# PROJECT DOCUMENTATION REPORT

## 1 INTRODUCTION:

## 1.1 PROJECT OVERVIEW:

This doucment is provided as a report for the project **Crude Oil Price Prediction.** 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.

## 1.2. PURPOSE:

The purpose of this document is to provide a clear cut view of the project undertaken and produce a neat and greater understanding of the project.

## 2. LITERATURE SURVEY:

## 2.1 EXISTING PROBLEM:

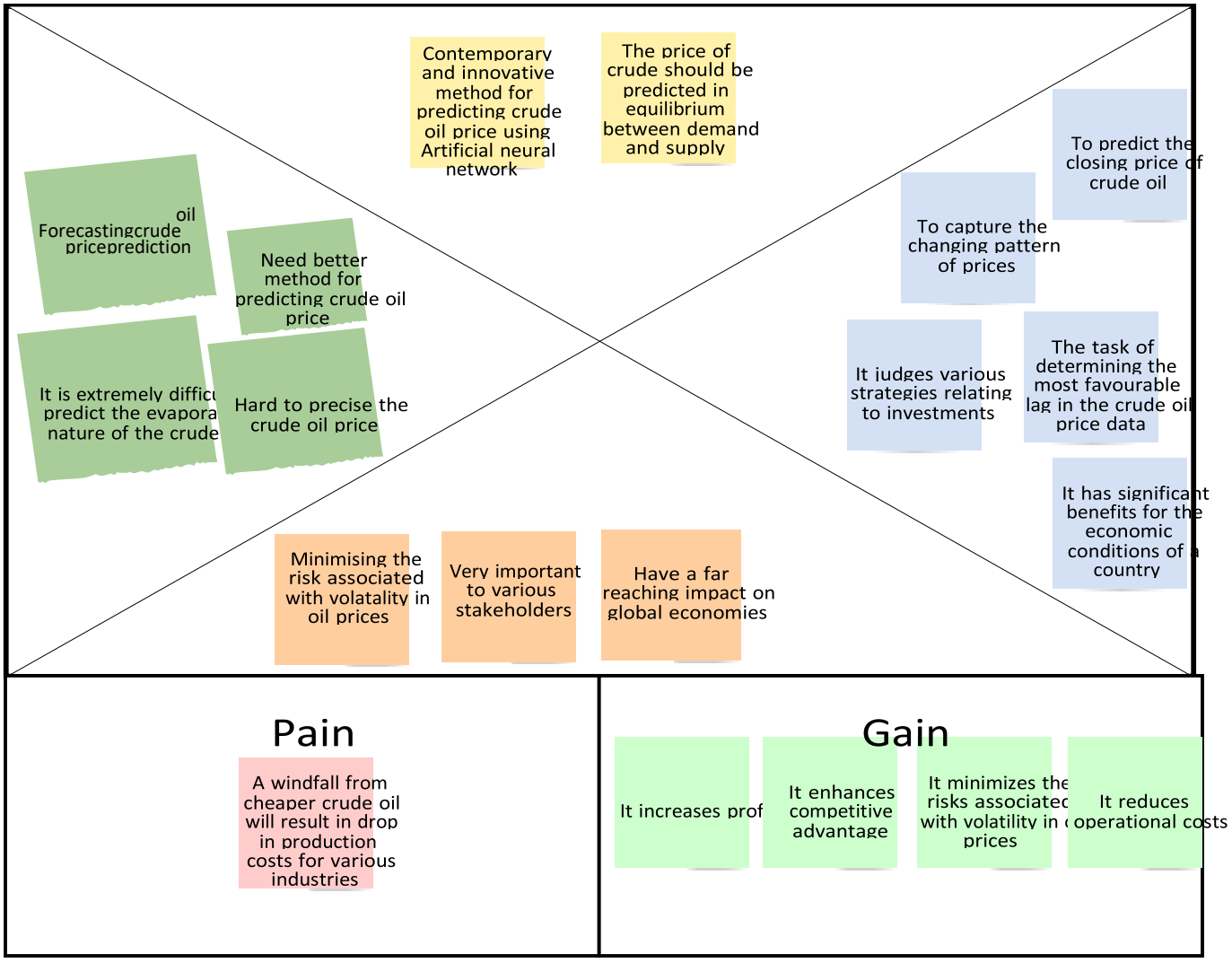
One of the most significant commodities in the world, crude oil is responsible for one-third of the world's energy use. It serves as the foundation for the majority of the items we use on a daily basis, ranging from plastics to transportation fuels. Since changes in the price of crude oil have a significant impact on national economies around the world, price forecasting can help reduce the risks brought on by oil price volatility. For a variety of stakeholders, including governments, public and private organisations, policymakers, and investors, price projections are crucial.

## 2.2 PROBELM STATEMENT DEFINITION:

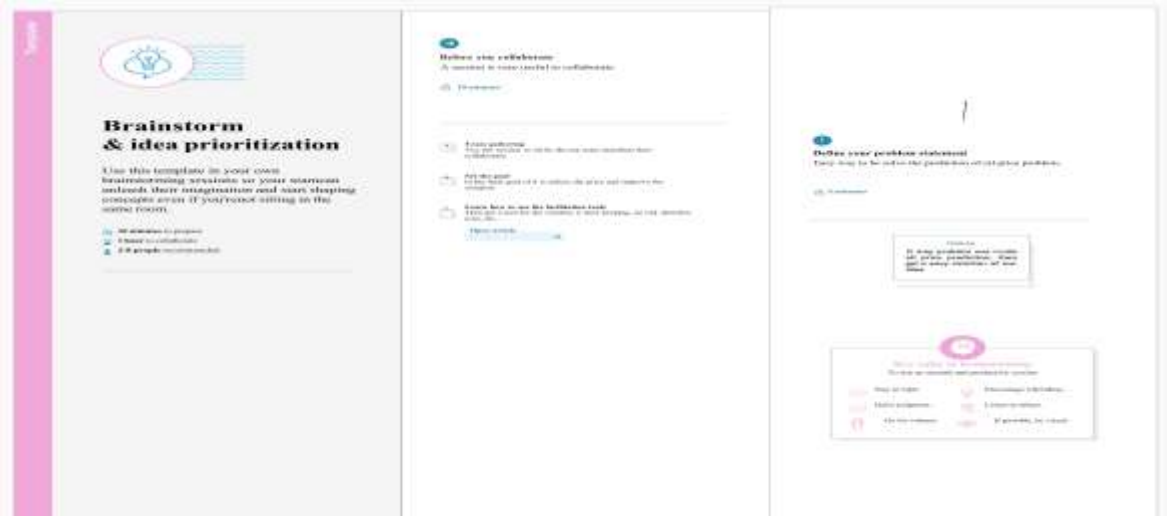
It is required to forecast CRUDE OIL PRICE in international market. The input and output should also be shown as charts and/or dashboards in various formats (like day, week, work-week, month, quarter, year, etc.). The models should be built with comprehensive explanation of data (using EDA), trend analysis, assumptions, data cleaning and validation, data augmentation (if required). Performance of various models need to be clearly evaluated and best model needs to be recommended based on some robust evaluation criteria e.g. AIC (Akaike information criterion), Accuracy, RMSE, MSE etc.

