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"FASAL GYAAN" - PREDICTING THE BEST-SELLING AND DEMANDING AGRICULTURAL CROP IN STATE

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December, 29, 2022

Abstract

This report is focusing the on the problem of predicting demanding and selling crop in the coming months thereafter finding the best price for the agricultural crops in local (city/district/state) market. My software solution will help to plan their crop culture according to demand rise in near future and in expanding their reach directly to the local companies such as: Food production (Biscuit, Juice, Sauce etc.), Oil production, Medicine, Restaurants, Cosmetics etc. These companies use farm produce as raw materials in their company and are the potential customers of farmers but became the customers of middleman first. This problem can be solved by empowering the farmers by making aware of the market price by understanding the Indian market as well as international market prices on the basis of production and demand trad-off.
This will empower farmer to produce the crop on the basis of demands predicted in the local as well as global market so that he will able to decide what crop he should procure the same and sell his crops by deciding his own suitable price and sell them directly to the companies in any part of the state.

Introduction

Last year we all have witness that Government of India had introduced the three farm bills which were mainly focusing on the solving the same issue of finding the most possible profitable price of farmers production. But it failed the main reason behind that was most of the farmers in our country is not aware of the market and don't want to go through the distress related to it because of fluctuating prices and if farmers were directly exposed to the market, middleman and big companies will eat them up. Therefore, the farmers protested and government had to repeal the laws. Also, sometime the news comes from the different part of the country that farmers are protesting for crop prices drop because of too much production of tomato, dairy produce etc. This happens because the farmer procures those crops which was in demand in the last year.

However, some of the point in the bills were not favoring the farmers but the problem is still the same and it is a genuine problem. In India government provide MSP (Minimum Support Price) which is 1.5 times of the capital required for the production of that crop but it is only for 26 crops which are listed. What about the horticulture crops and sessional fruits and vegetables. So, we have such a big populated country with 263 million out of 1210 million (Census 2011) population is involved in the agricultural activity which is the backbone of our economy. And these horticultural productions are in demand for the food production and packaging companies, cosmetic, medicines, and oil producing companies so the problems is that farmers are facing is to what crop should he procure according to future demand in global as well as local market mostly local market. So that he can plan his best crop culture according to market need. The work I will present here will also help them to video training to use the application also help them to contact their potential customers of different companies, as they will also register with the application. I will also provide the transportation companies to transports the good (refer to website of e-NAM – electronic National Agriculture Market).

To solve this problem and this implement whole system of application. First, I will try to implement this on some part of the country as an experiment in the rural areas. Here to collect the data of the local markets will be a challenging task like to identify the independent variable in which influences our dependent variable, the future cost of the crops. We will need to study every market and analyze them collect the data which small business-like biscuit factories, ice-cream factories, cold drink factories and medicine factories could be a challenging task, we will have to collect data from them since these small businesses are not listed in the market so it could be a tidy task but this will work. Since, the time is changing today everybody has the smart phones even small farmers. This will be successful since there is a problem that most of the local farmers procure their crop on the basic of fluke like in Diwali, they all produce Marygold but since every farmer does this, they do not get much price and if a stock come from neighbor market the price rates get down so our application will suggest farmers of the different places different crop culture suggestion also on the data of the studied market. However, this model implementation will be easy for big farmers.

The objectives of this system will be as follows:

- Suggestion of different crops to different part of country on the basis of demand and production trade off
- Prediction of crop prices in coming months by studying the markets production demand trad off using Machine learning algorithm
- To create an online local market for farmers in different parts of the country for finding the best price
- Awareness about the quality of crops and categorization of different quality of crops and quality check according to international standards to negotiate prices with importing companies and in national market also.
- Easy availability of transportation system in the software.

Initial Needs Statement

Initial needs of the project will include the data collection of the local market we are targeting to make the predictions about and its neighbor markets also since the demand and production trade off of these markets also affect the targeting market. Thereafter the need some information from local MNC mandis and farmer association about gathering in-depth knowledge of agricultural activities it's challenges and requirements.

Customer/ Market/Business Need Assessment

Our primary customers are the farmers of the India. They are the most important stakeholder for our software and after understanding their problems gravity it is observed that these are the following needs:

Demanded crop in the markets	Market analysis it may global or local
Quality of crop	Knowledge of quality of crop demanded in different markets
Connectivity to and Presence in markets	Farmer needs to be addressed the availability of crop
Flexible transportation system	Farmers needs to transportation availability to market for delivering their crops to market

Revised Needs Statement and Target Specifications

After understanding the wholistic idea of the application we need a good data set from the market to train our model for prediction and need a ground knowledge of farmers and companies (those can buy farmers produce) problems, challenges and needs for example the quality of grains, to make a trustable relationship between them. To make a software for selling, transporting the produces we need tie up with some transportation companies for transporting goods on both global and local level.

