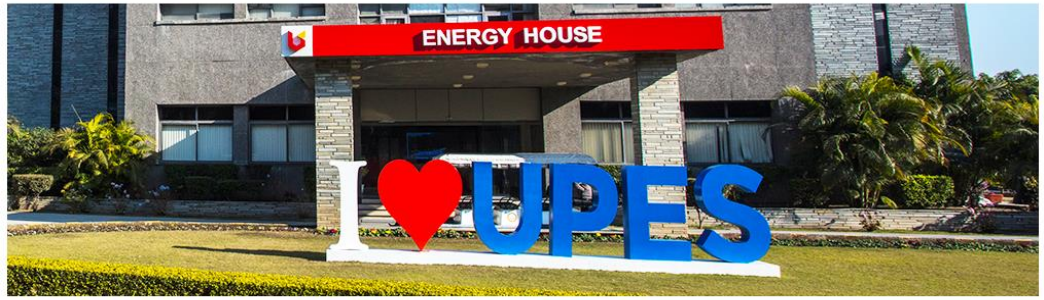

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MINOR PRESENTATION

Farmers Adviser

Project Guide:
Poonam Kainthura
Professor of computer department UPES

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TEAM MEMBER DETAILS

NAME	ROLL NO.	SAP ID
UMANG CHAUDHARY	R970218054	500068770
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Branch : B.Tech – CSE IN OIL AND GAS INFORMATICS

INTRODUCTION

- Now-a-day's agriculture is one of the most important field in the emerging real world . It is the spine of Indian Economy.

- In India, agriculture is in poor condition since majority of the poor farmers are not getting the expected crop yield due to several reasons.

- The farmers necessarily require a timely advice to predict the future crop productivity and an analysis is to be made in order to help the farmers to improve there crop production.(Helping them to take wise decisions)

Continue…

- With the help of Regression algorithms, prediction can be done by a farmer in estimating the MSP of his crop.

- Providing the data such as crop name, name of the state where the farmer live, which season of growth? and average MSP(Minimum Support Price) from 2011 to 2020 of the crops, can give the YIELD of the Crop to the farmer before sowing the seeds which can improve the agricultural conditions.

OBJECTIVES

- Do the analysis and predict the MSP of each crop for the upcoming year by applying linear regression.
- Second objective is to help farmers taking decisions related to there crop yield by applying decision tree.
- Lastly, building a user interface for porting information to the farmers.

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PROBLEM STATEMENT

Farmer requires a timely advice to predict the future crop productivity, which could help them to improve there crop production. Yield prediction is an important agricultural problem no one can predict that with 100% accuracy. The probability of risk is negligible, but a risk factor could be there if our farmers friend are completely dependent on this project model, after all the geographical status of a place is quite unpredictable and hence, some times the outcome may be different.

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METHODOLOGY

- Linear regression to fine the MSP of the crops for year 2021. And decision tree to find the crop yield in terms of good and bad of all the crops.
- Initially the data of MSP i.e. Minimum Support Price of crops and GDP (Gross Domestic Product) have been taken of past 10 years (2011-2020).

- Now we will calculated the MSP of a particular crop for year 2021 and repeated the same for all the crops.
- Then the classification of crop yield of all the crops is done into 2 types- Good and Bad by analysing according to the survey done in the data set.
- Finally by using decision tree we got the yield type of particular crop for a given location and best season for its growth in 2021.

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- Lastly, a front-end has been prepared which was named as Farmers Advisor.
- And linked the outputs of both the algorithms, so that the data of MSP of suitable crops and its crop yield can be displayed on the online portal after farmer providing the inputs.

