint 2

31 Oct – 5 Nov

(0 issues)

0 0 0

Start sprint

...

Plan a sprint by dragging the sprint footer down below some issues, or by dragging issues here.

+ Create issue

COP Sprint 3

Add dates

(1 issue)

0 0 0

Start sprint

...

EGP-15

Model Building

DONE

SM

+ Create issue

Quickstart

✓ Create a project

✓ Deliver more often with scrum

✓ Create an issue

Issue

Issues are individual pieces of work that you assign to teammates.

Issues can be tasks or stories.

Show me View issue tutorial

✓ Invite your teammates

✓ Connect your tools

Dismiss Quickstart

Jira Software

Your work

Projects

Filters

Dashboards

People

Apps

Create

Q Search

COP

Software project

PLANNING

Roadmap

Backlog

Board

Reports

DEVELOPMENT

Code

Project pages

Add shortcut

Project settings

a team-managed project

Learn more

Projects / COP

Backlog

Q

MY PK

Epic

Insights

Plan a sprint by dragging the sprint footer down below some issues, or by dragging issues here.

+ Create issue

COP Sprint 4

Add dates

(1 issue)

0 0 0

Start sprint

...

EGP-16

Application Building and Testing

DONE

PK

+ Create issue

Backlog

(0 issues)

0 0 0

Create sprint

Your backlog is empty.

+ Create issue

Quickstart

✓ Create a project

✓ Deliver more often with scrum

✓ Create an issue

Issue

Issues are individual pieces of work that you assign to teammates.

Issues can be tasks or stories.

Show me View issue tutorial

✓ Invite your teammates

✓ Connect your tools

Dismiss Quickstart

COP
Software project

PLANNING

Roadmap

Backlog

Board

Reports

DEVELOPMENT

Code

Project pages

Add shortcut

Project settings

a team-managed project
Learn more

Projects / COP

Backlog

MV

KR

Epic

Insights

COP Sprint 1 24 Oct – 29 Oct (1 issue)

0 0 0 Complete sprint

€GP-10 Data Collection

DONE MV

+ Create issue

COP Sprint 2 31 Oct – 5 Nov (1 issue)

0 0 0 Start sprint

€GP-14 Data Preprocessing

DONE KR

+ Create issue

Backlog (0 issues)

0 0 0 Create sprint

Your backlog is empty.

+ Create issue

Quickstart

- Create a project
- Deliver more often with scrum
- Create an issue
 - Issues are individual pieces of work that you assign to teammates.
 - Issues can be tasks or stories.
 - Show me View issue tutorial
- Invite your teammates
- Connect your tools

Dismiss Quickstart

7. Coding and Solutioning

```
from flask import Flask, render_template, request, redirect
import numpy as np
from tensorflow import keras
from keras.models import load_model
import joblib
import scipy

app = Flask(__name__)
model = load_model(r'C:\Users\muthu\OneDrive\Desktop\Crude-Oil-Price-Prediction\crude-oil.h5')

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

@app.route('/predict', methods=["POST", "GET"])
def predict():
    if request.method == "POST":
        string = request.form['val']
        string = string.split(',')
        x_input = [eval(i) for i in string]
        sc = joblib.load(r'C:\muthu\OneDrive\Desktop\Crude-Oil-Price-Prediction\scaler.save')

        x_input = sc.fit_transform(np.array(x_input).reshape(-1,1))

        x_input = np.array(x_input).reshape(1,-1)

        x_input = x_input.reshape(1,-1)
        x_input = x_input.reshape((1,10,1))
        print(x_input.shape)

        model = load_model(r'C:\Users\muthu\OneDrive\Desktop\Crude-Oil-Price-Prediction\crude-oil.h5')
        output = model.predict(x_input)
        print(output[0][0])

        val = sc.inverse_transform(output)

        return render_template('web.html' , prediction = val[0][0])
    if request.method=="GET":
        return render_template('web.html')

if __name__=="__main__":
    app.run(debug=True)
```

8. Testing

8.1 Test cases

Test case ID	Feature Type	Component	Test Scenario	Expected Result	Actual Result	Status
HP_TC_001	UI	HomePage	Verify UI elements in the Home Page	The Home page must be displayed properly	Working as expected	PASS
HP_TC_002	UI	HomePage	Check if the UI elements are displayed properly in different screen sizes	The Home page must be displayed properly in all sizes	The UI is not displayed properly in screen size 2560 x 1801 and 768 x 630	PASS
HP_TC_003	Functional	Web Page	Check if user can enter the past days	The input price should be updated to the	Working as expected	PASS

			price	applicat ion succes sfully		
WP_TC_ 001	Functional	Web Page	Check if user cannot enter any numb er as price	The applicati on should not allow user to enter any number as price	User is able to enter any price	FAIL
WP_TC_ 002	Functional	Web Page	Check if the page redirects to the result page once the input is given	The page should redirect to the results page	Working as expected	PASS

