

Recommendations for Agricultural Crops Based on Productivity and Season

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Abstract: *As world's population dependent upon agriculture, it places an important role. Through the help of machine learning we can improvise it by giving effective solutions. By taking existing data on crop yield can guess better prediction by the help of linear regression algorithm in this project. Models will be created by using real data's of agriculture and these will be tested with samples. So, through this end user who are farmers here will get to know the yield of that particular crop before investing on them and hence it will cut some cost in the field of agriculture.*

Keywords: Linear Regression Machine-learning algorithm, Decision-making model

I. INTRODUCTION

Now a days farmers are facing a challenges like where to invest, how much to invest, and when to invest their earned money. The aim of this project is to solve their problem by providing them a smart solution to invest their money smartly in the agriculture field. In this, the machine learning model which will be using Linear-regression, KNN, and Random Forest (which works on the decision trees) are used and also Python Django web framework used as user interface. Through this project farmer will be able to take the decision of investing their money properly on the agriculture. The result of this project will be predicted by previous year dataset as well. It will be analysis by the current soil, weather conditions and other factors

II. LITERATURE SURVEY

D. S. Zingade[1], **P.Priya**[2], **Sebastian Raschka**[3], This referred to know about the Python and its packages and Machine learning algorithms.

Geeks for geeks [4], they utilized the machine learning algorithm, that shows different type of graph in very good way which will tells the development of cultivating the crops in field and also rapid changes in the agricultural department.

Veenadhari Suraparaju [5], The technology used here is Machine learning with Ensemble algorithm which covers major part of decision making for the crop production. The integration of ensemble algorithms is actually making the device intelligent enough to record the data and analyse it in a more efficient manner.

Dr. R. Jayaprakash [6], The algorithm used here is decision tree classifier. The data set features included are ID, state, ground water, temperature, soil type, season crops etc from which the data are taken and static charts like bar graph and pie chart prepared.

III. PROPOSED METHODOLOGY

The proposed system performs crop analysis using previous year crop yield dataset along with different algorithms. The proposed system mitigates the need for manual visual inspection of the crops productivity. The website includes a summary of production of particular crop and place and weather report.

3.1 Algorithms: Linear Regression

The main goal of the Linear Regression is that predict the value of variable based on value of another variable. The Linear Regression algorithms needs to estimate the relationship between one independent and one dependent variable.

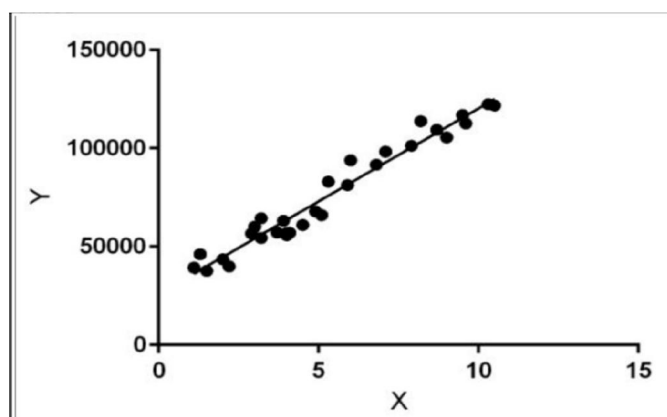


Figure-1: Graph of Linear Regression

As we can observe in the above graph as the time progresses with the value of X, the value of Y increases exponentially

A. Mathematical Formula of Linear Regression:

$$Y = A + BX$$

In The Above Formula:
Y → Dependent Variable
X → Explanatory Variable
A → Intercept Variable
B → Slope of the Line