PROJECT DESIGN

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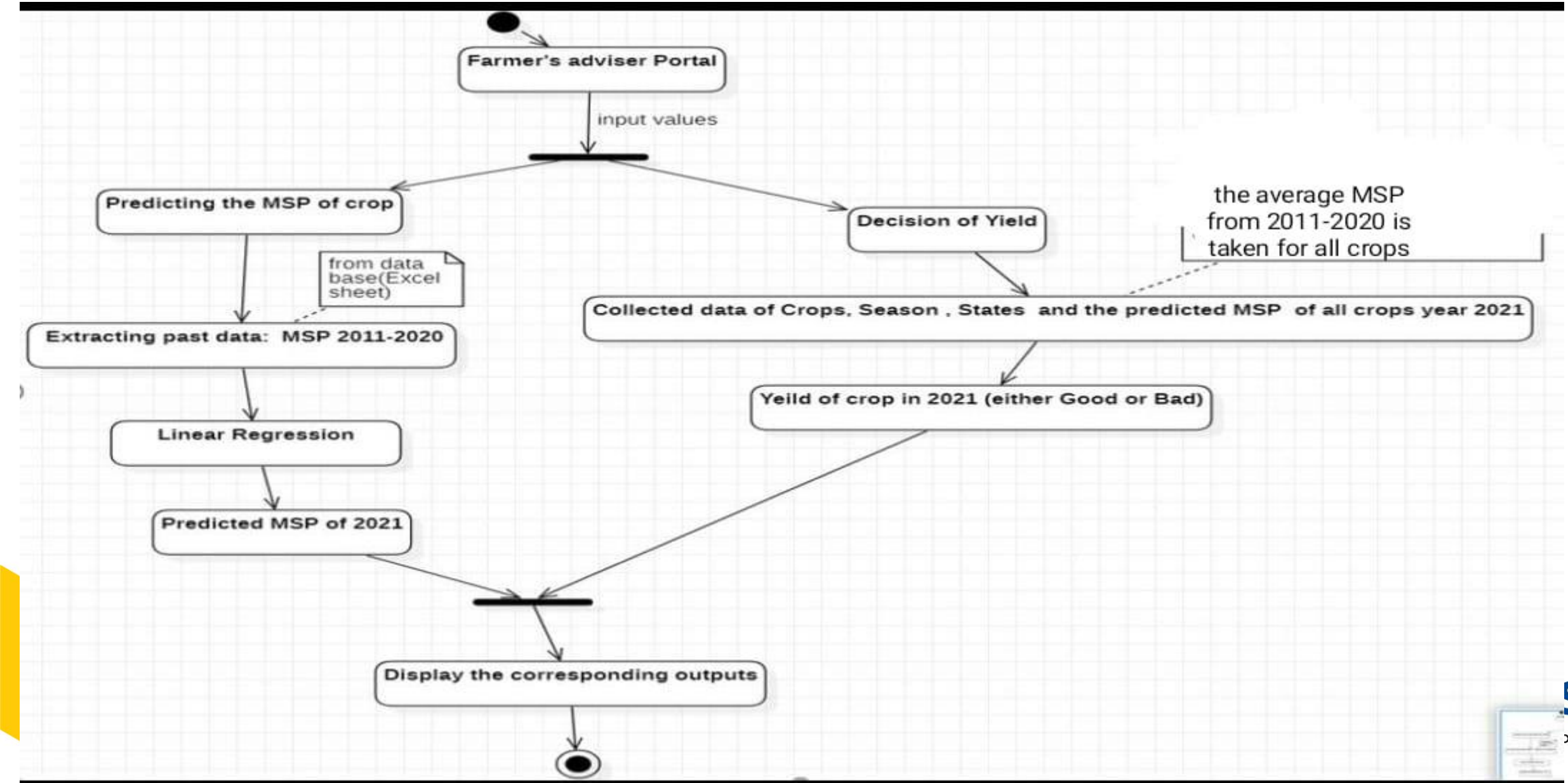
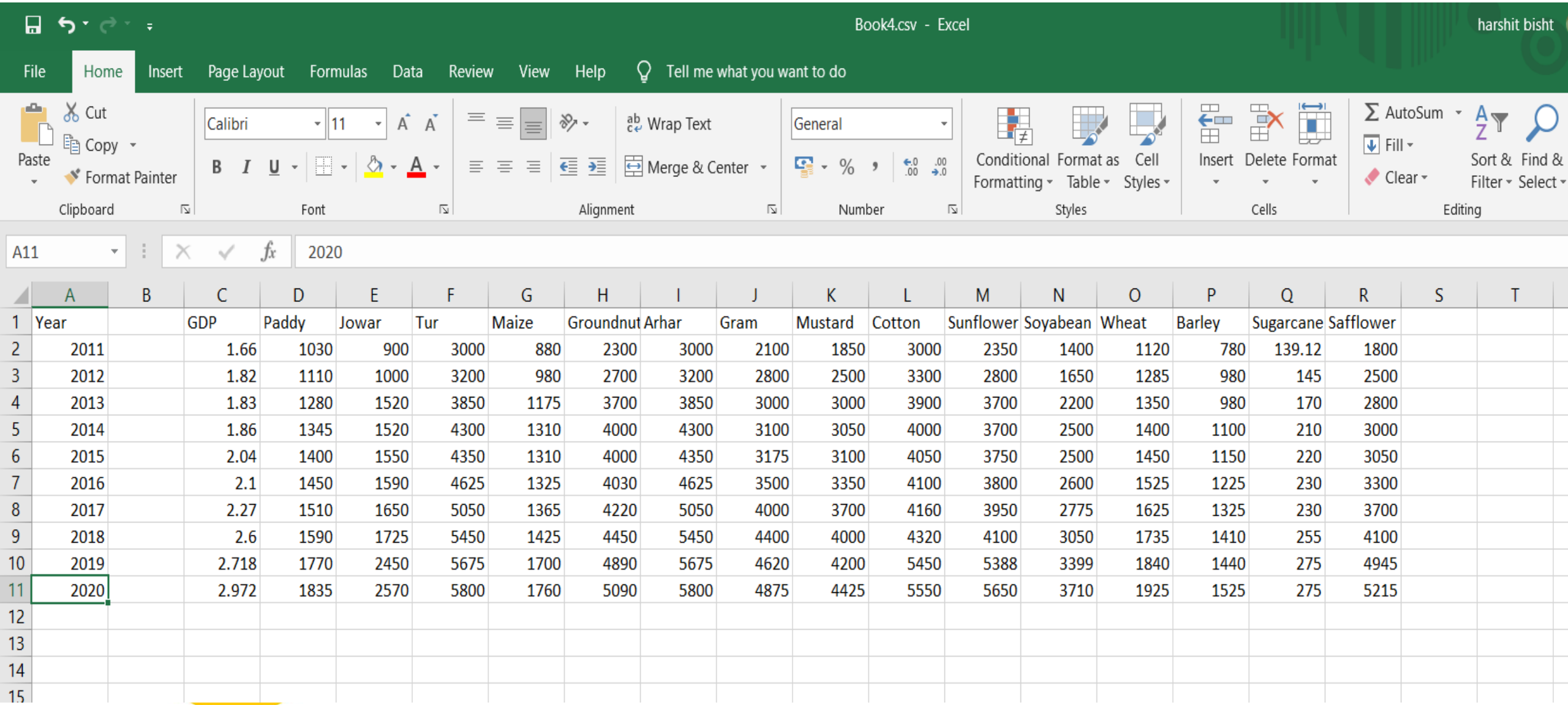
ACTIVITY DIAGRAM



