Fuel Stock Recommender System

CS 4200/ITX 3010 Senior Project 2 (1/2022)

Introduction

The oil and gas industry plays an important role in the world's Gross Domestic Product by providing energy resources to the world.

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Problem

Wet Stock Management

Stock Checking

Human Error

Complexity of ordering

Problem

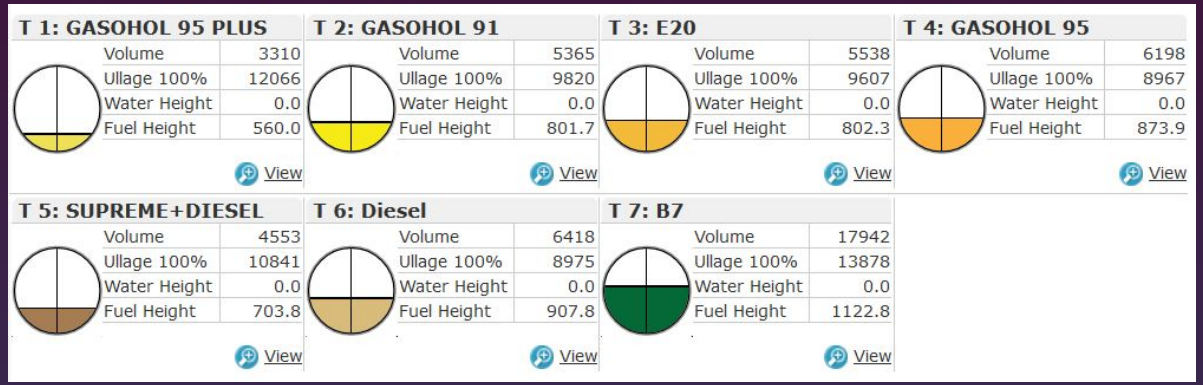
Ordering is not easy

- Minimum total must be equal or more than 22,000 liters.
- Truck compartment container standard 44,000 liter
- Must order one large tank at 9,000 -10,000 liters

Problem

Stock Checking

- Check fuel and gasoline stock every morning.
- There is no automated reporting, or notifications
- The tank capacity is 100% maximum, but it can actually be reduced to only 90% legally based on the law in Thailand.



T 1: GASOHOL 95 PLUS	
Volume	3310
Ullage 100%	12066
Water Height	0.0
Fuel Height	560.0

View

T 2: GASOHOL 91	
Volume	5365
Ullage 100%	9820
Water Height	0.0
Fuel Height	801.7

View

T 3: E20	
Volume	5538
Ullage 100%	9607
Water Height	0.0
Fuel Height	802.3

View

T 4: GASOHOL 95	
Volume	6198
Ullage 100%	8967
Water Height	0.0
Fuel Height	873.9

View

T 5: SUPREME+DIESEL	
Volume	4553
Ullage 100%	10841
Water Height	0.0
Fuel Height	703.8

View

T 6: Diesel	
Volume	6418
Ullage 100%	8975
Water Height	0.0
Fuel Height	907.8

View

T 7: B7	
Volume	17942
Ullage 100%	13878
Water Height	0.0
Fuel Height	1122.8

View

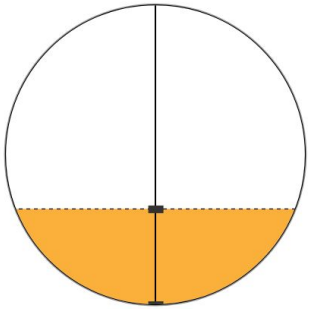
Problem

Human Error

- Minimum Requirement Ullage.
- Calculate Fuel Stock Manually
- Misunderstand the name or brand of similar fuel