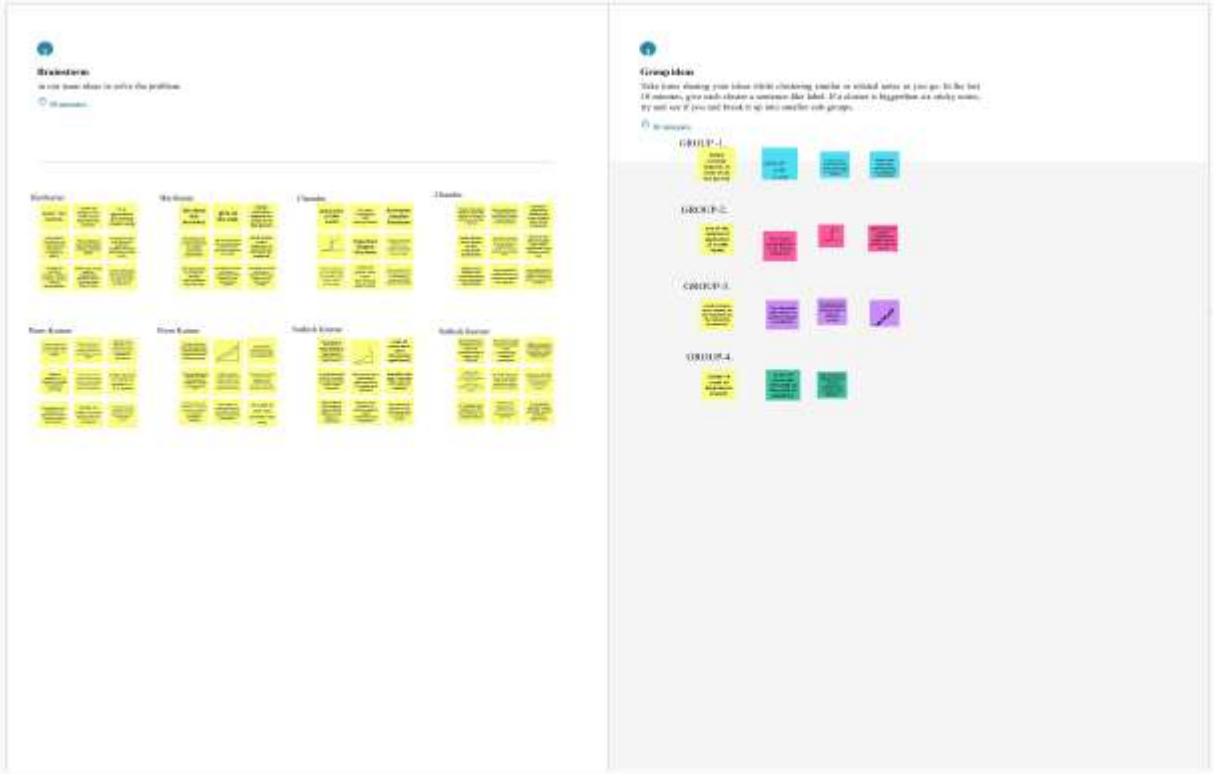
## 3 IDEATION & PROPOSED SOLUTION:

## 3.1 EMPATHY MAPS:



## 3.2 BRAINSTORMING:



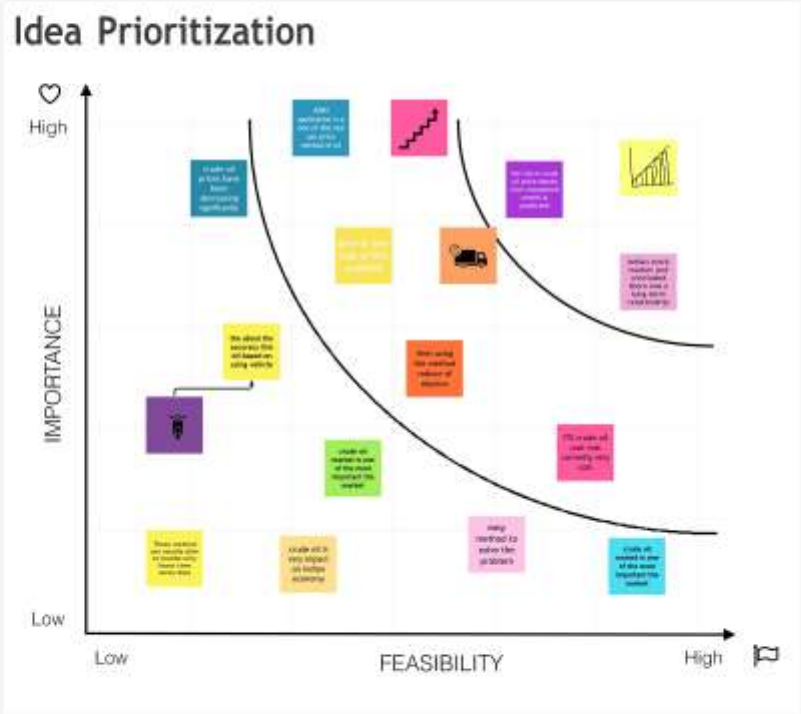



4

**Prioritize**

In the grid of our ideas is move to a prioritize it should be solve in the problem.

20 minutes




**Importance**

in the important ofthe problem was should be improvethe solution.