data year GDP and MSP of each crop

Linear Regression algorithm



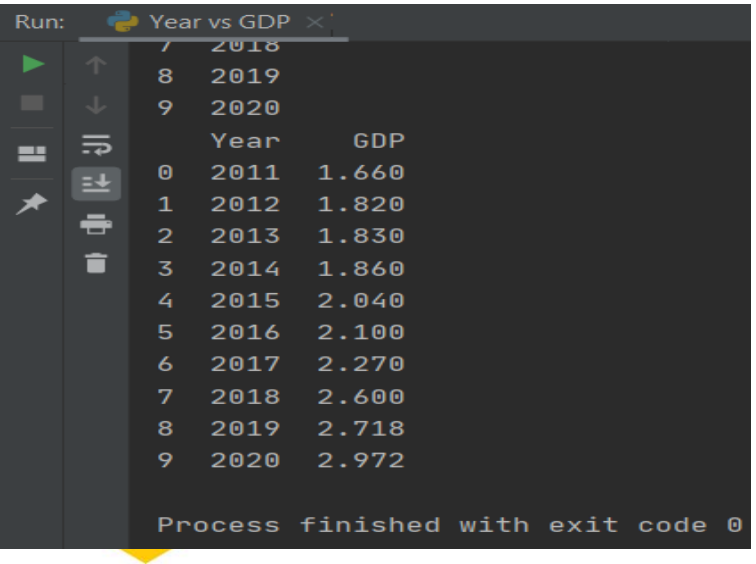
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
1	Year		GDP	Paddy	Jowar	Tur	Maize	Groundnut	Arhar	Gram	Mustard	Cotton	Sunflower	Soyabean	Wheat	Barley	Sugarcane	Safflower		
2	2011		1.66	1030	900	3000	880	2300	3000	2100	1850	3000	2350	1400	1120	780	139.12	1800		
3	2012		1.82	1110	1000	3200	980	2700	3200	2800	2500	3300	2800	1650	1285	980	145	2500		
4	2013		1.83	1280	1520	3850	1175	3700	3850	3000	3000	3900	3700	2200	1350	980	170	2800		
5	2014		1.86	1345	1520	4300	1310	4000	4300	3100	3050	4000	3700	2500	1400	1100	210	3000		
6	2015		2.04	1400	1550	4350	1310	4000	4350	3175	3100	4050	3750	2500	1450	1150	220	3050		
7	2016		2.1	1450	1590	4625	1325	4030	4625	3500	3350	4100	3800	2600	1525	1225	230	3300		
8	2017		2.27	1510	1650	5050	1365	4220	5050	4000	3700	4160	3950	2775	1625	1325	230	3700		
9	2018		2.6	1590	1725	5450	1425	4450	5450	4400	4000	4320	4100	3050	1735	1410	255	4100		
10	2019		2.718	1770	2450	5675	1700	4890	5675	4620	4200	5450	5388	3399	1840	1440	275	4945		
11	2020		2.972	1835	2570	5800	1760	5090	5800	4875	4425	5550	5650	3710	1925	1525	275	5215		
12																				
13																				
14																				
15																				

Prediction of GDP of year 2021 using linear regression (GDB VS YEAR GRAPH)