B. Flow-Diagram

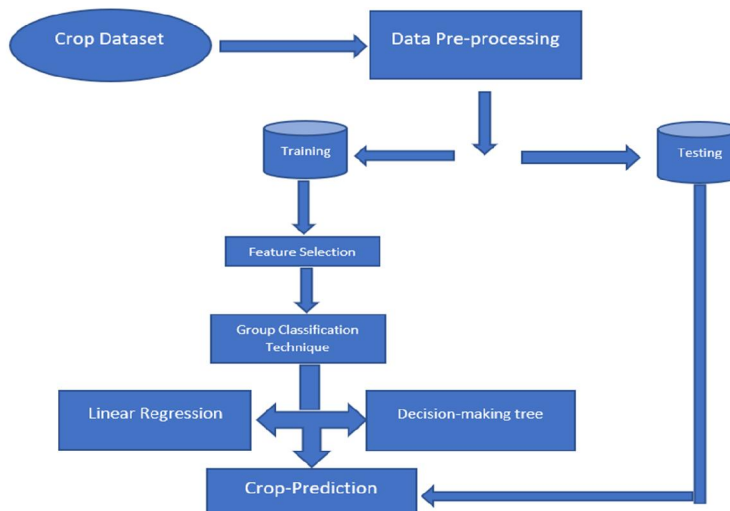


Figure-2: Flow of execution for prediction

The above figure indicates the working of the system on a Linear Regression Machine Learning Algorithm which means this algorithm is used because one variable is depend on another variable, here the prediction of this year crops will be depend on the previous year crop result and also on weather. The dataset of previous year collected and processed it and trained the dataset and testing also done as well. After training of dataset feature selection will be done and dataset will be classified. Now, is the main step of the project here now by applying the linear regression algorithm to the trained dataset that to get the result depend on the previous result, here which used as the dataset and also uses decision-making tree for making the decision. Later, the crop prediction will be done on the bases of above-mentioned process and now result will get.

IV. EXPERIMENTAL ANALYSIS

The analysis done by the Agricultural department in last 25 years shows that around \$12 4 billion is profit due to technologies. It is predicted that this profit will rise to \$186 in the future year.

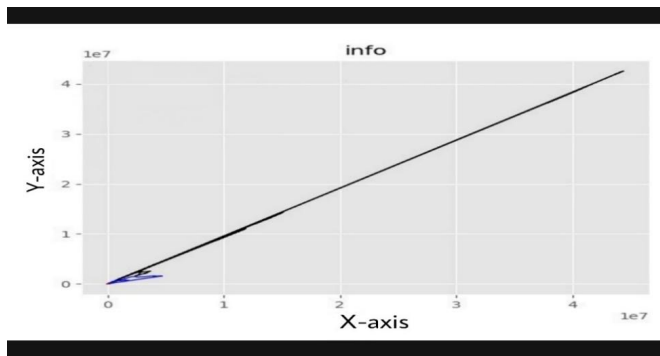


Figure -3: Graph for the values of net worth of the crops

The above graph tells the linear increasing of growth of crop's by using Linear-Regression machine learning algorithm. By this graph we can easily predict the rapid growth of cultivation of crops in the world. Sometimes technologies are so useful in this type fields.

State	District	Crop	Year	Season	Area	Production	Production Area	State Name	Latitude	Longitude
Andhra Pradesh	ANANTAPUR	1997	Kharif	Bajra	1400	500	0.357343	2.43E-07	14.55	77.41667
Andhra Pradesh	ANANTAPUR	1997	Kharif	Groundnut	650000	23400	0.359553	2.39E-07	14.55	77.41667
Andhra Pradesh	ANANTAPUR	1997	Kharif	Jowar	10100	18200	1.809091	8.87E-07	14.55	77.41667
Andhra Pradesh	ANANTAPUR	1997	Kharif	Maize	2800	4900	1.75	1.95E-06	14.55	77.41667
Andhra Pradesh	ANANTAPUR	1997	Kharif	Ragi	6700	11800	1.761194	1.20E-06	14.55	77.41667
Andhra Pradesh	ANANTAPUR	1997	Kharif	Rice	35000	75400	2.179076	1.44E-06	14.55	77.41667
Andhra Pradesh	ANANTAPUR	1997	Kharif	Sugarcane	700	22900	328.5439	9.08E-05	14.55	77.41667
Andhra Pradesh	ANANTAPUR	1997	Rabi	Groundnut	20300	21700	1.074237	7.30E-07	14.55	77.41667
Andhra Pradesh	ANANTAPUR	1997	Rabi	Jowar	18800	9400	6.5	3.40E-07	14.55	77.41667
Andhra Pradesh	ANANTAPUR	1997	Rabi	Maize	600	2400	4	2.72E-06	14.55	77.41667
Andhra Pradesh	ANANTAPUR	1997	Rabi	Ragi	600	1000	1.666667	1.13E-06	14.55	77.41667
Andhra Pradesh	ANANTAPUR	1997	Rabi	Rice	18800	37300	2.072222	1.41E-06	14.55	77.41667
Andhra Pradesh	ANANTAPUR	1997	Rabi	Wheat	300	200	0.666667	4.53E-07	14.55	77.41667
Andhra Pradesh	ANANTAPUR	1998	Kharif	Bajra	2400	1500	0.707059	4.97E-07	14.55	77.41667
Andhra Pradesh	ANANTAPUR	1998	Kharif	Groundnut	255000	86700	1.3481	7.81E-07	14.55	77.41667
Andhra Pradesh	ANANTAPUR	1998	Kharif	Jowar	3700	5800	1.567568	1.07E-06	14.55	77.41667
Andhra Pradesh	ANANTAPUR	1998	Kharif	Maize	3300	6700	2.030303	1.38E-06	14.55	77.41667