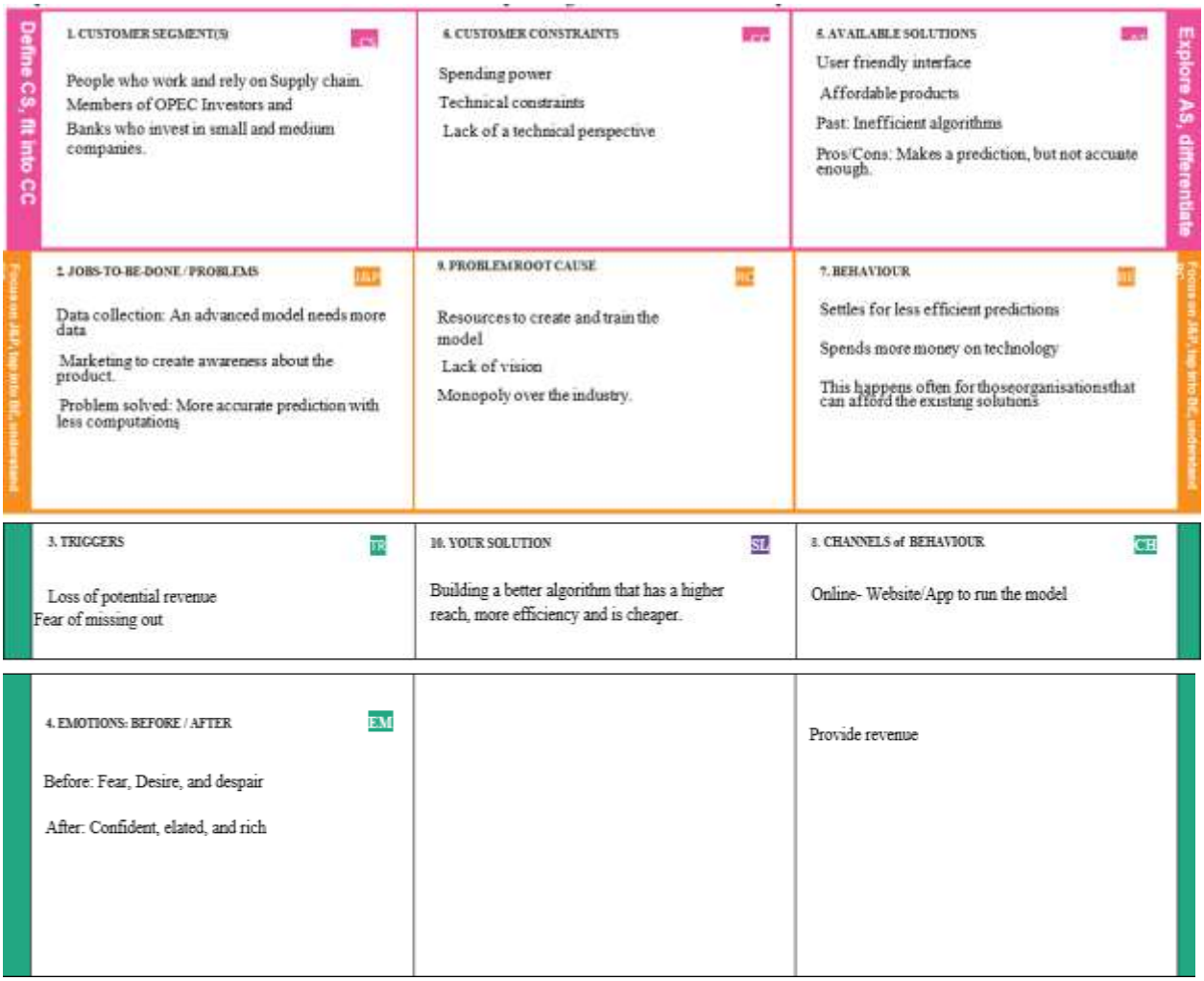
**Feasibility**

Regardless of their importance, they keep the correct time ,then as a no risks of the problem , then using only low cost.

## 3.3 PROPOSED SOLUTION:

| SI.NO | Parameter | Description |
|---|---|---|
| 01 | Problem Statement (Problem to be Solved) | To help the investors, public and private organizations to find a way to predict the crude oil price so that they can understand the oscillations 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. |
| 02 | 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 changes concerning the other commodities. |
| 03 | Novelty / Uniqueness | We divide crude oil price forecasting approaches into three categories: (1) heuristic approaches; (2) econometric models; and (3) machine learning techniques.<br>Heuristic approaches for oil price prediction include professional and survey forecasts, based on professional knowledge, judgments, opinion and intuition.<br>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. |
| 04 | Social Impact / Customer Satisfaction | As crude oil is a major source of fuel, predicting its price would provide 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 can anticipate it and take the action accordingly, they would be able to overcome the issues during critical situations. |
| 05 | Business Model (Revenue Model) | The stakeholders involved are governmental and private organisations who can get themselves prepared from unpredictable situations by finding a solution for this problem statement |
| 06 | Scalability of the Solution | To improve the precision of the solution we need to include more factors which are either affecting directly or indirectly the price of the crude oil. |

## 3.4 PROBLEM SOLUTION FIT:



## 4 REQUIREMENT ANALYSIS:

## 4.1 FUNCTIONAL REQUIREMENT:

| FR No. | Functional Requirements (Epic) | Sub Requirement (Story/Sub-Task) |
|---|---|---|
| FR-1 | User Application | User Direct Open with Google Play Store App<br>User Can Download the Crude Oil Price |
| FR-2 | User Products Available | User Using the Application<br>There Are So Many Products in Crude Oil Price App<br>User Update the Energy and Oil Price Instant the Application |
| FR-3 | User Additional Features | User Can Read Latest News and View Oil Price Charts<br>User View Major Energy Quotes<br>User Can Using a Multiple Color Theme |
| FR-4 | User Exception | User Can Exchange Rates and Currency Converter |