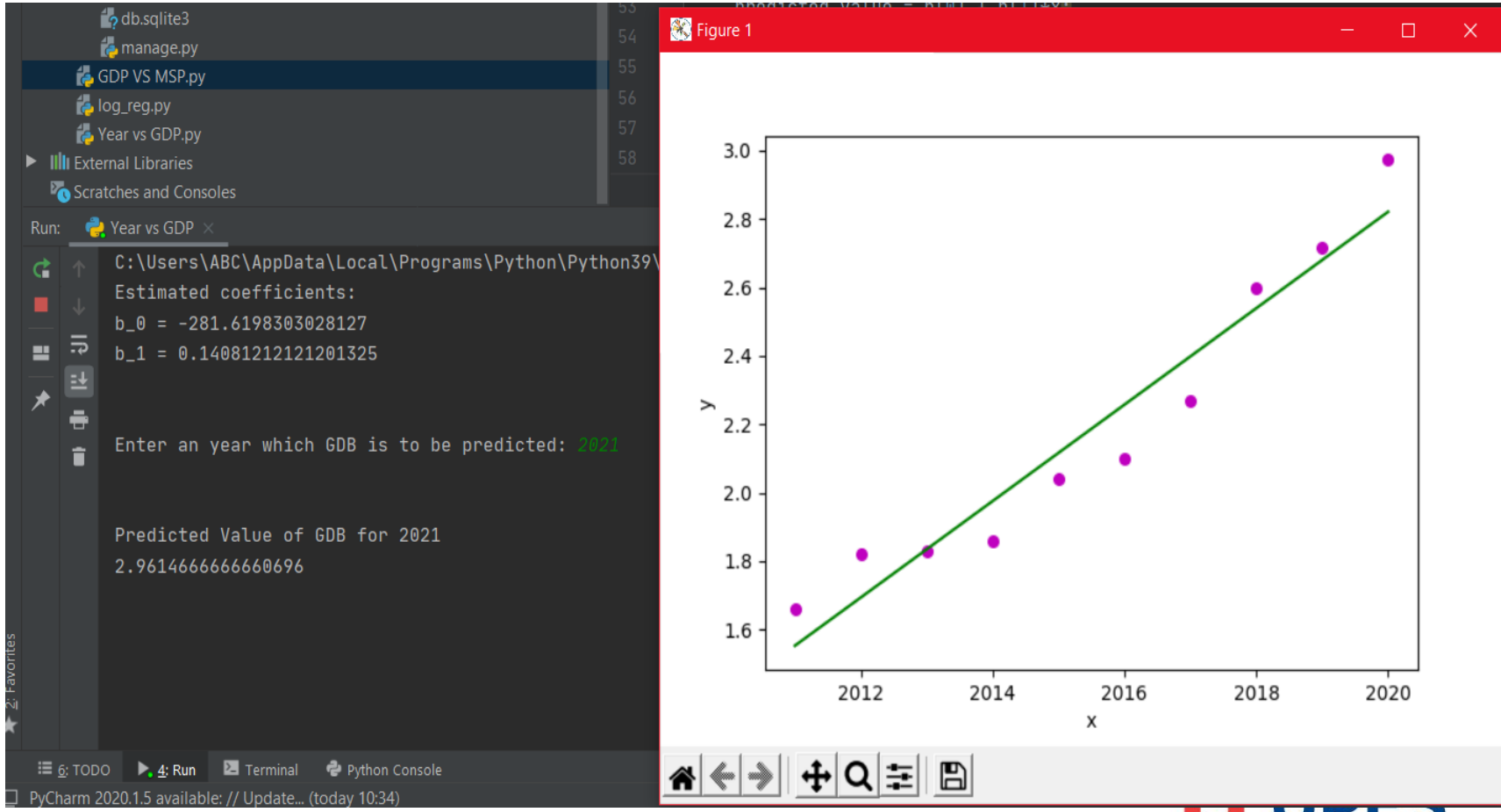
Step 1: From Database

	Year	GDP
1		
2	2011	1.66
3	2012	1.82
4	2013	1.83
5	2014	1.86
6	2015	2.04
7	2016	2.1
8	2017	2.27
9	2018	2.6
10	2019	2.718
11	2020	2.972

Step 2: Extracted data from Database into python console from year 2011 – 2020 past data



Step 3: Using y=b_0 + b_1*(x) predicting the value of GDB where x= 2021 or x Year