External Search

For external search I am providing here some of the articles of very renounced newspaper of the country to understand the problems of formers of not getting the good price for their crops. These are as follows:

Farmer Agitation: Latest News, Photos, Videos on Farmer Agitation - NDTV.COM

Farmers agitation reach Bhopal, 1400 litres of milk spilled on Khajuri road | Bhopal News - Times of India (indiatimes.com)

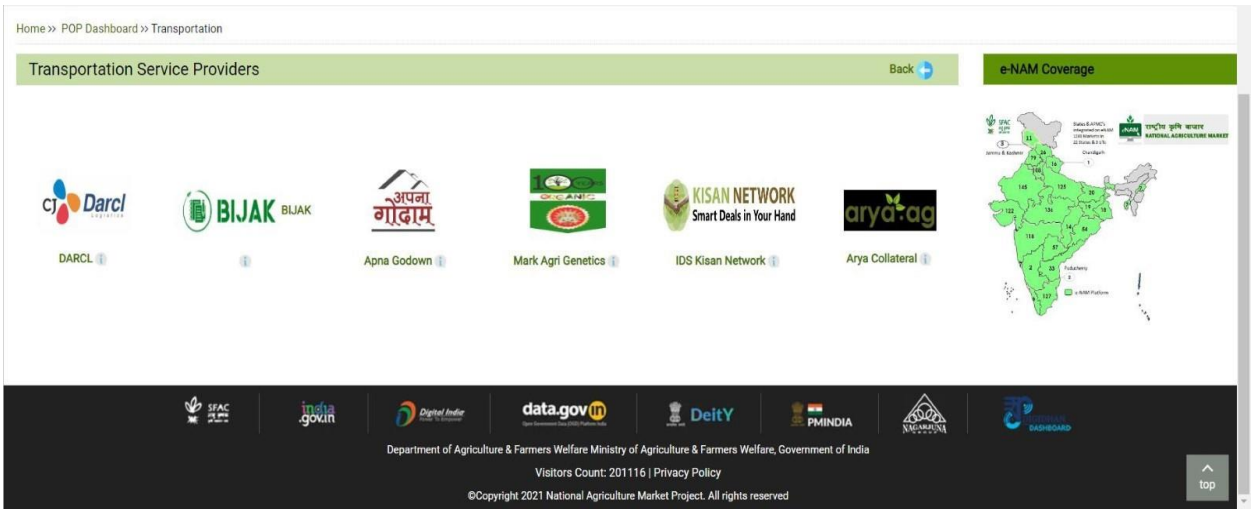
Farmers' agitation, poor production hit veggie supply as prices shoot up | Ludhiana News - Times of India (indiatimes.com)

[Farmers in Tamil Nadu throw tomatoes on roadside after price falls to Rs 2 per kg - India Today]