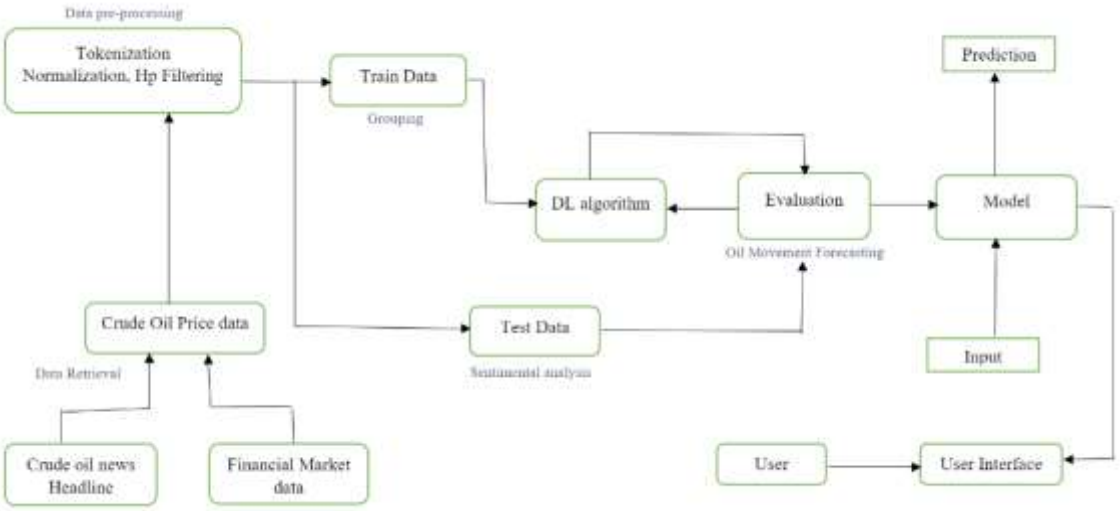
### Non -Functional Requirements:

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

| FR NO. | Non -Functional Requirement | Description |
|---|---|---|
| FR-1 | Usability | Used to improve to the Accuracy of crude oil price prediction |
| FR-2 | Security | In the rising oil price can even shift economically/political power from oil importers to oil exporters communications will be secured |
| FR-3 | Reliability | Reliability of the pointing towards high-risk components |
| FR-4 | Performance | Performance of the this project is to improve to the accuracy of crude oil price prediction |
| FR-5 | Availability | The Availability Solution is More Benefit for and the exporters in the crude oil price prediction |
| FR-6 | Scalability | The scalability are 90%-95% |

# 5 PROJECT DESIGN

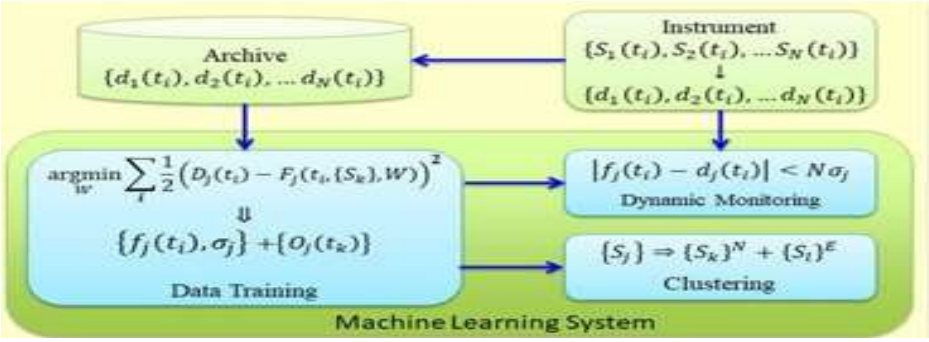
## 5.1 DATA FLOW DIAGRAM:




## 5.2 SOLUTION AND TECHNICAL ARCHITECTURE:

### Context View

This view gives a high level representation of the system, the different user types and interactions with external entities. It describes the boundaries of the solution.



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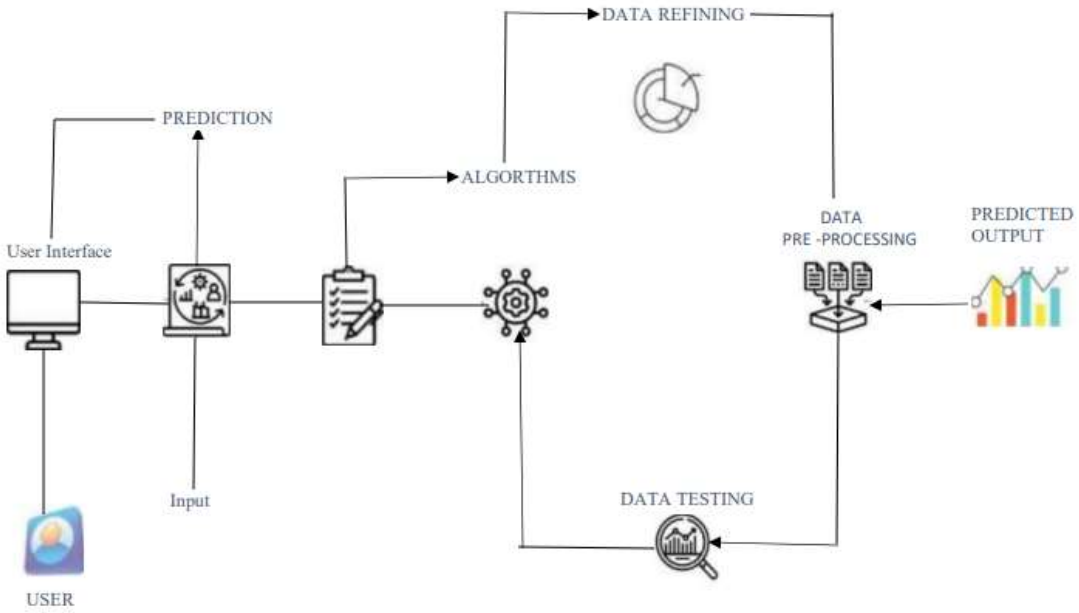
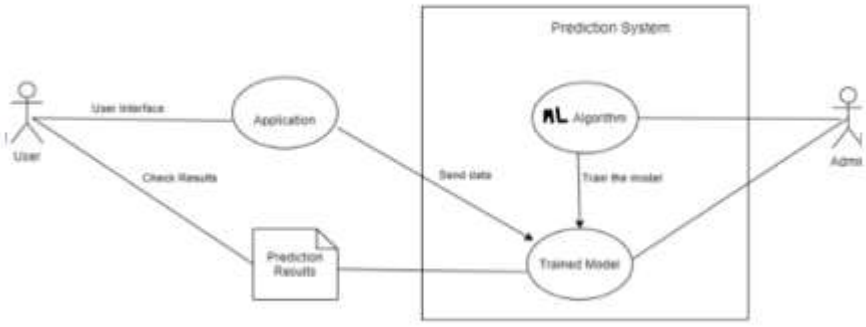