Step 4: OutPut-> 2021 (future) GDB is predicted as 2.9614666668696

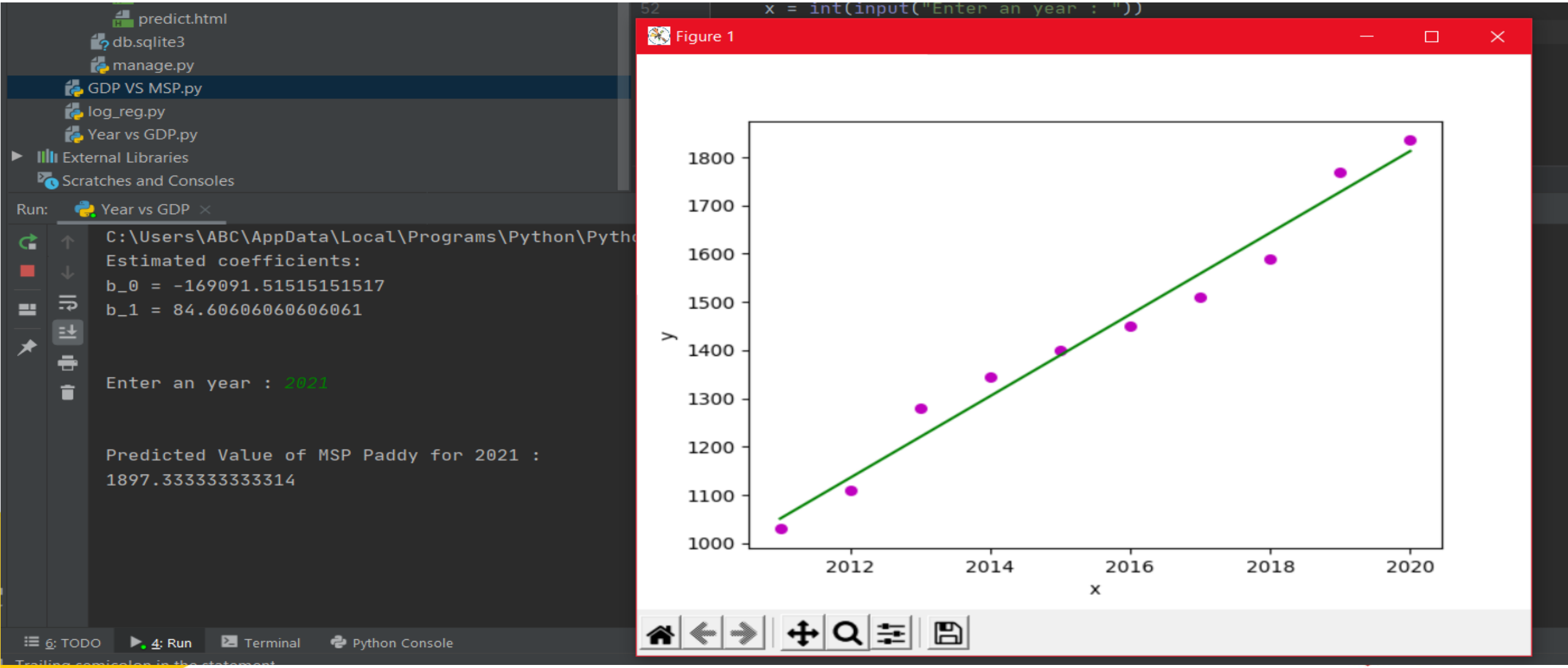
MSP of each crop prediction in 2021

Given MSP of each crop from 2011 – 2020

	A	B	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
1	Year		Paddy	Jowar	Tur	Maize	Groundnut	Arhar	Gram	Mustard	Cotton	Sunflower	Soyabean	Wheat	Barley	Sugarcane	Safflower	
2	2011		1030	900	3000	880	2300	3000	2100	1850	3000	2350	1400	1120	780	139.12	1800	
3	2012		1110	1000	3200	980	2700	3200	2800	2500	3300	2800	1650	1285	980	145	2500	
4	2013		1280	1520	3850	1175	3700	3850	3000	3000	3900	3700	2200	1350	980	170	2800	
5	2014		1345	1520	4300	1310	4000	4300	3100	3050	4000	3700	2500	1400	1100	210	3000	
6	2015		1400	1550	4350	1310	4000	4350	3175	3100	4050	3750	2500	1450	1150	220	3050	
7	2016		1450	1590	4625	1325	4030	4625	3500	3350	4100	3800	2600	1525	1225	230	3300	
8	2017		1510	1650	5050	1365	4220	5050	4000	3700	4160	3950	2775	1625	1325	230	3700	
9	2018		1590	1725	5450	1425	4450	5450	4400	4000	4320	4100	3050	1735	1410	255	4100	
10	2019		1770	2450	5675	1700	4890	5675	4620	4200	5450	5388	3399	1840	1440	275	4945	
11	2020		1835	2570	5800	1760	5090	5800	4875	4425	5550	5650	3710	1925	1525	275	5215	
12	2021		?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	
13	2022																	
14	.																	
15	If curious then can predict the MSP of crops for future years also																	
16																		
17																		

MSP of ‘Paddy’ for 2021 prediction.

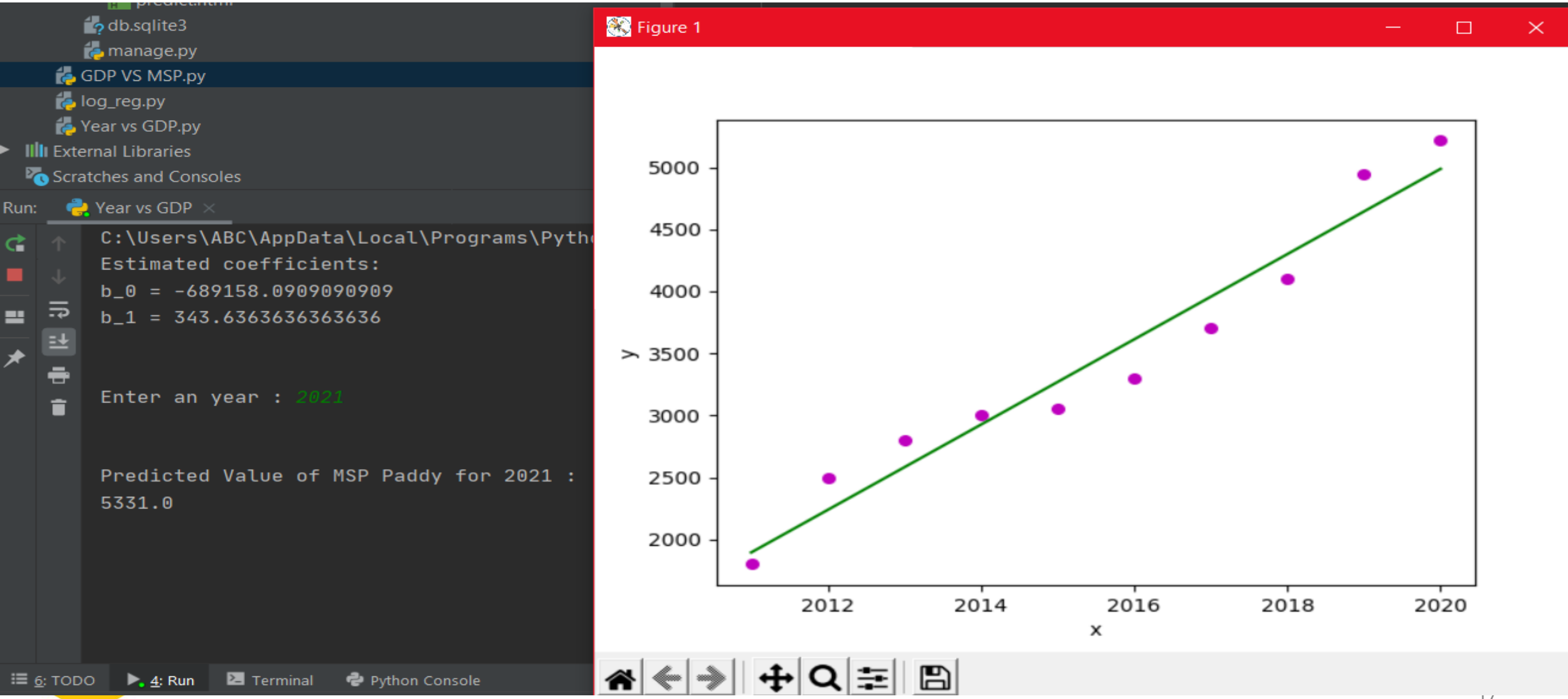
The 1st crop in out list ‘Paddy’ MSP prediction for 2021 :



Similarly for each crop we can have the predicted MSP of 2021

MSP of ‘Safflower’ for 2021 prediction

The last crop in out list ‘Safflower’ MSP prediction for 2021 :



Predicted Crop Yield

On the basis of attributes the decision tree will take decision either the yield is good/bad