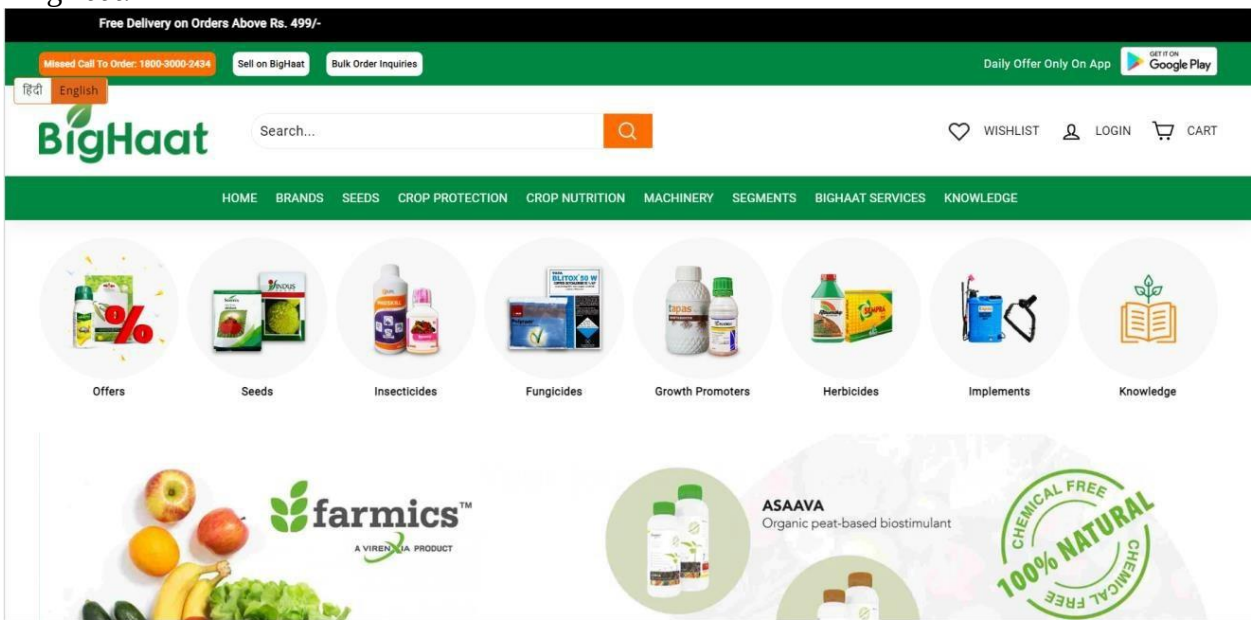
Benchmarking

There is not much work done by private companies in India that I am aware of in this direction but Government of India has launched an application and website called e-NAM (electronic National Agriculture Market) in July, 2022. Another company can also look up as benchmark for how to sell the agricultural products is BigHaat. Although, e-NAM also show the market prices of crops and mandi price but only my application focus on prediction of demanding crops in near future. The screenshots of the above-mentioned websites are given below. However, the idea of providing the transportation companies is taken from the e-NAM website.

e-NAM website:



BigHaat:



Applicable Patents

The idea of prediction of demanded crops for certain area using machine learning algorithm is a unique idea and can be patent. This idea makes my whole application a unique and has ability to stand out.

Applicable Standards

There are some standards for gaining the market information like we will need Demat accounts for Indian markets for accessing the data. For the rule and regulations refer to links: SEBI Guidelines and Rules for Opening a Demat Account - Upstox . There are

application standards in India refer to this article: 5 Latest Software Testing Standards | Testbytes.

Our application does not concern with health and safety, environmental regulations, governmental policies, etc. Although, this application will have impact on the crop culture like inter mixing of crops, in India. Also, this will impact in modernization of the Indian farmers.

Applicable Constraints

According to the need assessment in the above section we will need internal constraints for development of my application I will need an infrastructure like an office for working of all the departments like Planning and Reasearch, Software engineering, Coding and Technical department, IT department for maintenance of hardware, Testing and Marketing department etc. Thereafter their salary also thing will need a budget of 50 - 60 lakhs. Although, this can be reduced by working from home concept it will reduce the cost of infrastructure.

There are some external factors like market to make this application reach to the countryside and to the farmers so advertisement strategy can cost but through the help of Government of states

this can be possible and advertisement in the radio this will cost less money like 5 lakhs approx.

Business Opportunity with Financial Equation

To conclude all those constraints mentioned above are the basic constraints to make this project successful this may cost something like 70lakhs approx. So, this can be recovered from the large- scale farmers by charging them of 200-300 rupees for the subscription of our application.

Financial Equation:

Let,

Total profit = y

Price of the product = 300 per month

Total role as a function of time = x(t)

Total production and maintenance cost = 7 million

Therefore, Y = 300 * x(t) - 7000000

Concept Generation and Development with Product Proto type

With reference to the above information, we get a rough idea of how our application will be and what are the features my application provides to the farmers of our country in a nominal cost and how effective it can be. Also, so far, we are able to understand our application we have ability to solve his problem of good market research and prediction

of the crop. To become distress free from getting the good price for their produce. Now let us understand the basic frame work of our application. The data flow of application and stakeholders share of performance in our application named **"Fasal Gyaan".**

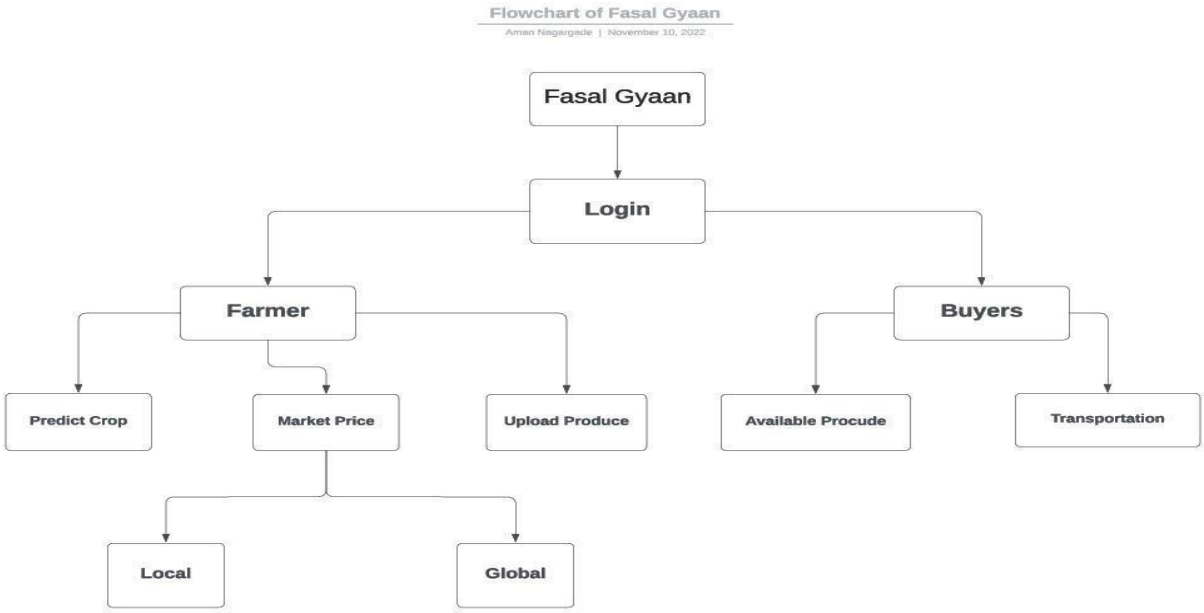


Fig: Data Flow Diagram/ Proto type of "Fasal Gyaan" Application.