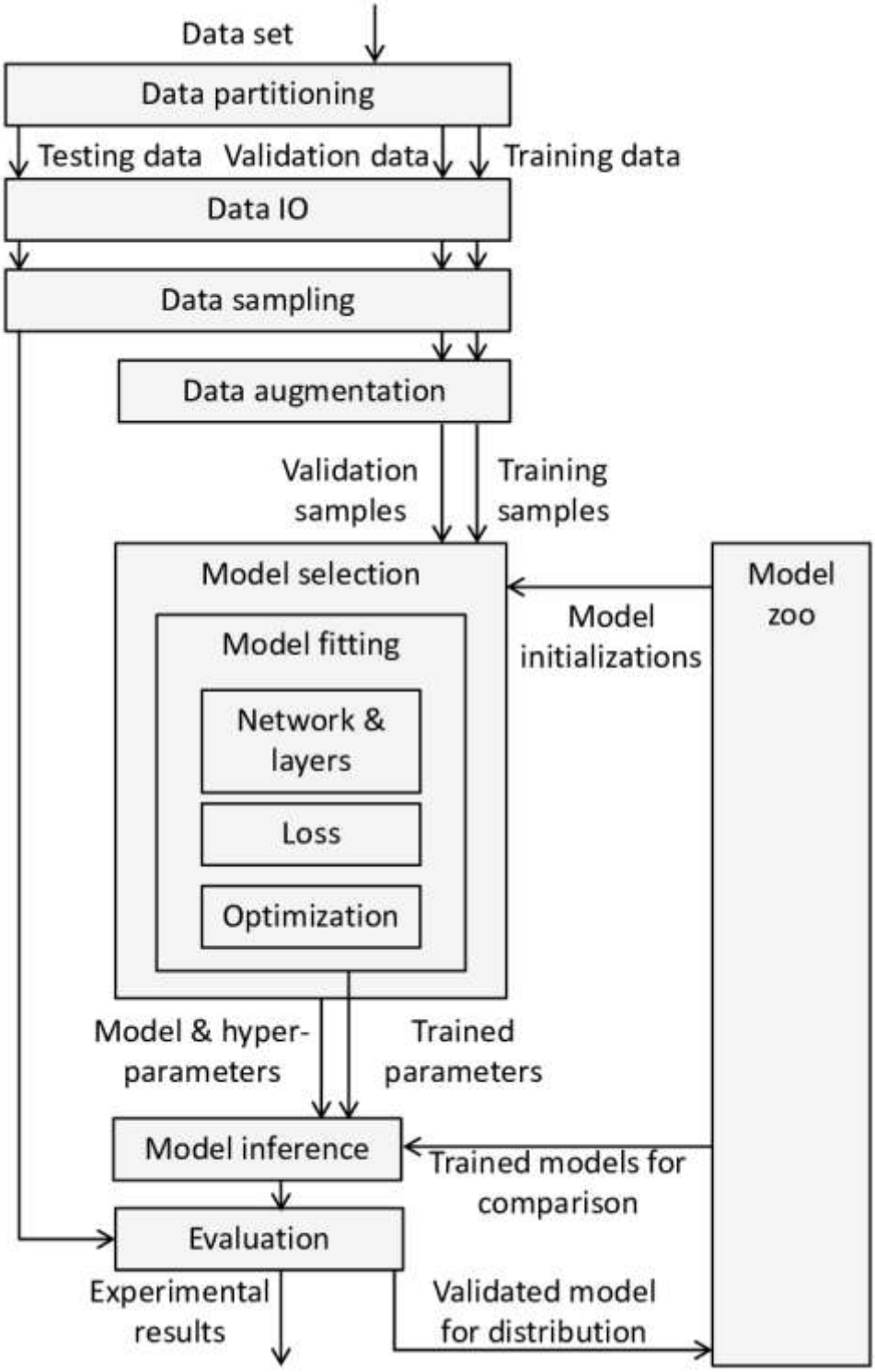

## Functional View

This section describes the key functional areas of the project. The goal is to provide context around the architecture – all software performs some functionality and the definition of this functional scope is a very important factor to define the architecture.



**Process View**

The intent of the process view is to show how the various processing steps within the system fit together to implement the overall functional requirements. This is necessary if the system relies on workflow processes, forked or parallel processing mechanisms. The following processes are significant:



## Non Functional View

This section describes architecturally significant changes that enable the solution to achieve the agreed non-functional requirements (NFRs). Each change is mapped to the corresponding NFR category, which is based on the ISO/IEC 25010-2011 product quality model.

NFRs are documented and maintained in the Non Functional Requirements Definition and will not be repeated here. In case of duplication, the Non Functional Requirements Definition takes precedence.

Performance Easy tracking of records and updating can be done. All the requirements relating to performance characteristics of the system are specified in the section below. There are two types of requirements.

1.Static Requirements:

These requirements do not impose any constraints on the execution characteristics of the system. They are:

A) Number of Terminals: The software makes use of an underlying database that will reside at the same system, while the front end will be available to the administrative computer.

B) Number of Users: The number of users can be administrator only, but this software can be extended to applications for almost all staff members of the organization.

2. Dynamic Requirements:

These specify constraints on the execution characteristics of the system. They typically include response time and throughout of the system. Since these factors are not applicable to the proposed software, it will suffice if the response tine is high and the transactions are carried out precisely and quickly. Reliability: The software will not be able to connect to the database in the event of the server being down due to a hardware or software failure.

3. Availability:

The software will be available only to administrator of the organization and the product as well as customer details will be recorded by him. He can add customers, update and delete them as well as add new products and manage them.