	Crops	Season	States	MSP	Yield
2	Paddy	Kharif	Uttar Pradesh	1897	Good
3	Paddy	Kharif	Maharashtra	1897	Bad
4	Paddy	Kharif	Andhra Pradesh	1897	Good
5	Maize	Kharif	Uttar Pradesh	1803	Bad
6	Maize	Kharif	Maharashtra	1803	Bad
7	Maize	Kharif	Andhra Pradesh	1803	Good
8	Jowar	Kharif	Uttar Pradesh	2536	Bad
9	Jowar	Kharif	Maharashtra	2536	Good
10	Jowar	Kharif	Andhra Pradesh	2536	Good
11	Tur	Kharif	Uttar Pradesh	6298	Good
12	Tur	Kharif	Maharashtra	6298	Bad
13	Tur	Kharif	Andhra Pradesh	6298	Bad
14	Cotton	Kharif	Uttar Pradesh	5537	Bad
15	Cotton	Kharif	Maharashtra	5537	Good
16	Cotton	Kharif	Andhra Pradesh	5537	Good
17	Groundnut	Kharif	Uttar Pradesh	5434	Bad
18	Groundnut	Kharif	Maharashtra	5434	Good
19	Groundnut	Kharif	Andhra Pradesh	5434	Good
20	Soyabean	Kharif	Uttar Pradesh	3852	Bad
21	Soyabean	kharif	Maharashtra	3852	Bad
22	Soyabean	kharif	Andhra Pradesh	3852	Good
23	Wheat	Rabi	Uttar Pradesh	1986	Bad
24	Wheat	Rabi	Maharashtra	1986	Good
25	Wheat	Rabi	Andhra Pradesh	1986	Bad
26	Barley	Rabi	Uttar Pradesh	1619	Bad
27	Barley	Rabi	Maharashtra	1619	Good
28	Barley	Rabi	Andhra Pradesh	1619	Bad
29	Gram	Rabi	Uttar Pradesh	5148	Bad
30	Gram	Rabi	Maharashtra	5148	Good
31	Gram	Rabi	Andhra Pradesh	5148	Bad
32	Mustard	Rabi	Uttar Pradesh	4726	Good
33	Mustard	Rabi	Maharashtra	4726	Bad
34	Mustard	Rabi	Andhra Pradesh	4726	Bad
35	Sugarcane	Rabi	Uttar Pradesh	302	Bad
36	Sugarcane	Rabi	Maharashtra	302	Good
37	Sugarcane	Rabi	Andhra Pradesh	302	Good
38	Safflower	Rabi	Uttar Pradesh	5331	Bad
39	Safflower	Rabi	Maharashtra	5331	Bad
40	Safflower	Rabi	Andhra Pradesh	5331	Good

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Output of Decision tree :

```
27         Gram     Rabi    Uttar Pradesh  5148    Bad   NaN
28         Gram     Rabi      Maharashtra  5148   Good   NaN
29         Gram     Rabi   Andhra Pradesh  5148    Bad   NaN
30      Mustard     Rabi    Uttar Pradesh  4726   Good   NaN
31      Mustard     Rabi      Maharashtra  4726    Bad   NaN
32      Mustard     Rabi   Andhra Pradesh  4726    Bad   NaN
33   Sugarcane      Rabi    Uttar Pradesh   302    Bad   NaN
34   Sugarcane      Rabi      Maharashtra   302   Good   NaN
35   Sugarcane      Rabi   Andhra Pradesh   302   Good   NaN
36   Safflower      Rabi    Uttar Pradesh  5331    Bad   NaN
37   Safflower      Rabi      Maharashtra  5331    Bad   NaN
38   Safflower      Rabi   Andhra Pradesh  5331   Good   NaN


 Crop : Cotton , Season : Kharif, State : Maharastra

['Yeild decision   : Bad']

Process finished with exit code 0
```

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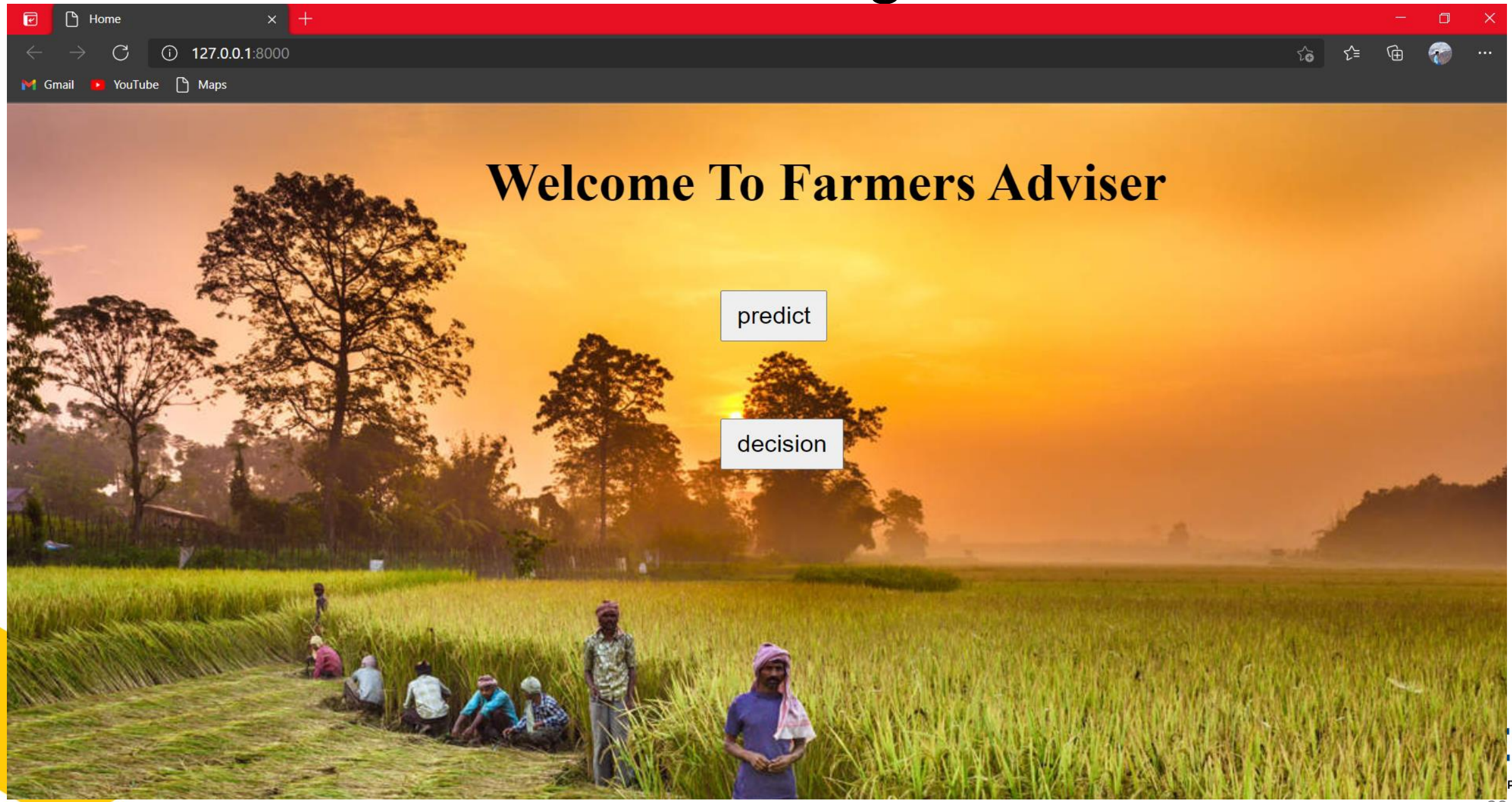
Portal Design