Prototype Development and Small-Scale Code Implementation

Now, let us understand in a brief how application will work using available data in Kaggle. Here, we performed EDA (External Data Analysis) to show how we take care of demand and production trade off of local markets and compare them with global market demand and production trade off. On the practical level we will be need to collect official and authentic data. For understanding this we are showing here how we will be going to Analyse the data and predict the future price, and suggest the crops to be cultivated.

Data Reading

In [6]:
```
agri_df = pd.read_csv('csv')
india_gdf = gpd.read_file('india_geo')
```

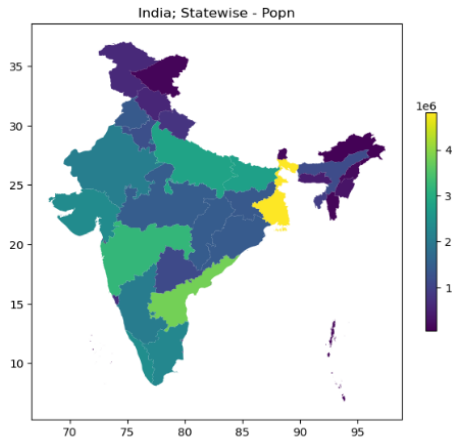
In [7]:
```
agri_df.head()
```

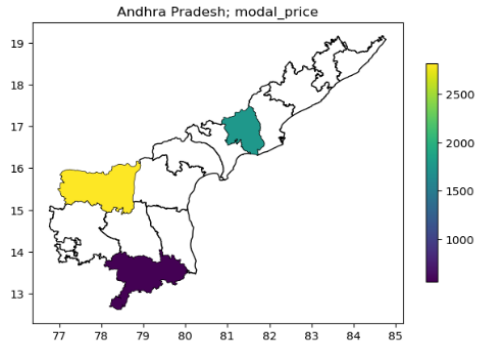
Out[7]:

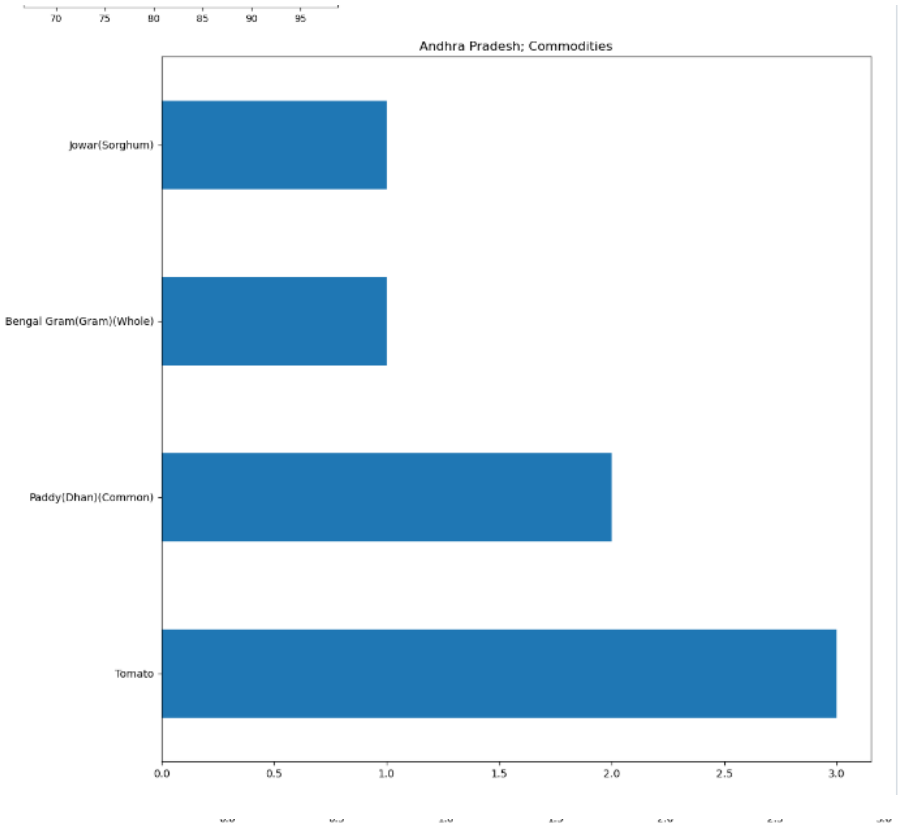
	state	district	market	commodity	variety	arrival_date	min_price	max_price	modal_price
0	Andaman and Nicobar	South Andaman	Port Blair	Amaranthus	Amaranthus	04/03/2019	6000	8000	7000
1	Andaman and Nicobar	South Andaman	Port Blair	Banana - Green	Banana - Green	04/03/2019	4500	5500	5000
2	Andaman and Nicobar	South Andaman	Port Blair	Bhindi(Ladies Finger)	Bhindi	04/03/2019	6000	8000	7000
3	Andaman and Nicobar	South Andaman	Port Blair	Bitter gourd	Other	04/03/2019	6000	8000	7000
4	Andaman and Nicobar	South Andaman	Port Blair	Black pepper	Other	04/03/2019	110000	130000	120000