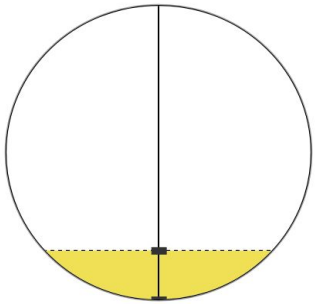
Problem

- For example, Gasohol 95 and Gasohol 95 Plus as shown below ordered the wrong product for 9000 liters. In spite of selling an average of 200 liters per day due to fuel premium grade it takes up to 2 months to drain the stock this causes damage to the price. Price continuously decreased 0.60 3 days total 1.80
  Sell 200L/day 3 day = 600L, Profit reduce 1080 Baht



Tank 4: GASOHOL 95

Volume	5074 lit
Ullage 100%	10091 lit
Ullage 90%	8574 lit
Height	750.0 mm
Water Volume	0 lit
Water Height	0.0 mm
Temperature	31.2 °C
Alarms / Warnings	
Maximum Product	15665 lit
High Product	95 %
Overfill	90 %
Delivery Needed	0 %
Low Product	1500 lit
High Water Warning	21.0 mm
High Water Alarm	21.0 mm
Tank Setup	
Capacity	0 lit
Diameter	2140.0 mm



Tank 1: GASOHOL 95 PLUS

Volume	2733 lit
Ullage 100%	12643 lit
Ullage 90%	11105 lit
Height	489.0 mm
Water Volume	0 lit
Water Height	0.0 mm
Temperature	32.2 °C
Alarms / Warnings	
Maximum Product	15875 lit
High Product	95 %
Overfill	90 %
Delivery Needed	0 %
Low Product	1500 lit
High Water Warning	21.0 mm
High Water Alarm	21.0 mm
Tank Setup	
Capacity	0 lit
Diameter	2140.0 mm

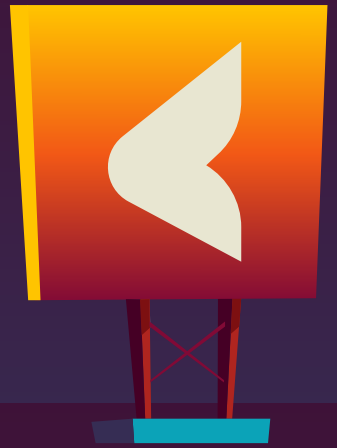
Problem

Complexity of Ordering

- Relevant people or family members cannot order instead.

02

Related Work



Route Recommendation using Real-time Fuel Prices

A navigation recommendation system that saves fuel costs by suggesting the cheapest gas stations along a route

Expert System in Inventory Management

The Expert System in Inventory Management is use to help people inventory then ask user a series of question to determine the assumption. Then proceed with the model to recommend the users.

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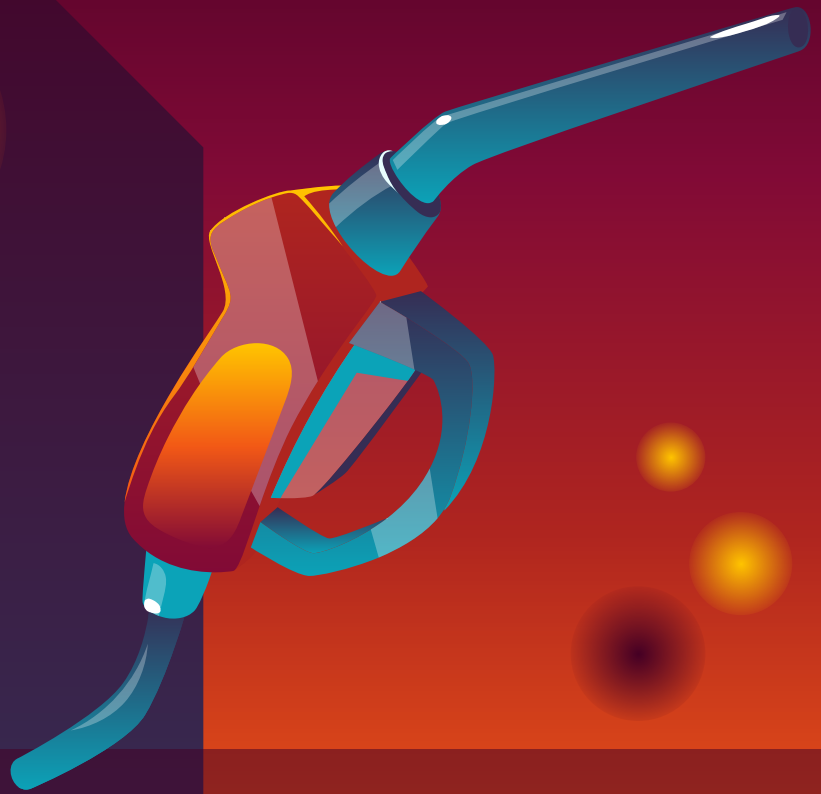
Methodology