PREDICTION OF MSP

Agro

127.0.0.1:8000/predict/linearRegression/?n11=Cotton&n22=2021

Gmail YouTube Maps

Enter the values

ENTER CROP NAME

Cotton

ENTER YEAR

2021

predict

PREDICTED MSP IS

5537.333333333314

EXIT

Search

ENG 11:22 15-05-2021

DECISION

Crop Decision

127.0.0.1:8000/decision/decisionTree/?n1=Paddy&n2=Uttrakhand&n3=Kharif

Gmail YouTube Maps

Enter the values

Crop Name

Paddy

Select State

Uttrakhand

Season

Kharif

Take decision

CROP NAME : Paddy

LOCATION STATE :Uttrakhand

YIELD OF CROP: ['Good']

OVER ALL output

The given crop Paddy will gives ['Good'] yield in Kharif season in Uttrakhand

EXIT

Search

ENG 11:29 15-05-2021

TECHINICAL IMPLEMENTATION AND ALGORITHM

ALGORITHM

Linear Regression.

STEP 1: Load the data set.

STEP 2: Select the columns a) independent = year 'X'
b) dependent = msp of crop 'Y'

STEP 3: Estimating coefficient.
(i) Find the mean value of both 'X' and 'Y' column.
(ii) Find the number of observations, i.e n = np.size(x)

Independent Variables

STEP 4: Calculating cross-deviation and deviation.

(i) cross-deviation(SS_xy) = np.sum(y*x) − n * m_x * m_y
where m_x and m_y are the mean value of x and y

(ii) deviation(SS_xx) = np.sum(x*x) − n * m_x * m_x

STEP 5: Calculating regression coefficients

$$b\_1 = \frac{\text{cross-deviation}}{\text{deviation}} \left(\text{or } \frac{SS\_xy}{SS\_xx} \right)$$

b_0 = dependent var(m_y) − b_1 * independent var (m_x)

STEP 6: Return the values of the coefficient b_1 and b_0

STEP 7: predicted value = b[0] + b[1] * x

"where X is that value entered by the farmer"

STEP 8: If X = 2021 year
MSP of 2021 = the result.

IMPLEMENTATION (code snippet)

Linear Regression: Code spippet.

```
def linearRegression(request):
        data_set = pd.read_csv('E:\minor 2 data set\Book4.csv')
        data_set.pop('Unnamed: 1')  # cleaning extra column print(data_set)
        var11 = request.GET["n11"]
        var22 = request.GET["n22"]
        b = estimate_coef(data_set["Year"], data_set[var11])
        print("\n")
        x = int(var22)
        predicted_value = b[0] + b[1] * x;
        print("\n")
        answer = str(predicted_value)
        return render(request, "predict.html", {"result22": answer})
```