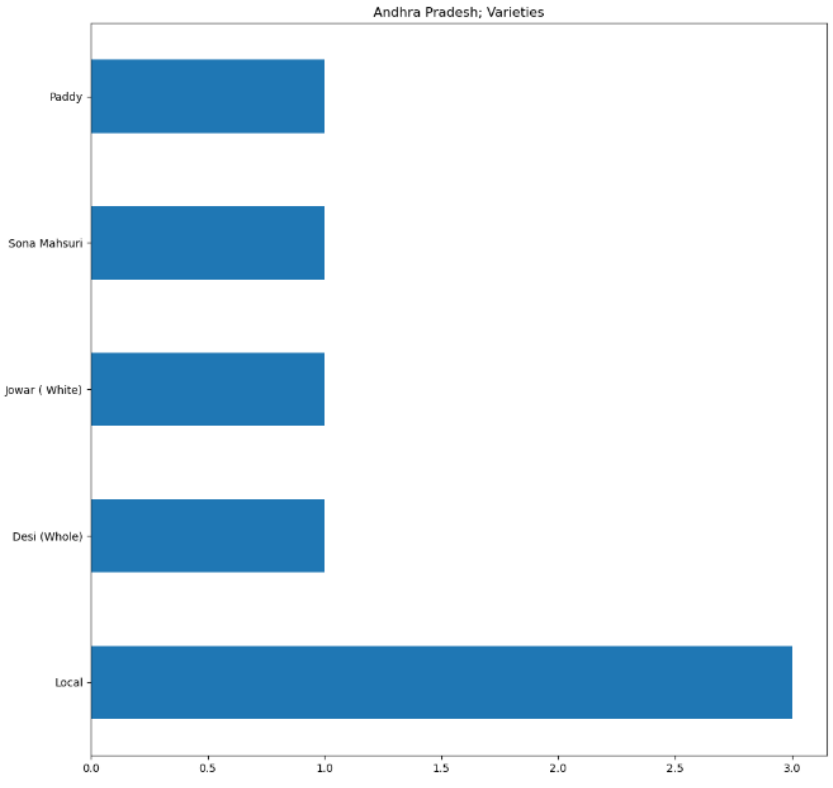
Andhra Pradesh

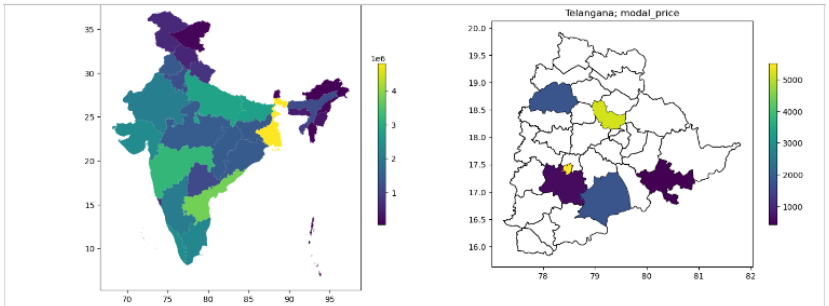
In [30]:
```
filter_statewise(
    state_name='Andhra Pradesh',
    df=agri_df,
    gdf=india_gdf,
    show_plot=True,
    show_country=True,
    plot_column='modal_price'
)
```