8.2 USER ACCEPTANCE TESTING

8.2.1 DEFECT ANALYSIS

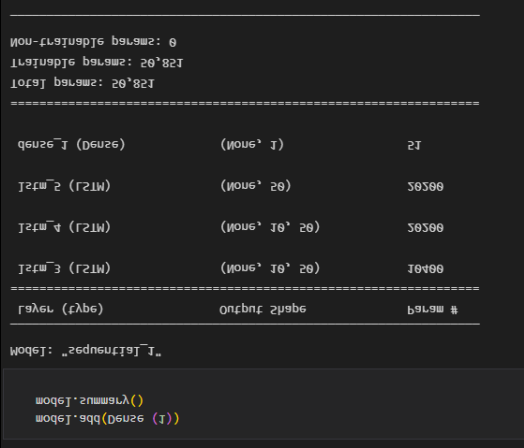
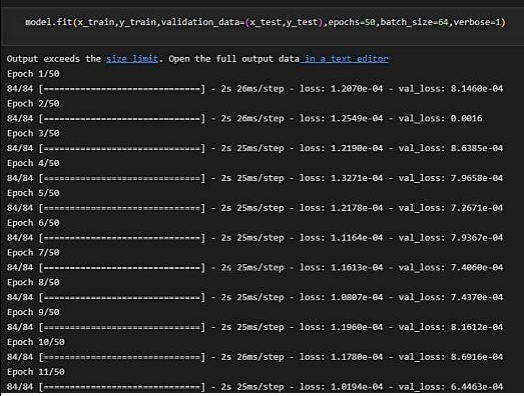
Resolution	Severity 1	Severity 2	Severity 3	Severity 4	Total
By Design	1	0	1	0	2
Duplicate	0	0	0	0	0
External	0	0	2	0	2
Fixed	4	1	0	1	6
Not Reproduced	0	0	0	1	1
Skipped	0	0	0	1	1
Won't Fix	1	0	1	0	2
Total	6	1	4	3	14

8.2.2 TESTCASE ANALYSIS

Section	Total Cases	Not Tested	Fail	Pass
Client Application	10	0	3	7
Security	2	0	1	1
Performance	3	0	1	2
Exception Reporting	2	0	0	2
Print Engine	2	0	0	2
Final ReportOutput	2	0	0	2

9. Results

9.1 Performance Metrics

S.No.	Parameter	Values	Screenshot
1.	Model Summary		
2.	Accuracy	Training Accuracy - 1.9685525432167308 Validation Accuracy - 2.201959455277266	
3.	Confidence Score	Class Detected-9 ConfidenceScore9	

10. Advantages and Disadvantages

ADVANTAGES

1. With Price of falling up full to its lowest level in consumer will spend to gasoline in government estimate.
2. Tepid inflation declining energy price lamp down inflation.
3. Lowest oil prices economy energy producing in US, Iran, Venezuela.
4. The plunge in oil price is roiling market worldwide.
5. Increase fuel mileage for passenger can seemed expensive

DISADVANTAGES

1. Falling oil prices hurt a key sector of stock market.
2. Less business spending automation of energy and equipment firms.
3. Sagging economics higher supply may or reason for oil drop, investor worry persistent declines.
4. Less business spending automation of energy and equipment forms. These facilities high demand of actuator and valves

11. Conclusion

For forecasting prices, LSTM networks are better than traditional neural networks because they use back propagation models. A traditional neural network, such as an RNN, predicts the next outgoing data but does not necessarily save the previous data. RNNs are based on feed-forwarding, so the previous data is not required to predict the future data. The LSTM method stores the previous data and makes predictions based on it, which is rather encouraging and approximate. As a result, relatively encouraging results were derived. It appears that large lookups do not necessarily improve the accuracy of crude oil price predictions. Therefore, it can be concluded that the LSTM model with a single node is the most accurate.

12. Future Scope

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 help the proposed model perform more efficiently.

13. Appendix

Source Code

Model Creation

MODEL BUILDING :

IMPORTING THE MODEL BUILDING LIBRARIES

```
from tensorflow.keras.models import Sequential
from tensorflow.keras.layers import Dense
from tensorflow.keras.layers import LSTM
```

INITIALIZING THE MODEL

```
model = Sequential()
```

ADDING LSTM LAYERS

```
model.add(LSTM(50, return_sequences=True, input_shape=(10,1)))
model.add(LSTM(50, return_sequences=True))
model.add(LSTM(50))
```

Flask App

```
from flask import Flask, render_template, request, redirect
import numpy as np
from tensorflow import keras
from keras.models import load_model
import joblib
import scipy

app = Flask(__name__)
model = load_model(r'C:\Users\muthu\OneDrive\Desktop\Crude-Oil-Price-Prediction\crude-oil.h5')

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