Methodology

- Rule-based system
- Reduce Expenses
- Remaining and predict stock order

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Functional Requirements

Stakeholders

Service Station Operator

Main Functionalities

Tank Volume

users can ask to view the daily amount of fuel

Most out of tank

Users are able to see how many days left of fuel will be out of tanks.

Best Seller

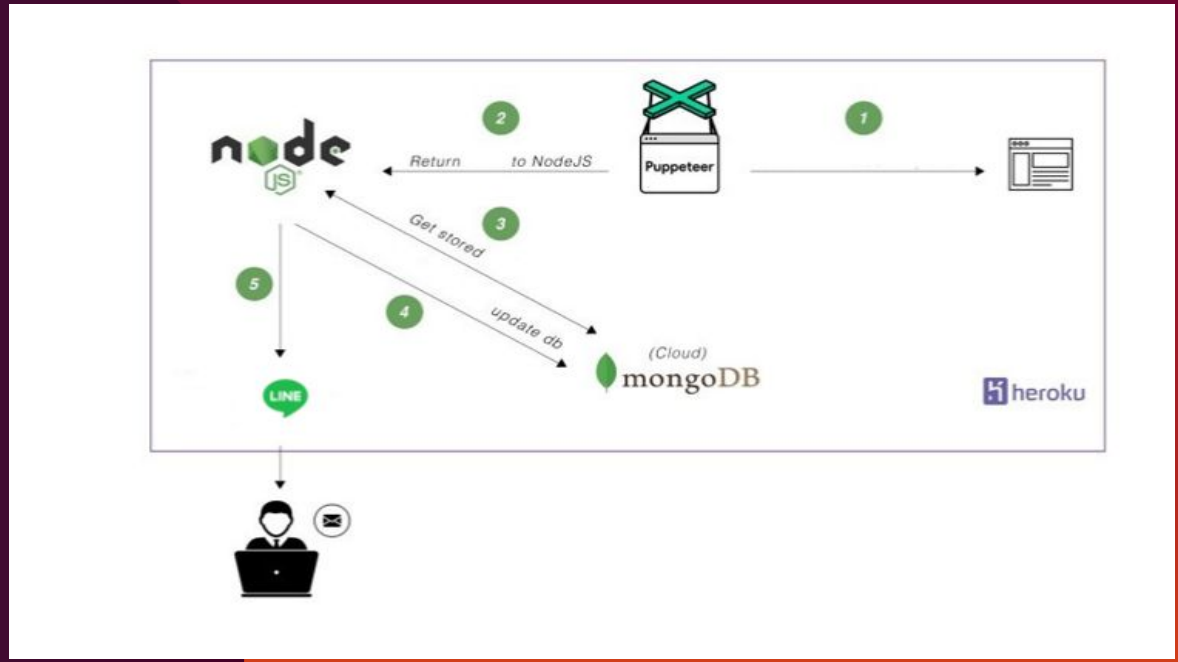
Users can also see the average sales per day of fuel in each tank.