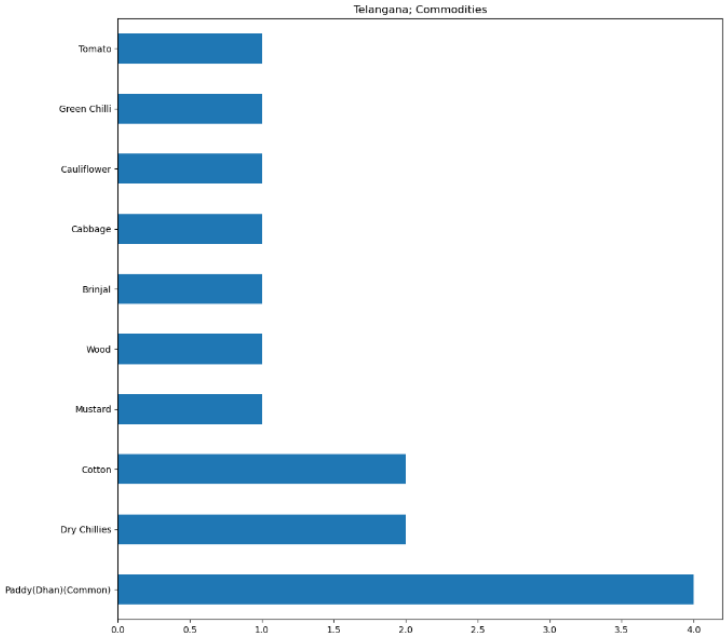


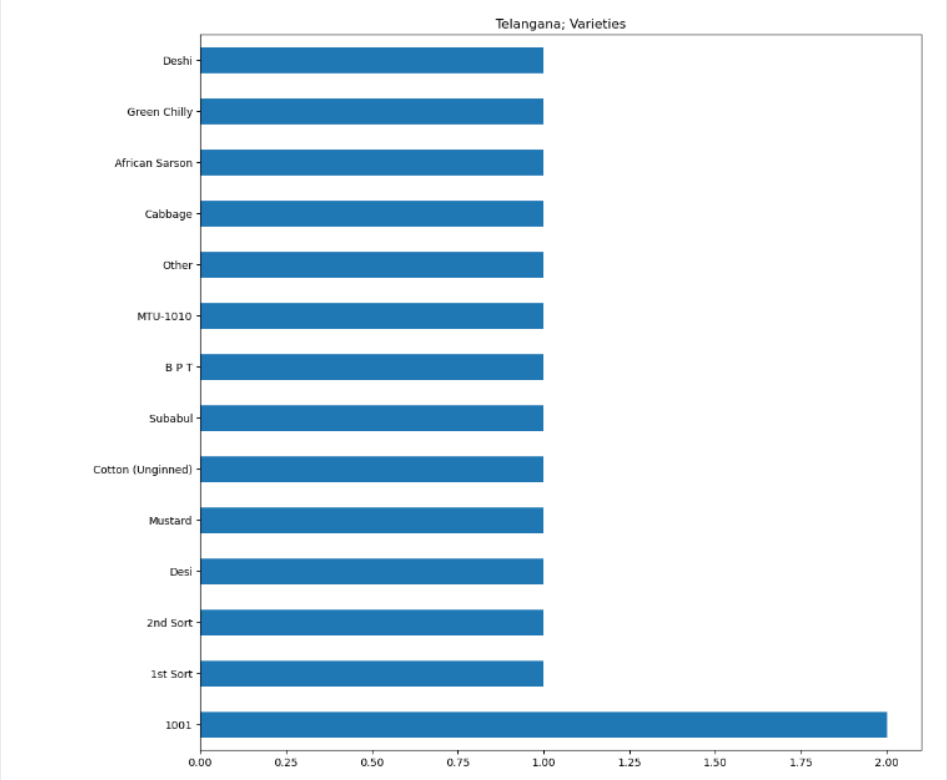

70
75
80
85
90
95
Andhra Pradesh; Commodities
Jowar(Sorghum)
Bengal Gram(Gram)(Whole)
Paddy(Dhan)(Common)
Tomato
0.0
0.5
1.0
1.5
2.0
2.5
3.0