```
@app.route('/predict', methods=["POST", "GET"])
def predict():
    if request.method == "POST":
        string = request.form['val']
        string = string.split(',')
        x_input = [eval(i) for i in string]
        sc = joblib.load(r'C:\muthu\OneDrive\Desktop\Crude-Oil-Price-Prediction\scaler.save')

        x_input = sc.fit_transform(np.array(x_input).reshape(-1,1))

        x_input = np.array(x_input).reshape(1,-1)

        x_input = x_input.reshape(1,-1)
        x_input = x_input.reshape((1,10,1))
        print(x_input.shape)

        model = load_model(r'C:\Users\muthu\OneDrive\Desktop\Crude-Oil-Price-Prediction\crude-oil.h5')
        output = model.predict(x_input)
        print(output[0][0])

        val = sc.inverse_transform(output)

        return render_template('web.html' , prediction = val[0][0])
    if request.method=="GET":
        return render_template('web.html')
```

```
if __name__=="__main__":
    app.run(debug=True)
```

RECOGNIZER

```

x_input = [eval(i) for i in string]
sc = joblib.load(r'C:\muthu\OneDrive\Desktop\Crude-Oil-Price-Prediction\scaler.save')

x_input = sc.fit_transform(np.array(x_input).reshape(-1,1))

x_input = np.array(x_input).reshape(1,-1)

x_input = x_input.reshape(1,-1)
x_input = x_input.reshape((1,10,1))
print(x_input.shape)

model = load_model(r'C:\Users\muthu\OneDrive\Desktop\Crude-Oil-Price-Prediction\crude-oil.h5')
output = model.predict(x_input)
print(output[0][0])

val = sc.inverse_transform(output)

```

Home Page - HTML

```

<!DOCTYPE html>
<html lang="en">
<head>
  <meta charset="UTF-8">
  <title>Homepage</title>
  <link href="https://fonts.googleapis.com/css2?family=Poppins:wght@400;700&display=swap" rel="stylesheet">
  <link href="https://fonts.googleapis.com/css2?family=Ubuntu&display=swap" rel="stylesheet">
  <link rel="stylesheet" href="{{url_for('static',filename='css/style.css')}}">
</head>
<body>
  <header>
    <div>
      <ul class="menu">
        <li><a href="{{url_for('home')}}">Home</a></li>
        <li><a href="{{url_for('home')}}">About</a></li>
      </ul>
    </div>
    <div class="banner-text">
      <h1>CRUDE OIL<span> PRICE PREDICTION</span></h1>
      <p>Crude oil is composed of hydrocarbons, which are mainly hydrogen (about 13% by weight) and carbon</p>
      <a href="{{url_for('predict')}}">PREDICT</a>
    </div>
  </header>
</body>
</html>

```

Home Page - CSS

```
* {
  margin: 0;
  padding: 0;
}
body {
  font-family: "Poppins", sans-serif;
}
.wrapper {
  width: 1170px;
  margin: auto;
}
header {
  background: linear-gradient(rgba(0, 0, 0, 0.8), rgba(0, 0, 0, 0.8)),
    url(1.jpg);
  height: 100vh;
  -webkit-background-size: cover;
  background-size: cover;
  background-position: center center;
  position: relative;
}
.menu {
  float: right;
  list-style: none;
  margin-top: 30px;
}
.menu li {
  display: inline-block;
}
.menu li a {
  color: #fff;
  text-decoration: none;
  padding: 5px 20px;
  font-family: "Poppins", sans-serif;
  font-size: 16px;
  text-transform: uppercase;
}
```

Web Page - HTML

```
<!DOCTYPE html>
<html lang="en">
  <head>
    <meta charset="UTF-8" />
    <meta http-equiv="X-UA-Compatible" content="IE=edge" />
    <meta name="viewport" content="width=device-width, initial-scale=1.0" />
    <title>Web Page</title>
    <link
      rel="stylesheet"
      href="{{url_for('static',filename='css/web.css')}}"
    />
    <style>
      input[type="text"] {
        width: 100%;
        border: 2px solid #aaa;
        border-radius: 4px;
        margin: 8px 0;
        outline: none;
        padding: 8px;
        box-sizing: border-box;
        transition: 3s;
      }
      input[type="text"]:focus {
        border-color: purple;
        box-shadow: 0 0 8px 0 purple;
      }
    </style>
```

Web Page - CSS


```

* {
  margin: 0;
  padding: 0;
  text-decoration: none;
  list-style: none;
}
body {
  font-family: "poppins", sans-serif;
}
.homepage {
  min-height: 100vh;
  width: 100%;
  position: relative;
  background: linear-gradient(rgba(0, 0, 0, 0.8), rgba(0, 0, 0, 0.8)),
    url(1.jpg);
  background-size: cover;
  background-position: center;
  z-index: 1;
}
.homepage::after {
  content: "";
  position: absolute;
  left: 0;
  top: 0;
  height: 100%;
  width: 100%;
  background-color: rgba(34, 33, 33);
  opacity: 0.3;
  z-index: -2;
}
.navbar {
  position: absolute;
  padding: 40px 40px;
  display: flex;
  justify-content: space-between;
  width: 100%;
  box-sizing: border-box;
}

```

Github Project Link: <https://github.com/IBM-EPBL/IBM-Project-6934-1658843459>

Project Demo

Link: https://drive.google.com/drive/folders/1Qlq2mmC1XJ_7slnsAuRoW5yLOIM6sR0N?usp=sharing