Suggestion

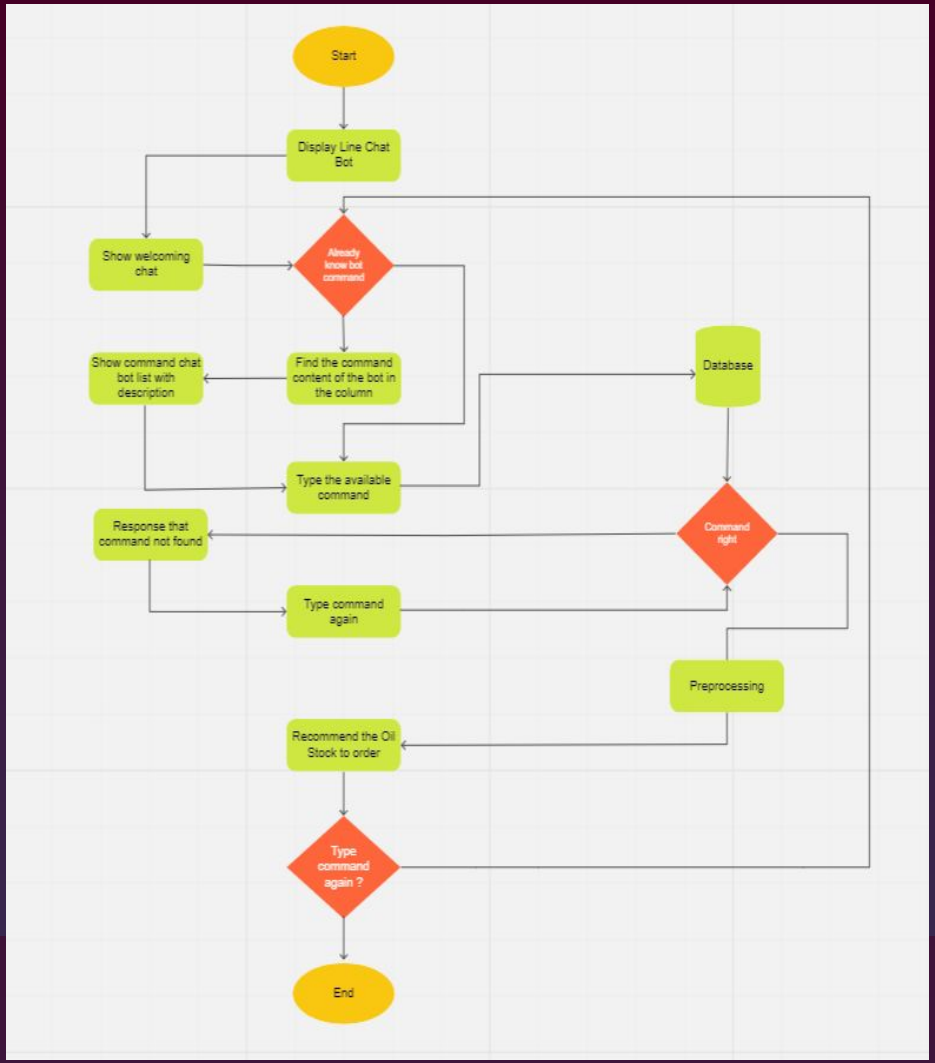
Recommend the fuel order for the service station which tank and how much amount of fuel should be ordered.

System Architecture

we use puppeteer to scrape and generate data from the veeder-root web interface. It will automatically open a Firefox browser instance, open a new page in the browser and navigate to the website.