4. Security:

The security requirements deal with the primary security. The software should be handled only by the administrator and authorized users. Only the administrator has right to create new accounts and generating inventory. Only authorized users can access the system with username and password of administrator

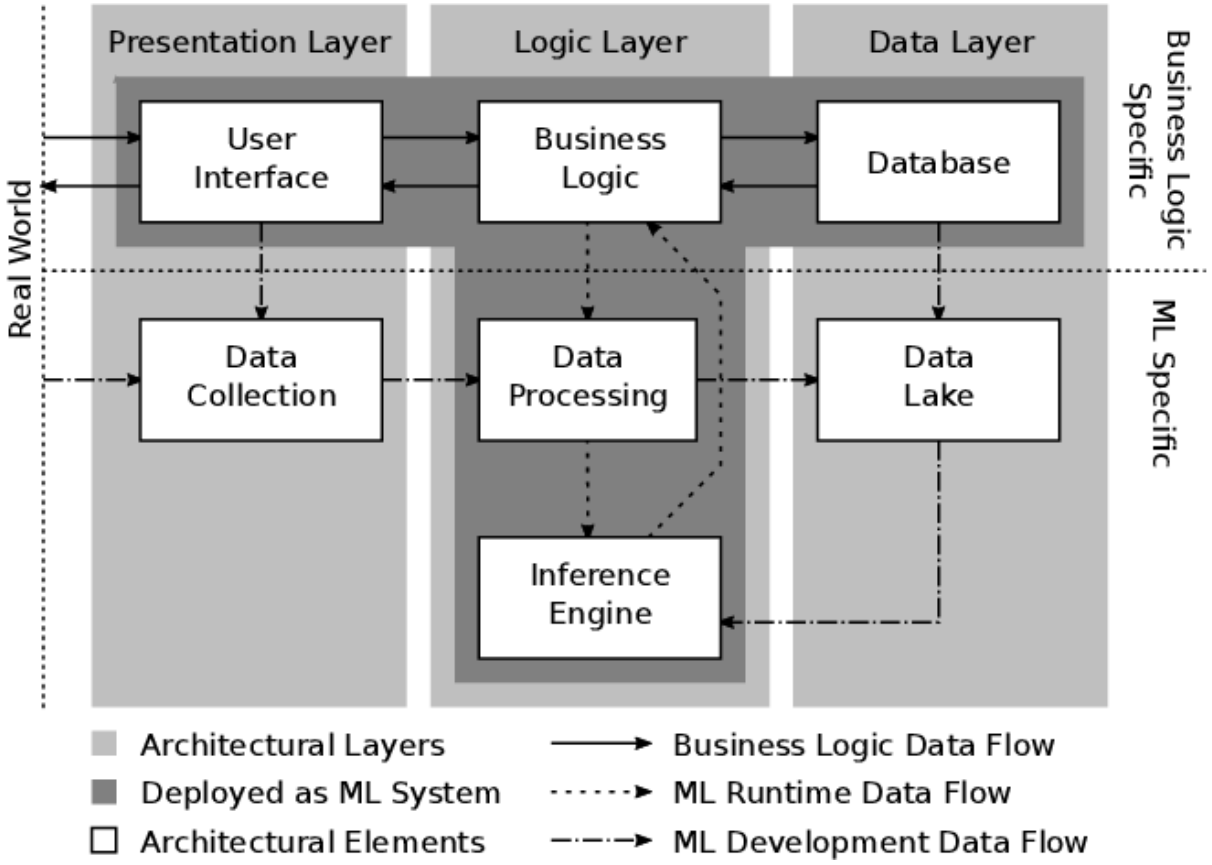
5. Maintainability:

Backups for database are available.

6. Portability:

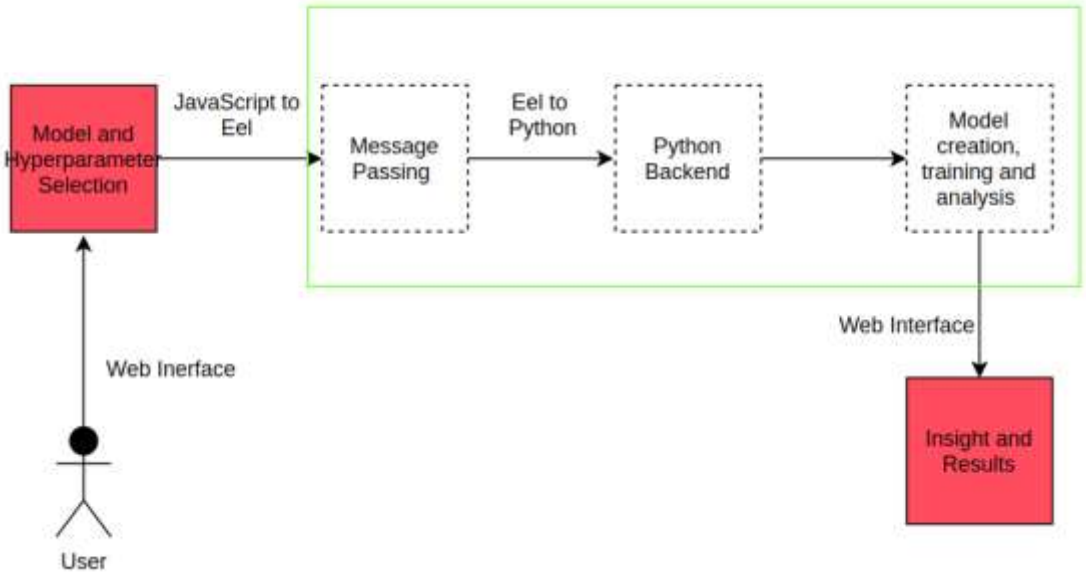
The Software is a web-based application and is built in Python and Nosql so it is platform independent and is independent of operating system.