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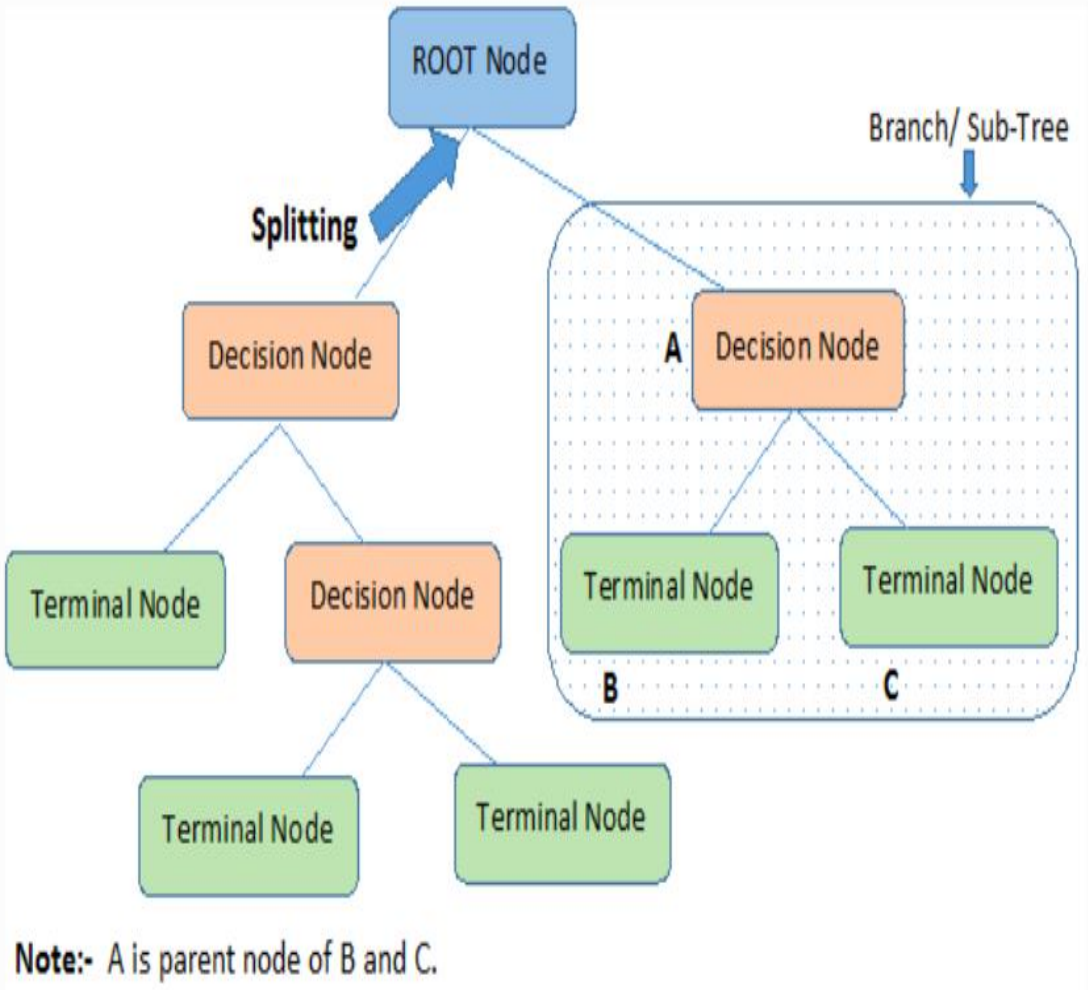
Continue.. estimate_cof(x,y) method call from linear regression method

```
def estimate_coef(x, y):
        n = np.size(x)            # number of observations/points
        m_x = np.mean(x)   # m_x variable will have the mean of x i.e years
        m_y = np.mean(y)    # m_y variable will have the mean of y i.e individual crops Msp

    # calculating cross-deviation and deviation about x
         SS_xy = np.sum(y * x) - n * m_y * m_x   #SS_xy is cross deviation
        SS_xx = np.sum(x * x) - n * m_x * m_x   #SS_xx is deviation

    # calculating regression coefficients
         b_1 = SS_xy / SS_xx
        b_0 = m_y - b_1 * m_x

         return (b_0, b_1)
```

Decision Tree

Important Terminology related to Decision Trees

1. **Root Node:** It represents the entire population or sample and this further gets divided into two or more homogeneous sets.
2. **Splitting:** It is a process of dividing a node into two or more sub-nodes.
3. **Decision Node:** When a sub-node splits into further sub-nodes, then it is called the decision node.
4. **Leaf / Terminal Node:** Nodes do not split is called Leaf or Terminal node.
5. **Pruning:** When we remove sub-nodes of a decision node, this process is called pruning. You can say the opposite process of splitting.
6. **Branch / Sub-Tree:** A subsection of the entire tree is called branch or sub-tree.
7. **Parent and Child Node:** A node, which is divided into sub-nodes is called a parent node of sub-nodes whereas sub-nodes are the child of a parent node.



ALGORITHM

Steps in ID3 algorithm:

1. It begins with the original set S as the root node.
2. On each iteration of the algorithm, it iterates through the very unused attribute of the set S and calculates **Information gain(IG)** of this attribute.
3. It then selects the attribute which has the Largest Information gain.
4. The set S is then split by the selected attribute to produce a subset of the data.
5. The algorithm continues to recur on each subset, considering only attributes never selected before.

IMPLEMENTATION (code snippet)

```
import pandas as pd
import numpy as np
from sklearn.preprocessing import LabelEncoder
from sklearn.tree import DecisionTreeClassifier
from sklearn import tree
from sklearn.datasets import load_iris
import graphviz
iris = load_iris()
data_set = pd.read_csv('E:\minor 2 data set\Tou.csv')

X = data_set.iloc[:, : -1]
y= data_set.iloc[:, 4]

labelencoder = LabelEncoder()
X = X.apply(LabelEncoder().fit_transform)

regressor = DecisionTreeClassifier()
regressor.fit(X.iloc[:, 1:4], y)

Crops ={'Paddy': 7, 'Maize': 5, 'Jowar': 4, 'Tur': 11, 'Cotton': 1, 'Groundnut': 3, 'Soyabean': 9, 'Wheat': 12, 'Barley': 0, 'Gram': 2, 'Mustard':

Season = {'Kharif':0,'Rabi':1}

States = {'Uttar Pradesh': 2, 'Maharashtra': 1, 'Andhra Pradesh': 0}

X_input_values = np.array([Crops['Cotton'], Season['Kharif'], States['Maharashtra']])
Y_prediction = regressor.predict([X_input_values])

print("Yeild decision  : "+Y_prediction)
```

RESULT ANALYSIS

- The site has been made to port the predictions done by using Linear regression and Decision tree classifier about the MSP of the upcoming year and yield of crops.
- The user can enter the required details and the information will be delivered to them based on their requirements.

CONCLUSION a

- The project is developed with the aim of resolving the problems and doubts that the farmers face while they give their thoughts on which crop to show.
- As farmers are the backbone of our country and facing the unfortunate fact that most of the farmers are illiterate, it is our sole responsibility to help our farmers.
- Thus, we came up with the idea of presenting forward the details of the crops that a particular farmer from a particular region in a particular period of the year may require to make the decision that which crop can benefit him according to his convenience.

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THANK YOU

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