Workflow


Start
Display Line Chat Bot
Show welcoming chat
Already know bot command
Show command chat bot list with description
Find the command content of the bot in the column
Database
Type the available command
Response that command not found
Command right
Type command again
Preprocessing
Recommend the Oil Stock to order
Type command again ?
End

Tech Stack

Node JS

Puppeteer

MongoDB

Heroku

Express.js

Line Chat Bot

Rule based

Rule based

T1 T2 T3 T4 T5 T6 T7

Take more 4 days to out of tank, not need to order

Less than 4 days ,must to order

Mare than 4 days but volumn < 1900L, must to order

T1 T2 T3 T4 T5 T6 T7

Rule based

T1	T2	T6	T7
200L / day	2600 L/day	3200L / day	6800L /day

Rule based

Total order = 23000

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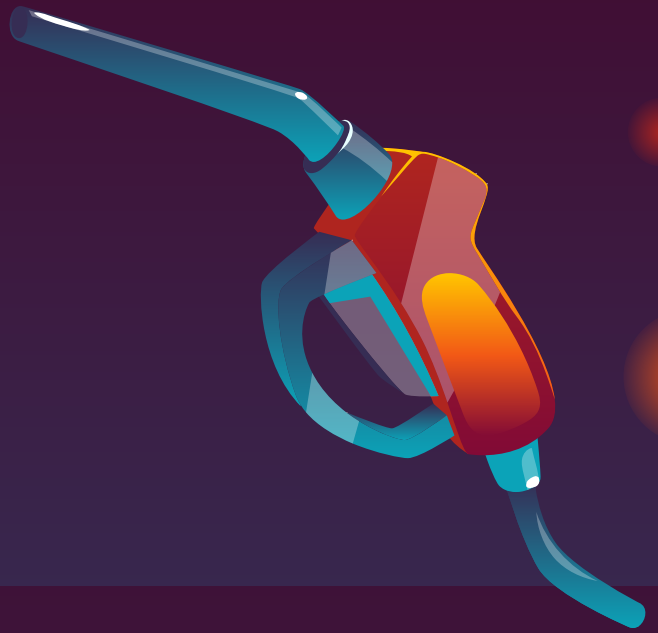
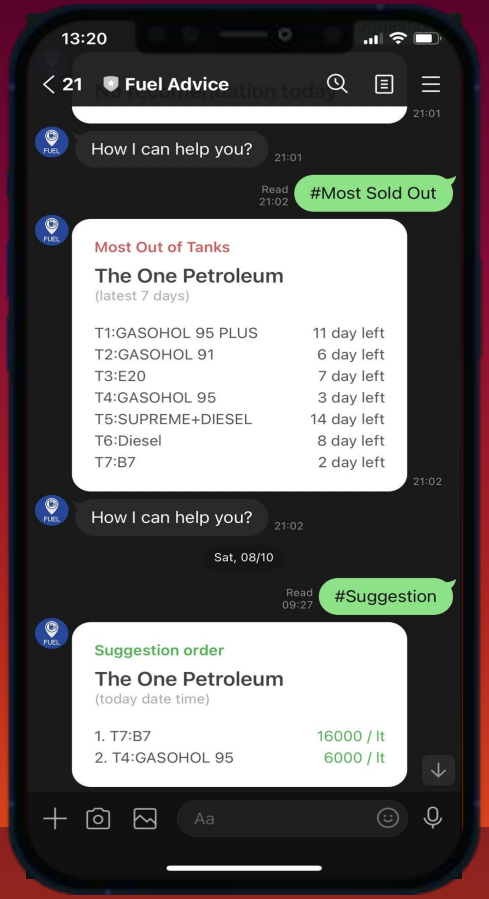
Results

