



19TH MARCH, 2022

# PROFARM

AI-Based Crop Prediction and Yield Calculation  
Project

PRESENTED TO  
DIGITAL VILLAGE HACKATHON

PRESENTED WITH ❤ BY  
HARSH BANSAL

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# DISCUSSING THE PROBLEMS



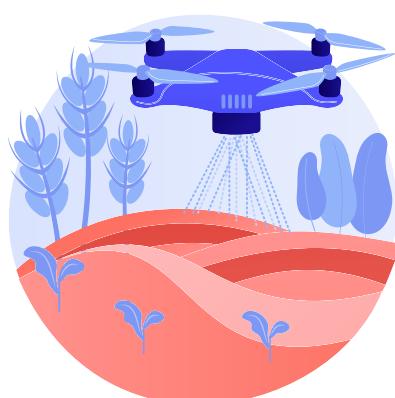
Agriculture is a primary activity. It includes growing crops, fruits, vegetables, flowers and rearing of livestock. In the world, 50 per cent of persons are engaged in agricultural activity. Two-thirds of India's population is still dependent on agriculture as a source of income.

Yet, lack of knowledge and proper resources have been a problem over all these years to our farmers. Not knowing what is best for the field, and being totally unaware of what could happen in the future, thousands of acres of land goes waste every year.

To tackle this problem of the farmer, not being sure of what should be grown, being uncertain about what yield will he receive, we have built a platform to support precision agriculture.

# ABOUT THE PROJECT

## BRIEF INTRODUCTION TO THE CONCEPT



**The Project is a 3-Step Web Application, which allows you to perform two tasks -**

1. Predict what crop would be best for the piece of land you own, based on factors like NPK Values and Environmental Factors.
2. Predict the Approximate Yield for a crop, based on Location and Type of Crop.

**Combined with an easy-to-use, versatile form, the UI allows the user to enter the required values, and processes it at the back-end to produce the desired results.**



# SERVICE 1 - CROP CHOICE PREDICTION

**STEP 1** Visit our Website

**STEP 2** Choose Crop Choice Prediction

**STEP 3** Enter NPK Ratios

**STEP 4** Enter other required parameters

**STEP 5** Get your Results!

For a farmer, the first part of the crop phase is deciding what is best for their field. As Crops are grown for a large period of time, it is important to take the right decision at the beginning itself.

The first service of our website, requires farm owners to input -

1. **Nitrogen, Phosphorus and Potassium Ratio in Soil**
2. **Rainfall** in mm (in the area)
3. **Soil pH Value**
4. Relative **Humidity** (in %)
5. **Temperature** (in Celsius)

After inputting the required values, the App processes **what crop is best for these conditions**, using **KNeighborsClassifier** algorithm.

Having a crop recommendation in his hand, a farmer will be more confident in his upcoming steps. It saves time, improves yield, and hence increases the efficiency of the Farmer.

# Demonstration of CROP CHOICE PREDICTION



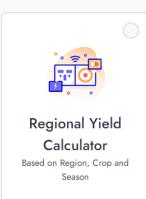
Step 1

## What kind of Services You need?

Choose from a variety of Free and Paid Services that suits your needs.

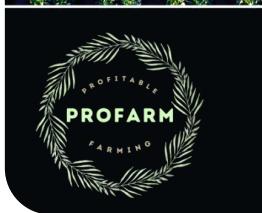


Crop Choice  
Prediction  
Using NPK and other  
Environmental Factors



Regional Yield  
Calculator  
Based on Region, Crop and  
Season

NEXT →



Step 2

2 of 3 completed

## Enter NPK

Enter the Values of Nitrogen, Phosphorus and Potassium contents in your soil.

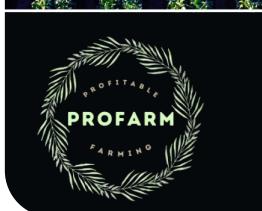
|              |
|--------------|
| Nitrogen *   |
| Phosphorus * |
| Potassium *  |

(Optional) Help us improve our accuracy.

Tell us how you calculated the values. (Sensor, Device, etc.)