Figure-4: Dataset of previous year's predicted data

The above figure is more important and a difficult task to collect while doing the project. The dataset contains the more than 2 thousand rows and some columns for prediction. That contains mainly State name, District name, crop year, season, crop name, area, production, production area, state name, latitude and longitude. Tried to collect the data from the year 1997 to till date. So, by this can easily predict the result by previous year's data. So, this is the main part of the project.

V. RESULTS

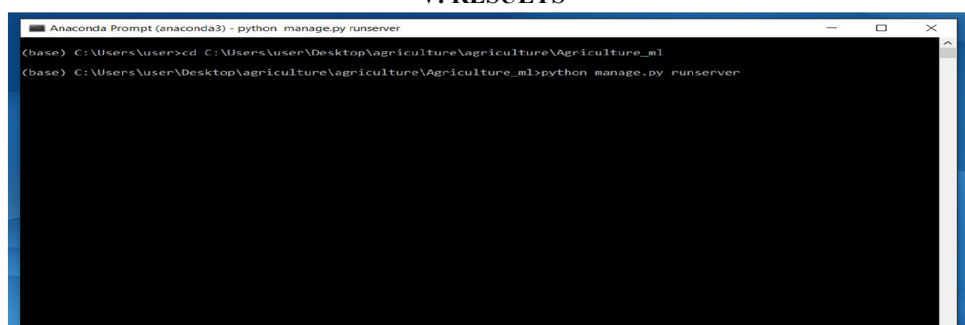
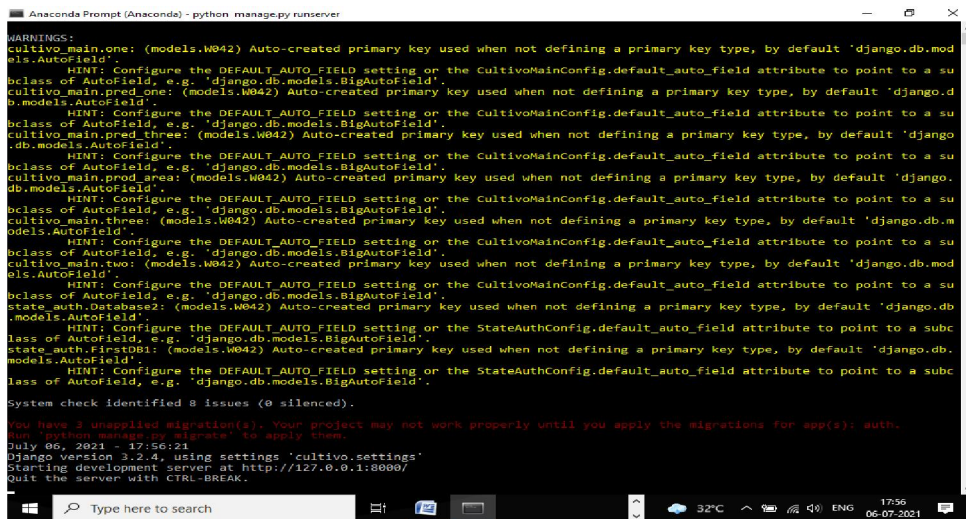


Figure-5: Path of the Project

In this page, the path of project can be see.