Sample Case

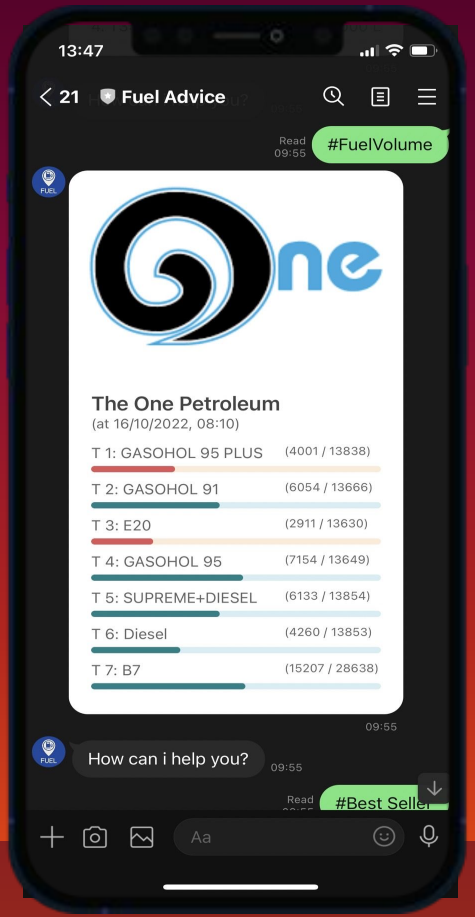
Fuel Advice





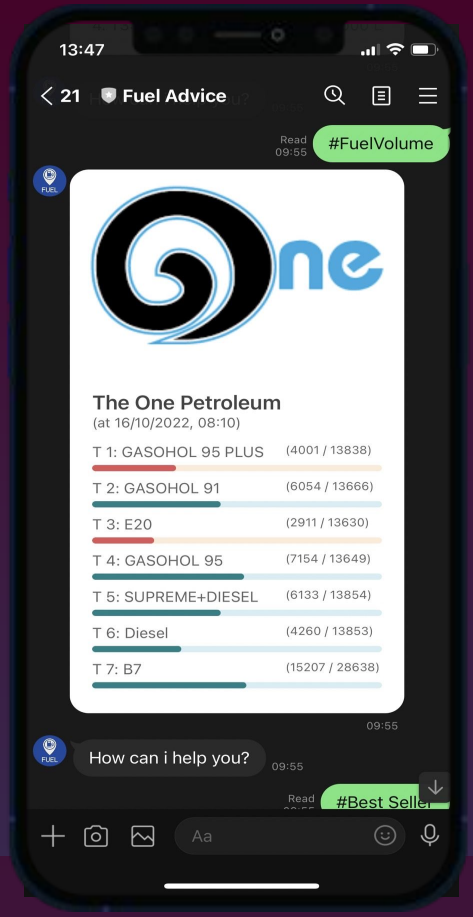
Sample Case 1

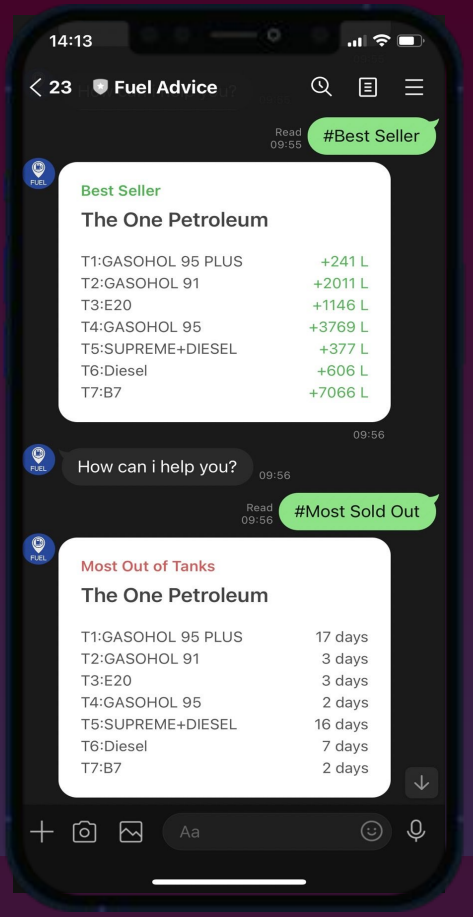
Most out of tanks show the day running out of fuel by showing the number of days. Based on the condition if one of the tanks with days remaining less than 4 days or equal to 4 days it will be taken into consideration to suggest the order as you can see in the suggestion part.

