

# Fertilizer Recommendation System for Disease Prediction

## **Abstract:**

Farmers face several challenges when growing crops like uncertain irrigation, poor soil quality, etc. Especially in India, a major fraction of farmers do not have the knowledge to select appropriate crops and fertilizers. Moreover, crop failure due to disease causes a significant loss to the farmers, as well as the consumers. While there have been recent developments in the automated detection of these diseases using Machine Learning techniques, the utilization of Deep Learning has not been fully explored. Additionally, such models are not easy to use because of the high-quality data used in their training, lack of computational power, and poor generalizability of the models. To this end, we create an open-source easy-to-use web application to address some of these issues which may help improve crop production.

In particular, we support crop recommendation, fertilizer recommendation, plant disease prediction, and an interactive news feed. In addition, we also use interpretability techniques in an attempt to explain the prediction made by our disease detection model. While our application runs very smoothly, we have several directions in which we can improve our application. Firstly, for crop recommendation and fertilizer recommendation, we can provide the availability of the same on the popular shopping websites, and possibly allow users to buy the crops and fertilizers directly from our application.

## **Ideation Phase**

### **Define the Problem Statements**

#### **Customer Problem Statement Template:**

Create a problem statement to understand your customer's point of view. The Customer Problem Statement template helps you focus on what matters to create experiences people will love.

A well-articulated customer problem statement allows you and your team to find the ideal solution for the challenges your customers face. Throughout the process, you'll also be able to empathize with your customers, which helps you better understand how they perceive your product or service.

<b>I am</b>	Describe customer with 3-4 key characteristics - <i>who are they?</i>	Describe the customer and their attributes here
<b>I'm trying to</b>	List their outcome or "job" the care about - <i>what are they trying to achieve?</i>	List the thing they are trying to achieve here
<b>but</b>	Describe what problems or barriers stand in the way - <i>what bothers them most?</i>	Describe the problems or barriers that get in the way here
<b>because</b>	Enter the "root cause" of why the problem or barrier exists - <i>what needs to be solved?</i>	Describe the reason the problems or barriers exist
<b>which makes me feel</b>	Describe the emotions from the customer's point of view - <i>how does it impact them emotionally?</i>	Describe the emotions the result from experiencing the problems or barriers

Reference: <https://miro.com/templates/customer-problem-statement/> **Example:**

I am <b>a traveler</b>	I'm trying to <b>book flights on my phone</b>	but <b>it takes a long time</b>	Because <b>The website is not responsive and doesn't have a mobile version</b>	Which makes me feel <b>Frustrated</b>
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Problem Statement (PS)	I am (Customer)	I'm trying to	But	Because	Which makes me feel
PS-1	A man	can plant a tree	But the soil was so dry	He is unable to do longer with that tree	He gets frustrated
PS-2	A man	can plant a tree	Now the soil condition is good, ...but not the sunlight comes there	He is planting a tree behind the wall	He gets frustrated

## LITERATURE SURVEY

Here are some of the previous solutions that attempt to solve issues in fertilizer recommendation and disease prediction.

S. No	Author & Year	Title	Methodology	Dataset used	Inferences
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[1]	Dr.P. Pandi Selvi, P. Poornima (Mar-Apr 2021)	Soil Based Fertilizer Recommendation System for Crop Disease Prediction System	1. Registration phase 2. The user will upload the soil test report. 3. The corresponding crops infection status will be analyzed and recorded. 4. The fertilizers are recommended	Real time data recording	The proposed system was able to analyze the soil nutrient type efficiently, kind of leaf disease present in the crop and predict the fertilizer in a proficient manner. The approach was flexible, and can be extended to the needs of the users in a better manner. The proposed method was carried out with five different crops.
[2]	R.Neela nithiya (November 2019)	Fertilizers recommendation system for disease prediction in tree leaves	1.Using digital image processing 2.Admin can store the fertilizers based on diseases categorization on with severity levels	Digital image processing	The proposed method uses SVM to classify tree leaves,identify the disease and suggest

			3.compare the performance of the proposed SVM method with the existing CNN method		the fertilizers the proposed method is compared with the exiting CNN based leaf disease prediction
[3].	SK Mahmudul Hassan; Arnab Kumar Maji (January 2022)	Plant Disease Identification Using a Novel Convolutional Neural Network	1. Convolutional Neural Network 2. Residual Network 3. Depth wise Separable Convolution 4. Proposed Novel CNN Approach for Identification of Plant Diseases	Rice plant dataset, cassava plant dataset, and Plant village dataset	It can effectively classify the diseases in plants. Training the network requires much less time as compared to the standard CNN. The experimental result shows that the proposed model achieves good accuracy.
[4]	Archana chougule vijaykumarjha Debajyoti mukhopadhyay (July 2029)	Crop suitability and fertilizers recommendation using data mining techniques	1.Agriculture is the main source of income and survival in india for majority population 2.Various data mining techniques can be used for finding recommendation about corps and fertilizers 3.Recommendation of fertilizers is based on nitrogen,phosphorus and potassium measurements from soil 4.It helps to prevent the inappropriate application of fertilizers in wheat production systems in china	Fertilizers recommendation	As recommendation of fertilizers and crops is important for farmers in farming in design making thus aim of this system is to increase the production of crops by recommendation correct crop and fertilizer

[5]	Dr.P.Pandiselvi, p.poornima mar(april 2021)	Soil based fertilizer recommendation system for crop disease prediction system	1.The advanced farming involves various techniques as lot,cloud computing and data mining 2.The first step involved the registration phase 3.Second step the user will upload the soil test report 4.Finally the fertilizers are recommendation	IOT,cloud computing and data mining	The authors purposed a new approach for the soil basede fertilizers prediction system the purpose system was able to analyzs the soil nutrient type efficiently
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URL Reference:

[1] <http://www.ijetajournal.org/volume-8/issue-2/IJETA-V8I2P1.pdf>

[2] <http://www.ijstr.org/final-print/nov2019/Fertilizers-Recommendation-System-For-Disease-Prediction-In-Tree-Leave.pdf>

[3] <https://ieeexplore.ieee.org/document/9674894>

[4] [https://www.researchgate.net/publication/326304244\\_Crop\\_Suitability\\_and\\_Fertilizers\\_Recommendation\\_Using\\_Data\\_Mining\\_Techniques](https://www.researchgate.net/publication/326304244_Crop_Suitability_and_Fertilizers_Recommendation_Using_Data_Mining_Techniques)

[5] <http://www.ijetajournal.org/volume-8/issue-2/IJETA-V8I2P1.pdf>