Step - 1

## Choose the Service



Step 3

3 of 3 completed

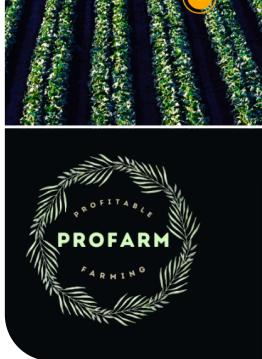
## More details about your Field

To provide you with the best results for you, we need a few more details

|                                |
|--------------------------------|
| Temperature (Degree Celsius) * |
| Relative Humidity Percentage * |
| Soil pH Value (0-14) *         |
| Rainfall in MM *               |

Step - 2

## Enter NPK Values



Step - 3

## Enter other required parameters

← BACK

SUBMIT →

# RESULT SLIDE OF CROP CHOICE PREDICTION



## Crop Recommendation : Rice

Thank you for choosing us to determine what's best  
for your Farm. Happy Farming

Calculation Accuracy -> 97.05%



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# SERVICE 2 - YIELD PREDICTION / DATA

**STEP 1** Visit our Website

Having information about the future has always benifitted as it has allowed people to take more calculated decisions.

**STEP 2** Choose Yield Calculator

The second service of our website requires the users to input -

1. **State** (location of farm)
2. **District**
3. **Crop Name** (for which yield is required)
4. **Crop Season** (Kharif, Rabi, Zaid, or Whole Year)
5. **Year Range** for which Yield is desired.
6. **Area under Cultivation** (optional)

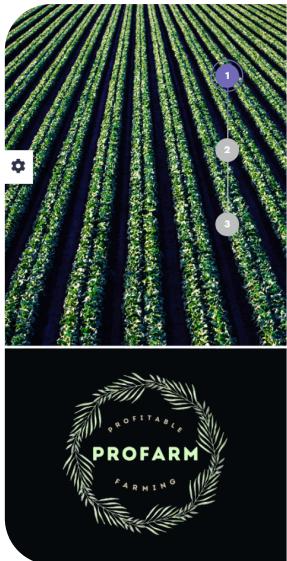
**STEP 3** Enter State and District

After inputting the required values, the Web-App **processes the Yield for the given crop and area**, and returns it, along with Net Production. This calculation is performed using **DecisionTreeRegression** algorithm.

**STEP 4** Enter other Crop Related Details

**STEP 5** Get your Results!

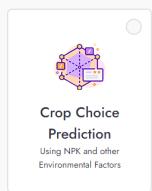
# Demonstration of YIELD PREDICTION / DATA



Step 1

## What kind of Services You need?

Choose from a variety of Free and Paid Services that suits your needs.



### Crop Choice Prediction

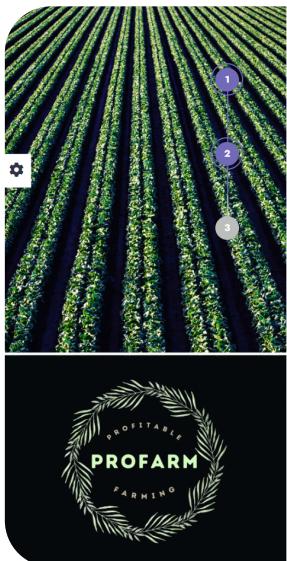
Using NPK and other  
Environmental Factors



### Regional Yield Calculator

Based on Region, Crop and  
Season

NEXT →



Step 2  
2 of 3 completed

## Location Information

Enter your Farm's Location Details - State and District

Choose your State

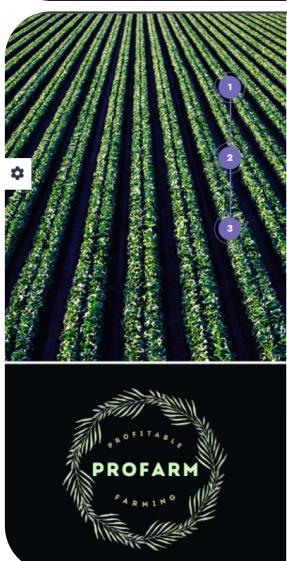
Choose your District

**Step - 1**

**Choose the Service**

**Step - 2**

**Enter Location  
Details**



Step 3

3 of 3 completed

## More details about your Field

To provide you with the best results for you, we need a few more details

Choose your Crop

Crop Season  
Season of Crop

Year Range

Area under Cultivation

(Optional) Help us grow.