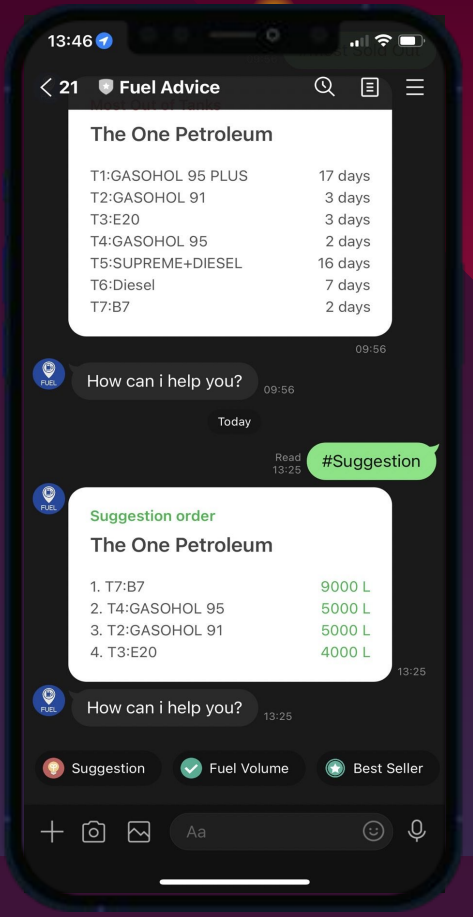


Sample Case 2

There are 7 tank divided into Gasohol 95 Plus, Gasohol 91, E20, Gasohol 95, Supreme+Diesel, and B7 show the current fuel left in the tank capacity.


13:47
21
Fuel Advice
Read 09:55
#FuelVolume
The One Petroleum
(at 16/10/2022, 08:10)
T 1: GASOHOL 95 PLUS (4001 / 13838)
T 2: GASOHOL 91 (6054 / 13666)
T 3: E20 (2911 / 13630)
T 4: GASOHOL 95 (7154 / 13649)
T 5: SUPREME+DIESEL (6133 / 13854)
T 6: Diesel (4260 / 13853)
T 7: B7 (15207 / 28638)
09:55
How can i help you?
09:55
Aa


14:13
23
Fuel Advice
Read 09:55
#Best Seller
Best Seller
The One Petroleum
T1:GASOHOL 95 PLUS +241 L
T2:GASOHOL 91 +2011 L
T3:E20 +1146 L
T4:GASOHOL 95 +3769 L
T5:SUPREME+DIESEL +377 L
T6:Diesel +606 L
T7:B7 +7066 L
09:56
How can i help you?
09:56
Read 09:56
#Most Sold Out
Most Out of Tanks
The One Petroleum
T1:GASOHOL 95 PLUS 17 days
T2:GASOHOL 91 3 days
T3:E20 3 days
T4:GASOHOL 95 2 days
T5:SUPREME+DIESEL 16 days
T6:Diesel 7 days
T7:B7 2 days
Aa


13:46
21
Fuel Advice
The One Petroleum
T1:GASOHOL 95 PLUS 17 days
T2:GASOHOL 91 3 days
T3:E20 3 days
T4:GASOHOL 95 2 days
T5:SUPREME+DIESEL 16 days
T6:Diesel 7 days
T7:B7 2 days
09:56
How can i help you?
09:56
Today
Read 13:25
#Suggestion
Suggestion order
The One Petroleum
1. T7:B7 9000 L
2. T4:GASOHOL 95 5000 L
3. T2:GASOHOL 91 5000 L
4. T3:E20 4000 L
13:25
How can i help you?
13:25
Suggestion
Fuel Volume
Best Seller
Aa

Back Test Results

Accuracy

Back test 50 days

Evaluation based on:

- If today there is order or not
- If there is order check with the suggestion that the tank type match or not
- Then check if the amount is not much different from the actual order.