**Logical View**



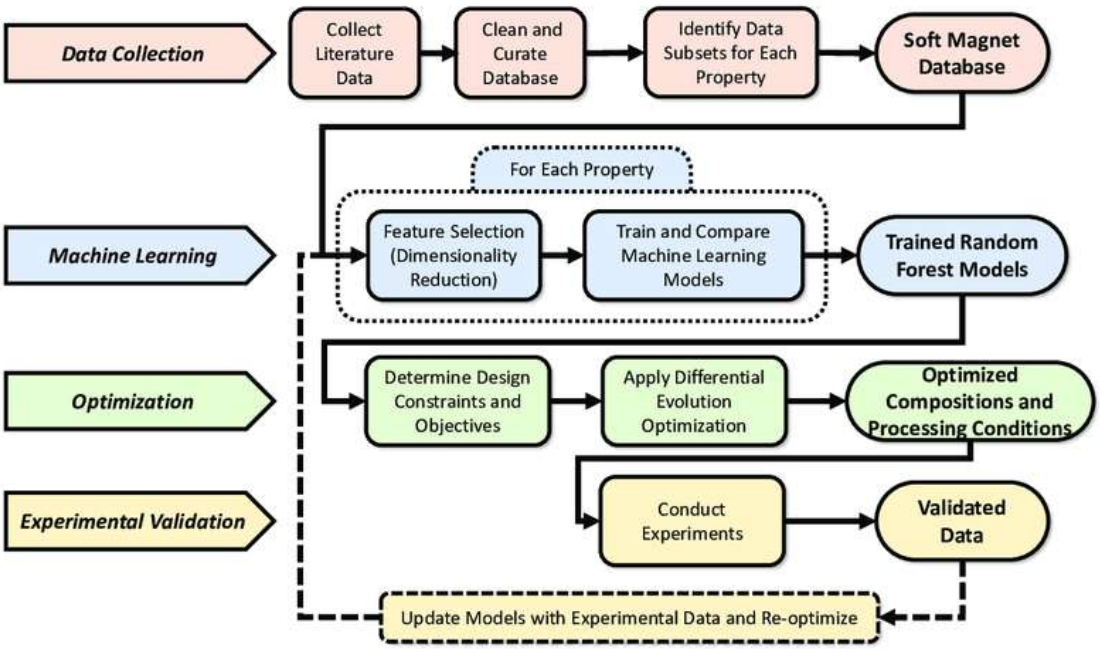

# Interface View

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

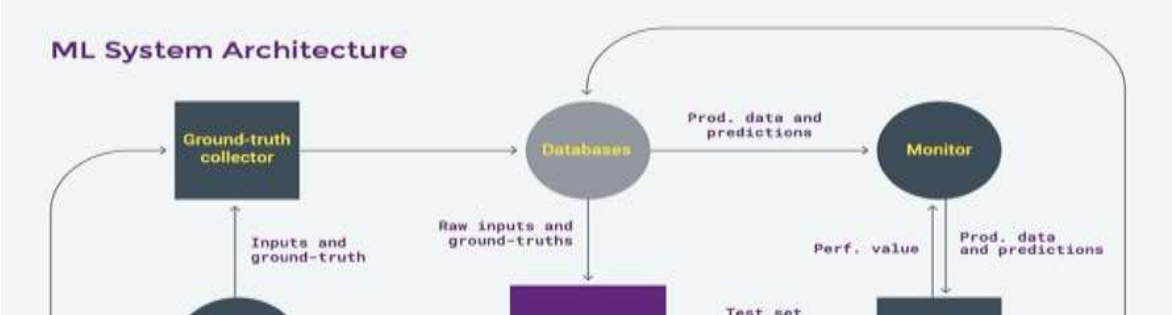



## Design View

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

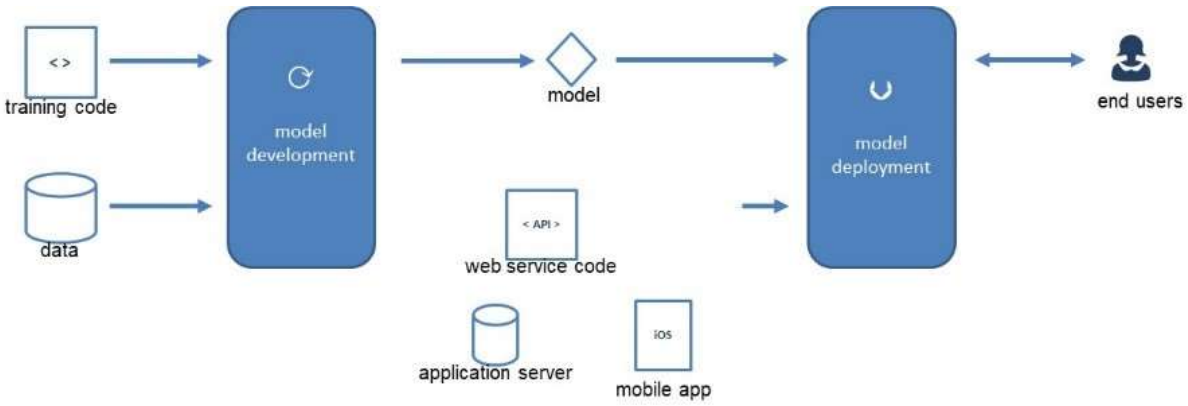



## Physical View



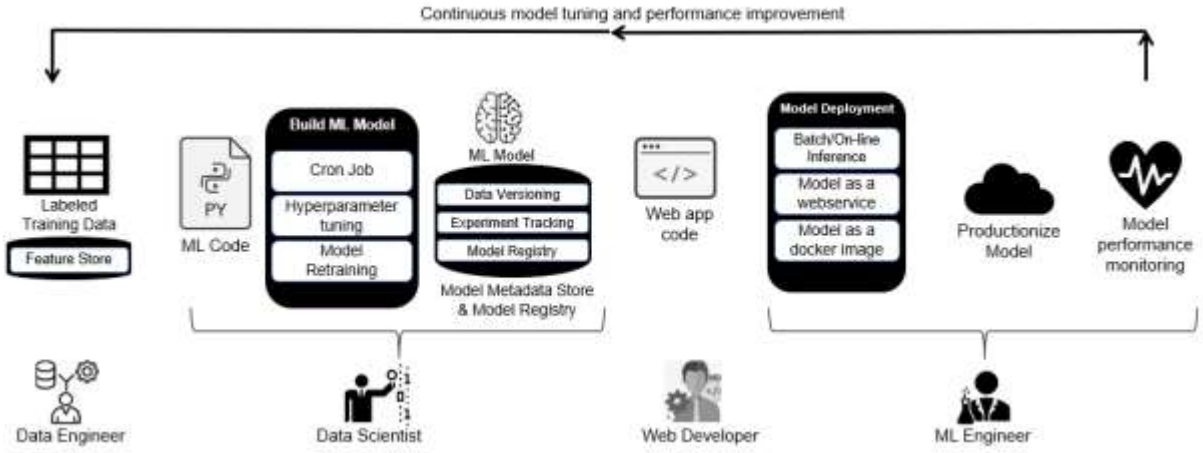
## Deployment View

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



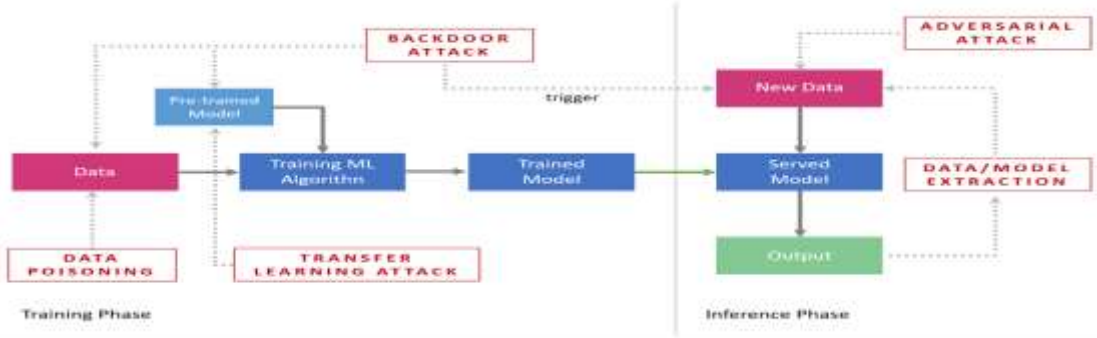

## Operational View

This section describes how the architecture will support operational processes and activities.



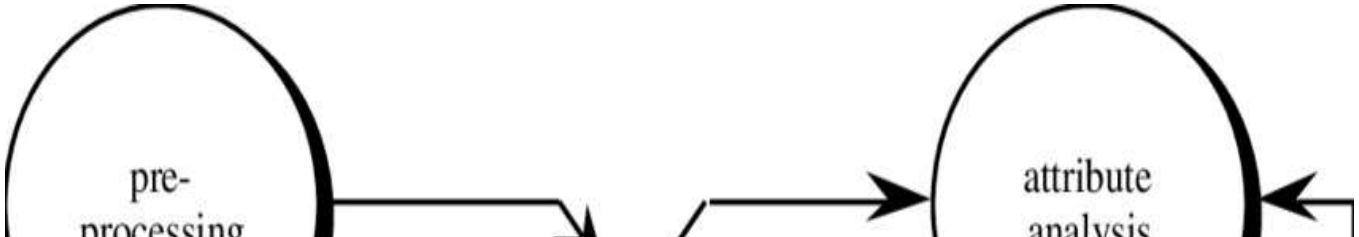

## Security View

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




## Data View

This section describes the important data model changes required to fulfil the requirements and the associated data flows.



## 5.3 USER STORIES:

| USER TYPE | FUNCTIONAL REQUIREMENT | USER STORY | USER STORY / TASK | ACCEPTANCE CRITERIA | PRIORITY | RELEASE |
|---|---|---|---|---|---|---|

| | | | | | | |
|---|---|---|---|---|---|---|
| Customer | Registration | 1 | Register for the Application through different vendors. | I can access my account / dashboard | High | Sprint-3 |
| | Confirmation | 2 | Receiving Confirmation Mail | I can receive confirmation email & click confirm | High | Sprint-4 |
| | Login | 3 | Log in into the application | Access to the account | High | Sprint-2 |
| | Enquiry | 4 | Enter the range of dates | Plausible Rnage | High | Sprint-1 |
| | Visualize | 5 | Visualize the Trend | Accuracy Check | High | Sprint-3 |
| | Endowment | 6 | See the result | Prediction Check | High | Sprint-1 |
| | Utilizatiojn | 7 | Log Out | Confirmation and Session Closure | High | Sprint-2 |
| | | | | | | |
| Administrator | Authroity | 1 | Verify the imbalances | Session Dryness | High | Sprint-3 |

## 6 PROJECT PLANNING AND SCHEDULING:

### 6.1 SPRINT PLANNING AND 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. | 2 | High | S. Premkumar |
| Sprint-1 | | USN-2 | Data Pre-processing. | 1 | High | R. Sathish Kumar |
