# FERTILIZER RECOMMENDATION FOR DISEASE PREDICTION

## INTRODUCTION :

The early detection and identification of plant diseases using machine learning is particularly effective at providing symptoms. For the purpose of diagnosing plant diseases, plant pathologists can examine digital photographs utilizing digital image processing. Simply said, the use of computer vision and image processing techniques benefits farmers across all areas of agriculture. In most cases, aberrant physiological functioning of plants is what causes plant diseases. Therefore, the differentiation between the plants' regular physiological capabilities and aberrant physiological functionalities leads to the generation of the specific symptoms. The pathogens that often infect plant leaves are found on the stems of the plants.Different image processing techniques can forecast these various leaf signs and illnesses. These many approaches make use of several core techniques including segmentation, feature extraction, and classification, among others.Most often, segmentation is used to distinguish between healthy and diseased tissues of leaves in order to forecast and diagnose leaf diseases.

## LITERATURE REVIEW :

**[1]** The author proposes a method which helps us to predict the suitable nutrients for different crops and provide nutrients recommendations by analyzing the crop fertility and yield production,this paper proposes nutrient recommendations through an improved genetic algorithm (IGA) that uses time-series sensor data and recommends various crop settings.A neighborhood-based strategy is then presented to handle exploration and exploitation for optimizing the parameters to obtain the maximum yield.

**Advantages :**With time, crop fertility decreases due to the low level of nutrients. This crop model will help to increase yield by analysis of the seasonal fertility performance of the soil.The proposed method is also a useful tool to improve soil fertility performance by providing the nutrient recommendation of optimal conditions for crop development.

**Disadvantages :**Cannot plan to optimize the search strategy and individual repair methods to extract valuable parameters.

**[2]** The current framework on deciding soil nutrient substance and proposal for fertilizer isn't sufficiently proficient enough. This paper introduces a compelling technique for estimation of nutrient dimension in soil and suggestions for appropriate fertilizer. The proposed methodologies comprise of four stages: soil analysis, data pre-processing, data analysis and Recommendation. The soil sample is analyzed using an IoT based device Utilizing NPK sensors with two electrodes are set to calculate and collect the NPK ratio of the soil nutrient and for pre-processing, the data gathered from sensors are figured into the correct dataset and machine learning algorithm is utilized to recognize the reasonable fertilizer.

**Advantages :**This fertilizer recommendation system opens up new opportunities in the field of robotics to create autonomous mobile robots to spray appropriate fertilizer taking the NPK value into account. Smart farming and precision farming can be advanced by calculating the NPKvalue for more accurate values.

**Disadvantages :** Make the process complex because of customizing user priorities based on their region.

**[3]**Different Machine learning techniques are used and evaluated in agriculture for estimating the future year's crop production. This paper proposes and implements a system to predict crop yield from previous data.

This is achieved by applying machine learning algorithms like Support Vector Machine and Random Forest on agriculture data and recommends fertilizer suitable for every particular crop and focuses on creation of a prediction model which may be used for future prediction of crop yield.

**Advantages:**The prediction of crop yield based on location and proper implementation of algorithms have proved that the higher crop yield can be achieved.

**Disadvantages :**Crop disease detection using image processing in which users get pesticides based on disease images accuracy isless . Implement Smart Irrigation System for farms to get higher yield.

**[4]** This paper is focused on to support crop recommendation, fertilizer recommendation, plant disease prediction, and an interactive news-feed.
In addition, they also use interpretability techniques in an attempt to explain the prediction made by our disease detection model.

**Advantages:**The prediction is able to provide several features - crop recommendation using Random Forest algorithm, fertilizer recommendation using a rule based classification system, and crop disease detection using EfficientNet model on leaf images. The user can provide the input using forms on our user interface and quickly get their results.

**Disadvantages :**The model performs well only on the images which are from the classes the model already knows. It will not be able to detect the correct class for any out-of-domain data.

**[5]** The nutrient deficiency of the soil should be addressed by relating the result to the expected level of nutrient. Nutrient level additionally changes as the weather changes during the dry or wet season. The objective of this paper is to style a symbolic logic program that may offer plant food

recommendations supporting the season and Nitrogen-Phosphorus-Potassium (NPK) level of the soil.