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Conclusion

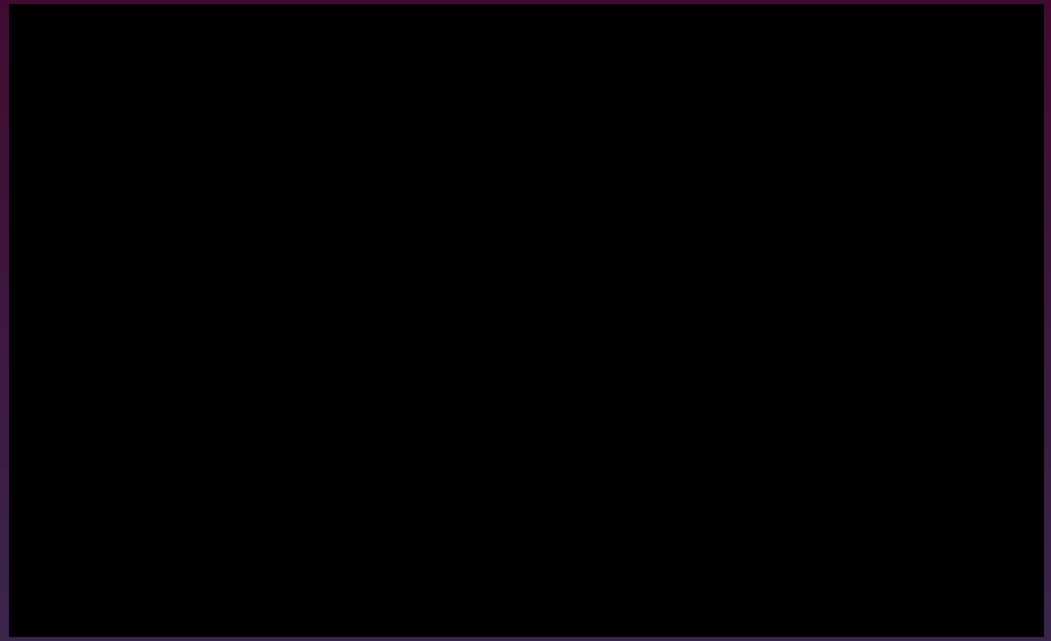
Conclusion

- System not only helps to recommend, user can also see best seller tank and most out of tank
- No concern that the fuel will be less than 10%
- Furthermore, we use a line chat bot which is easy to communicate with users and also cost savings.

Future Work

- In the future, we can increase the accuracy recommendation by trying other algorithms or improve and add more cases for the rule based algorithm.
- Moreover, we can also recommend fuel order based on the fuel market price so that it can help the user to reduce their budget and increase income when ordering fuel.
- Furthermore, we can also try to get the real time volume of fuel in the tanks.

Demo Work



Actual Order

Tank 2: GASOHOL 91					
Start	10/16/22 9:37 PM	4357	0.0	31.7	688.2
End	10/16/22 9:45 PM	10405	0.0	29.2	1347.7
Amount		6048			

T2

Tank 3: E20					
Start	10/16/22 9:18 PM	1783	0.0	31.7	346.6
End	10/16/22 9:25 PM	7819	0.0	28.7	1049.6
Amount		6036			

T3

Start	10/16/22 9:27 PM	3582	0.0	31.8	578.2
End	10/16/22 9:34 PM	9654	0.0	29.4	1246.6
Amount		6072			

T4

Start	10/16/22 9:46 PM	10735	0.0	32.3	744.5
End	10/16/22 10:00 PM	19827	0.0	30.9	1221.7
Amount		9092			

T7

References

Route Recommendation using Real-time Fuel Prices | Devpost

Expert System in Inventory Management

Thanks!

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