Are you the Farm Owner or you work for Someone?

**Step - 3**

**Enter other  
required  
parameters**

# RESULT SLIDE OF CROP CHOICE PREDICTION



**Yield - 4.68 Tonnes / Hectare  
Net Production - 468 Tonnes**

Thank you for choosing us to determine what's best  
for your Farm. Happy Farming

Calculation Accuracy -> 97.38%



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# Scalability and Future Prospects

PROJECT PROPOSAL

Future Plans, areas of improvements, and expanding services in the App



## Integrating APIs for more Versatile Experience

This project has space for API Integrations in various steps of the form. **Finding location of the user using IP Geolocation, weather data of the region and integrating with autofill**, is something that can be done in future to increase usability. Moreover, **an API to detect crop season can also help save time** of the user when he visits the website.



## Adding More Services

Increasing the amount of **services the website provides, and bringing in other models as well to verify the integrity of the results** can greatly highlight the webapp, as it would be **an ALL-AT-ONE-PLACE model**, being a farmer's best partner in any decision he wishes to take.



## Revenue Generation through Paid Services

The project can be also expanded by providing Paid Services to the farmers. This is an addition that is sought to **add more value to the project**. As cloud costs come into action to keep the versatility intact, **this is something that needs to be implemented in due time to keep the project running**.

# SOME MORE FEATURES OF THE PROJECT

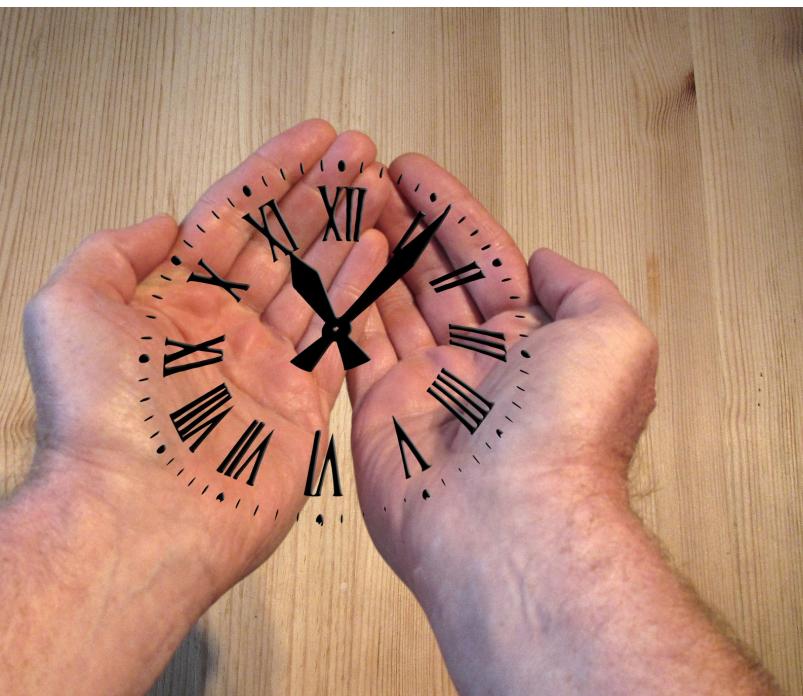
## Collection of Data

While we provide data to the users of the website, we also aim at collecting information from them. We try to gather information about what Sensors the user uses, what season of farming does he prefer, in order to use it in the development of this industry of Precision Agriculture.



## Very Extensive Dataset

Having a dataset with over 600K entries, our model is greatly reliable. Despite of such large datasets, the webapp runs with almost negligible delay in the processing, and displays results in a speedy fashion.