| Sprint-2 | Model Building | USN-3 | Prepare the model by importing the necessary libraries, adding the layers, and compiling it. | 2 | Low | E. Chandru |
| Sprint-2 | | USN-4 | The data classification model is trained using RNNs and other systems. | 2 | Medium | S. Hariharan |
| Sprint-3 | Training and Testing | USN-5 | Testing the model's performance and training it | 5 | High | E. Chandru |
| Sprint-4 | | USN-6 | Deploy the model in the IBM cloud and build the system | 5 | High | S. Hariharan |

## 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 | 20 | 6 Days | 24 Oct 2022 | 29 Oct 2022 | 20 | 29 Oct 2022 |
| Sprint-2 | 20 | 6 Days | 31 Oct 2022 | 05 Nov 2022 | 20 | 05 Nov 2022 |
| Sprint-3 | 20 | 6 Days | 07 Nov 2022 | 12 Nov 2022 | 20 | 12 Nov 2022 |
| Sprint-4 | 20 | 6 Days | 14 Nov 2022 | 19 Nov 2022 | 20 | 19 Nov 2022 |

***1 . CODING & SOLUTIONING (Explain the features added in the project along with code)***

1. *A LSTM Price forecasting machine learning model*
2. *A User Interface for forecasting based on the past 10 days price*

***2. TESTING***

1. *Test Cases*
2. *User Acceptance Testing*

***3. RESULTS***

1. *Performance Metrics – RMSE – 2.78*

***4. ADVANTAGES & DISADVANTAGES***

*The model is able to forecasting the price accurately based on the past 10 days data.*
*But whenever the commodity is affected by external factors which are caused naturally then the predictions are bad. This cannot be predicted by machine learning model*

***5. CONCLUSION***

*Therefore the ml was deployed as a web app and the user interface is handy for stakeholders who do not have much knowledge in programming. The predicted value is displayed in the user interface.*

***6. FUTURE SCOPE***

*The machine learning model can be improved by converting it from univariate to multi variate model for better understanding the price value. This can result in a great boost in the prediction accuracy.*