**Advantages:**Season, nitrogen, phosphorus and K level is employed as input parameter of the fuzzy system. a completely different chemical combination is made depending on the variety of input parameters used.

**Disadvantages :**The system will not have any subsequent recommendations to further improve the research.

**[6]** The system comes with a model to be precise and accurate in predicting crop yield and deliver the end user with the proper recommendations about required fertilizer ratio based on atmospheric and soil parameters of the land which enhance to increase the crop yield and increase farmer revenue. Thus, the proposed system takes the data regarding the quality of soil and the weather-related information as an input. The quality of the soil such as Nitrogen, Phosphorous, Potassium and Ph value. Weather related information like Rainfall, Temperature and Humidity to predict the better crop.

**Advantages:**It will serve as a conduit for providing farmers with the information they need to earn a high return and, as a result, increase benefits, lowering self-destruction rates and reducing his obstacles.

**Disadvantages:** Voting classifier, which is nothing more than an ensemble of models, is used in the proposed work to create a crop prediction framework.

**[7]** Continuous cropping and over use of fertilizers cause the decline in soil productiveness and impact the environment as well The paper explains how the amount of soil vitamins and environmental factors followed by the pointers for cropping and special fertilization of the site can be established. 1 The selection of the best crop for the soil and the sowing of it to provide the full yield is one of the key problems in agriculture. The proposed method

takes the soil and PH samples as the input and helps to predict the crops that can be recommended suitable for the soil and fertilizer that can be used as the solution in the form of the webpage.

**Advantages:** Helps farmers in cultivating the best seed based on soil requirements so productivity increases and acquire profit with the support of big data analytics. Thus, improved crop prediction, opportunity to forward - and the help of weather forecasts to improve production at field and income rates.

**Disadvantages:** The data processing from the weather is not qualified enough to support this data. Mainly if any complex comparative of the data is required the similarity of the weather cannot be indulged in the data processing sector to control the computation time.

**[8]** The soil type, fertilizer recommendation, diseases in plants and leaves. All these features need to be considered. The proposed system was organized in such a way, to analyze the soil type, diseases in the leaves and finally to recommend the appropriate fertilizer to the farmers, that may be of great help to them. Plant disease, especially on leaves, is one of the major factors that reduce the yield in both quality and quantity of the food crops.

**Advantages:** 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.

**Disadvantages:** The method can be extended to include diverse varieties of crops to be cultivated and to analyze its performance.

**[9]** Soil testing is significant since it allows for the determination of soil fertility and hence crop prediction. Soil pH is a measure of the acidity and alkalinity in soils. pH levels range from 0 to 14, with 7 being neutral, below 7 acidic and above 7 alkaline. We have proposed a system which will have a device which gives pH value and we will estimate Nitrogen (N), Phosphorus (P) and Potassium (K) from the pH of that soil. We are using Machine Learning classification algorithm to predict suitable crops based on the values we get from our device and we will also provide suitable fertilizers required for that land.

**Advantages:** This technology will assist farmers in determining soil fertility and recommending which crops to grow. It also recommends the fertilizer that should be used to boost productivity. It detects many diseases in crops and recommends appropriate treatments to help them recover. It gives farmers the vital information about farming techniques to assist them enhance crop productivity.

**Disadvantages:** The device doesn't help farmers calculate crop MSP.The disease detection feature is not improved by adding dedicated cameras to the device, which will improve the device's accuracy even further.

**[10]** This proposed system  can help the farmers get good results within a small period of time. The project aims at making a Soil Fertility Analysis and Fertilizer Recommendation System which gives the soil nutrient level and the fertilizers to be used in real time. The relevance of this system is that once we get a dataset representing the nutrient level of soil samples, we can use this dataset to train our system and by testing with a new soil sample the system predicts whether the soil is fertile or not.

**Advantages:** Real time analysis will help the farmers save the time and also help eliminate any unintended errors. The classification is based on the soil

richness; hence the users of the system will be able to have a clear idea on their soil health.

**Disadvantages:** Predicting the crop that would be ideal for the given test sample with available nutrient levels is not one of the methods

**References:**

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