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Anaconda Prompt (Anaconda) - python manage.py runserver

WARNINGS:
cultivo_main.one: (models.W042) Auto-created primary key used when not defining a primary key type, by default 'django.db.mod
els.AutoField'.
  HINT: Configure the DEFAULT_AUTO_FIELD setting or the CultivoMainConfig.default_auto_field attribute to point to a su
bclass of AutoField, e.g. 'django.db.models.BigAutoField'.
cultivo_main.pred_one: (models.W042) Auto-created primary key used when not defining a primary key type, by default 'django.d
b.models.AutoField'.
  HINT: Configure the DEFAULT_AUTO_FIELD setting or the CultivoMainConfig.default_auto_field attribute to point to a su
bclass of AutoField, e.g. 'django.db.models.BigAutoField'.
cultivo_main.pred_three: (models.W042) Auto-created primary key used when not defining a primary key type, by default 'django.d
b.models.AutoField'.
  HINT: Configure the DEFAULT_AUTO_FIELD setting or the CultivoMainConfig.default_auto_field attribute to point to a su
bclass of AutoField, e.g. 'django.db.models.BigAutoField'.
cultivo_main.prod_area: (models.W042) Auto-created primary key used when not defining a primary key type, by default 'django.d
b.models.AutoField'.
  HINT: Configure the DEFAULT_AUTO_FIELD setting or the CultivoMainConfig.default_auto_field attribute to point to a su
bclass of AutoField, e.g. 'django.db.models.BigAutoField'.
cultivo_main.three: (models.W042) Auto-created primary key used when not defining a primary key type, by default 'django.db.m
odels.AutoField'.
  HINT: Configure the DEFAULT_AUTO_FIELD setting or the CultivoMainConfig.default_auto_field attribute to point to a su
bclass of AutoField, e.g. 'django.db.models.BigAutoField'.
cultivo_main.two: (models.W042) Auto-created primary key used when not defining a primary key type, by default 'django.db.mod
els.AutoField'.
  HINT: Configure the DEFAULT_AUTO_FIELD setting or the CultivoMainConfig.default_auto_field attribute to point to a su
bclass of AutoField, e.g. 'django.db.models.BigAutoField'.
state_auth.Database: (models.W042) Auto-created primary key used when not defining a primary key type, by default 'django.db
.models.AutoField'.
  HINT: Configure the DEFAULT_AUTO_FIELD setting or the StateAuthConfig.default_auto_field attribute to point to a subc
lass of AutoField, e.g. 'django.db.models.BigAutoField'.
state_auth.FirstDB1: (models.W042) Auto-created primary key used when not defining a primary key type, by default 'django.db.
models.AutoField'.
  HINT: Configure the DEFAULT_AUTO_FIELD setting or the StateAuthConfig.default_auto_field attribute to point to a subc
lass of AutoField, e.g. 'django.db.models.BigAutoField'.

System check identified 8 issues (0 silenced).
You have 3 unapplied migration(s). Your project may not work properly until you apply the migrations for app(s): auth.
Run 'python manage.py migrate' to apply them.
July 06, 2021 - 17:56:21
Django version 3.2.4, using settings 'cultivo.settings'
Starting development server at http://127.0.0.1:8000/
Quit the server with CTRL-BREAK.
  
```

Figure-5: Loading Process

In this page, the loading of the process can be seen and this is the background work.



Figure-6: User Login page

In this Page the User (Farmer) can login only after the Registration.



Figure-7: Django admin Login page

In this page the super user login and maintains the whole admin module



Figure-8: Admin control page

This is page of Admin control page, once super user logged-in this page will be redirected.



Figure- 9: State-AUTH Data upload page

This is page of Uploading of previous year Data to predict.



Figure-10: Output of weather and place

In this Result Page it shows weather report and place. This is the main output page.



Figure-11: Result of Prediction of crop in that place

In this Result Page it gives final prediction result of crop in that place. This is the main output page.

VI. CONCLUSION

As through in this work we are trying to tackle some serious problem of agriculture Industry that facing from farmers, since this is a machine learning prediction model, the input data plays a very important role here. To get accurate results, previous years data and other factors like weather, soil etc. and other information should be appropriate to get result because of this we used Linear Regression algorithm that which always independent data is depended on the other data for prediction or evaluates the result by previous data that would be helpful for farmer to cultivate their field by crop and can expect the profit on their crop.

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