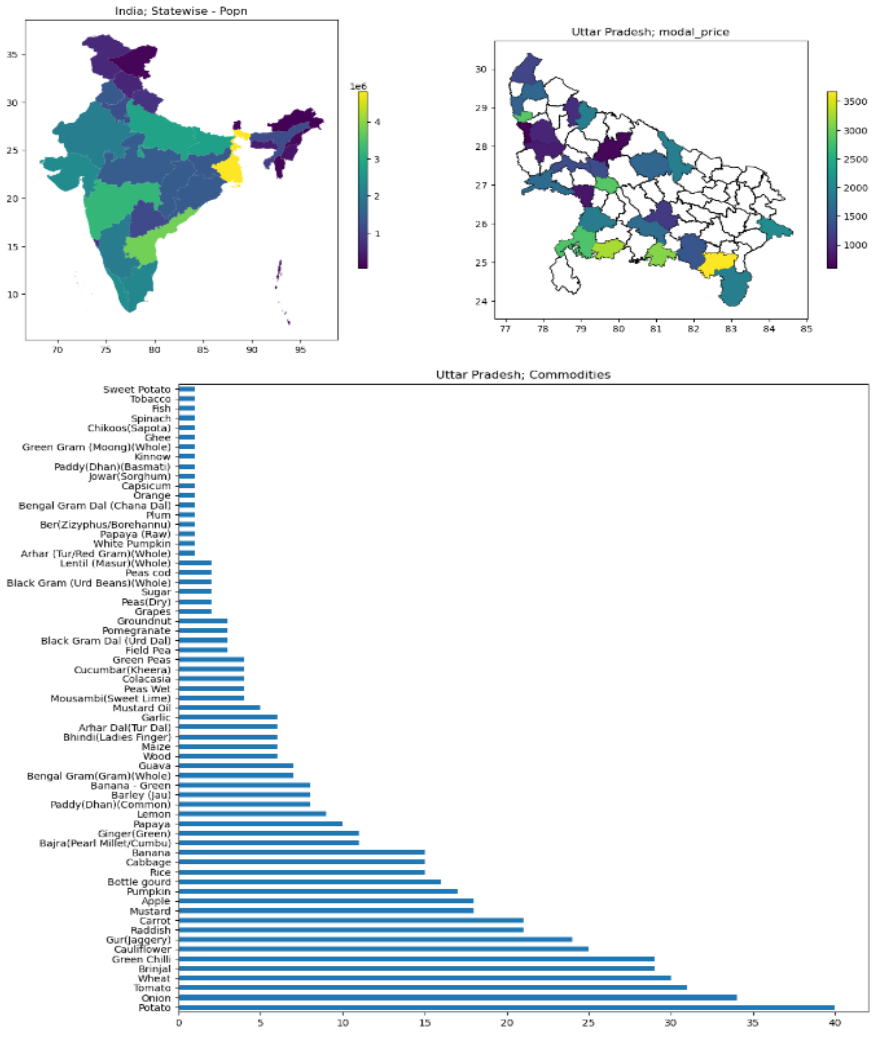

Andhra Pradesh; Varieties
Paddy
Sona Mahsuri
Jowar (White)
Desi (Whole)
Local
0.0
0.5
1.0
1.5
2.0
2.5
3.0

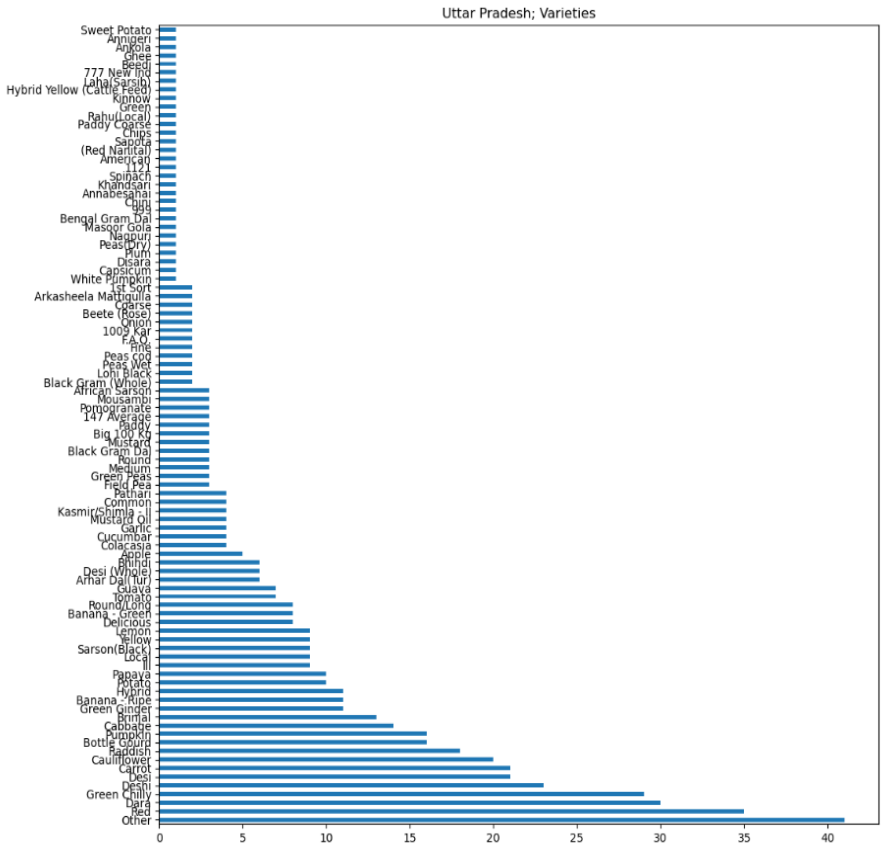

1e6
4
3
2
1

Telangana; modal_price
5000
4000
3000
2000
1000


Telangana; Commodities
Tomato
Green Chilli
Cauliflower
Cabbage
Brinjal
Wood
Mustard
Cotton
Dry Chillies
Paddy(Dhan)(Common)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0


Telangana; Varieties
Deshi
Green Chilly
African Sarson
Cabbage
Other
MTU-1010
B P T
Subabul
Cotton (Unginned)
Mustard
Desi
2nd Sort
1st Sort
1001
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
2.00