# Mission and Vision

The change we wish to bring to the field of Agriculture

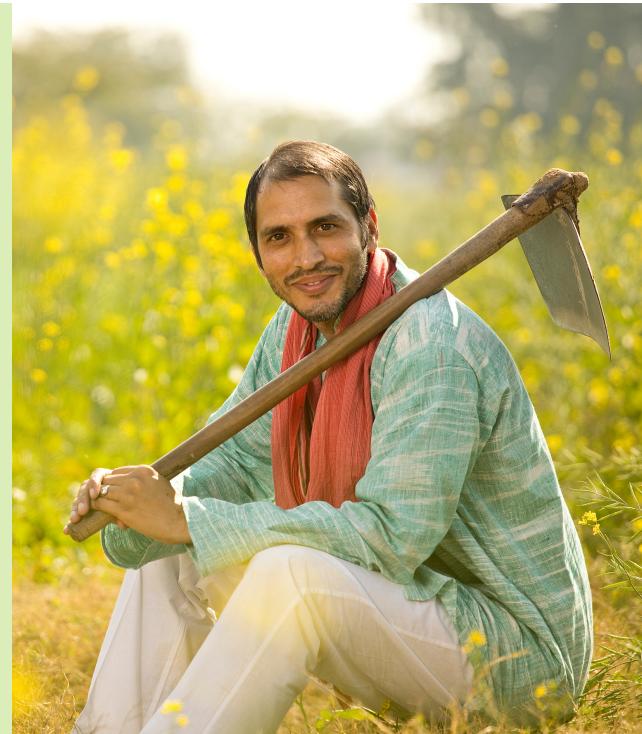


## Vision

We have a vision to expand this project, in order to get more out of the same platform, so the user doesn't have to rely on multiple platforms, as said above, increase his confidence and allow him to know what is going to happen in future.

## Mission

The mission of my project is to make the farmer be 100% confident about what decision he takes about his field, thus improve his net yield and income.



# REFERENCES

LINKS TO CONTENT USED AS REFERENCE FOR THIS PROJECT RELATED WORK



## *Datasets used in the project -*

### **Crop Prediction**

<https://www.kaggle.com/datasets/atharvaingle/crop-recommendation-dataset>

### **Yield Calculator**

<https://www.kaggle.com/datasets/pyatakov/india-agriculture-crop-production>

## *Technologies used in this project -*

### **Machine Learning**

Pandas, Numpy, Scikit-learn and Matplotlib

### **Web Framework**

Django (Python)

### **Cloud Services**

Google Cloud Platform



# SPECIAL MENTIONS

PEOPLE WHO WERE INDIRECTLY INVOLVED IN  
THE SUCCESSFUL CREATION OF THIS PROJECT

## Special Thanks to

**Members of Thapar Institute of Technology, Patiala**  
*for giving me a chance to present my idea before them, and learn so many new tech stacks that I hadn't explored before.*

**Dr. Kanu Goel**

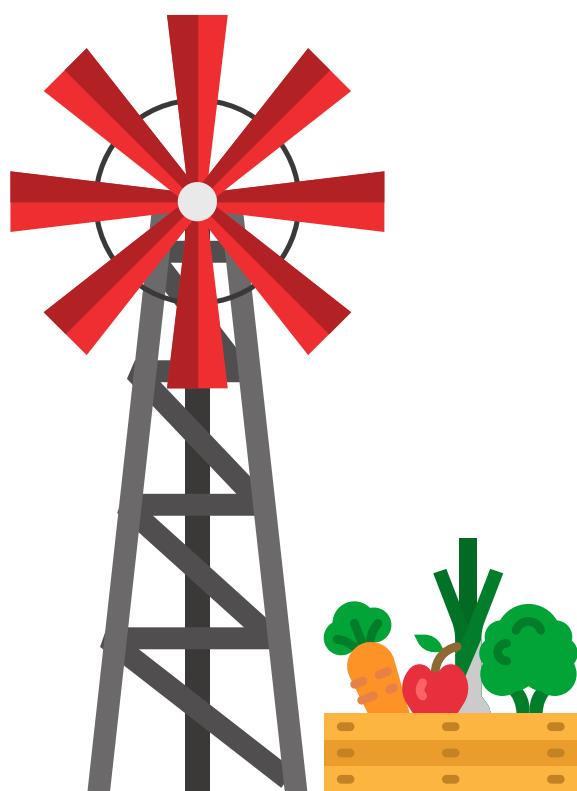
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