India; Statewise - Popn
1e6
Uttar Pradesh; modal_price
Uttar Pradesh; Commodities
Sweet Potato
Tobacco
Fish
Spinach
Chikoos(Sapota)
Ghee
Green Gram (Moong)(Whole)
Kinnow
Paddy(Dhan)(Basmati)
Jowar(Sorghum)
Capsicum
Orange
Bengal Gram Dal (Chana Dal)
Plum
Ber(Zizyphus/Boreharnu)
Papaya (Raw)
White Pumpkin
Arhar (Tur/Red Gram)(Whole)
Lentil (Masur)(Whole)
Peas cod
Black Gram (Urd Beans)(Whole)
Sugar
Peas(Dry)
Grapes
Groundnut
Pomegranate
Black Gram Dal (Urd Dal)
Field Pea
Green Peas
Cucumbar(Kheera)
Colacasia
Peas Wet
Mousambi(Sweet Lime)
Mustard Oil
Garlic
Arhar Dal(Tur Dal)
Bhindi(Ladies Finger)
Maize
Wood
Guava
Bengal Gram(Gram)(Whole)
Banana - Green
Barley (Jau)
Paddy(Dhan)(Common)
Lemon
Papaya
Ginger(Green)
Bajra(Pearl Millet/Cumbu)
Banana
Cabbage
Rice
Bottle gourd
Pumpkin
Apple
Mustard
Carrot
Raddish
Gur(Jaggery)
Cauliflower
Green Chilli
Brinjal
Wheat
Tomato
Onion
Potato



final conclusion :-

- In andhra pradesh mostly farmers farm of tomato and dhan with local verity
- In telangana mostly farmers farm of dhan and dry chilli with 1001 varieties with local variety
- In karnatak mostly farmers farm of tomato and beans with whole varieties
- In utter-Pradesh In mostly farmers farm of potato and onion's red varieties
- In Tamilnadu mostly farmers farm of dhan with local varieties

This is how we EDA every local market and study the past data simultaneously also study the import and export statistics then give suggestions to the farmers of local what to produce and what will be their good options for generating a good revenue of their cultivation.

How does it work?

Now, let us understand in a brief how application will work for the betterment of backbone of our economy – the farmers. The working of our application will be like this:

- **Farmer**: when they will login into the application they will find options like Demanding crops in your area, market price, production statistics, upload your goods according to quality constraints etc.
- *Demanding crops in your area*: The production of demanding crops list after understanding the market of local and global markets like BSE, SENSEX etc. will be generated by our ***ANN (Artificial Neural network Model) model*** trained on large amount of past data from the market to give utmost accurate predictions.
- *Market*: This option will show to farmer to negotiate with his customers either it is global or local.
- *Statistics*: This option will show farmers that how market is growing by showing statistics like total production in the market (Global/Local), total farmers registered so far, total buyers registered, demand in the market(global/local) etc.
- *Upload*: This for farmers to upload their goods, pictures and information related to it like humidity, age, size of grain etc.
- **Buyer**: When the cooperates, buyer's login they will find options like Market price, available produce, transportation companies etc.
- *Produces*: This option will show the available stores of production in the market with some quality rating will help in the bargaining.
- *Transportation*: This option is will show the list of transportation companies in local or global market or area for collecting the goods buyers buy form the farmers.

This will be the working of the Fasal Gyaan Application. This is a rough idea and many other features can be improvised with time as the application make reach to people.

Type of Financial Modelling

To gain the trust of the farmers for the app be dependent on it we need the **Freemium model** for our application and offer some advanced feature with a subscription of 300 per month like LinkedIn.

Conclusions

Farmers as the backbone of our economy is a verified statement and he has been going through a lot from the decades before independence and after independence also. Many of the country's farmers have become so much advance in technology. Still, in India hey are struggling for the basic needs of getting the good price for their crops and produce those crops which are in demand. Although the positive thing that this picture is changing slowly. There are some steps have taken by the government in this direction and my "Fasal Gyan" will also help in this direction. This application has ability to solve the problems of farmers which is already have been describe in the above sections of this report.

However specific idea of suggesting the list of demanded crops in the area is unique in itself will solve the undermine problem of productivity of goods and grains in the country. This is also helpful in controlling the inflation problem of the country and the hidden stock is one of the reasons for price rise and it has ability to solve that issue also since, every buyer will register to the application so there will be the records of the production and availability also. Also, the idea of selling the produce in the Fasal Gyaan APP will help to build the bridge between the cooperates and remove the middleman this will result to genuine price of the crop and it will help to lose the grip of middleman from controlling the market price. Thus, help in improving he farmers to control the market price and decide suitable price for their produce.

Thus, Fasal Gyaan Application will result into an idea which is practical application with good business opportunity and also a service to the nation by serving the farmers – *The Anndatas* of our country means a win- win for all the stockholders. This will make a beautiful ecosystem of market with harmony between all the stockholders as buyers, producers and service providers.