Fertilizer Recommendation Using Machine Learning

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Abstract- *Soil plays a significant role in agriculture and therefore the nutrients on the soil encompasses a direct impact on quality of crops growing thereon. each crop desires associate applicable combination of nutrients to live and grow healthy. Excessive quantity in plant food will be ototoxic to plant development whereas scarce nutrient level may cause sickness to plants. Nutrients in soil is classed in to 2 categories: macronutrients and micronutrients. Macronutrients includes Nitrogen, Phosphorus and K as primary parts and Sulphur, metallic element and metallic element as secondary parts. These area unit the weather that area unit required in comparatively giant amounts. whereas micronutrients embrace iron, boron, manganese, zinc, copper, gas and metallic element. These are also referred to as trace parts as a result of trace quantity of these parts is required by plants. Macronutrients specially N, Phosphorus and K or NPK is commonly the premise of the fertilizers because the 3 numbers that can be seen on a plant food label, indicates the proportion of each macronutrient that the plant food contains.*

I. INTRODUCTION

Soil plays a significant role in agriculture and therefore the nutrients on the soil encompasses a direct impact on quality of crops growing thereon. each crop desires associate applicable combination of nutrients to live and grow healthy. Excessive quantity in plant food will be ototoxic to plant development whereas scarce nutrient level may cause sickness to plants. Nutrients in soil is classed in to 2 categories: macronutrients and micronutrients. Macronutrients includes Nitrogen, Phosphorus and K as primary parts and Sulphur, metallic element and metallic element as secondary parts. These area unit the weather that area unit required in comparatively giant amounts. whereas micronutrients embrace iron, boron, manganese, zinc, copper, gas and metallic element. These are also referred to as trace parts as a result of trace quantity of

these parts is required by plants. Macronutrients specially N, Phosphorus and K or NPK is commonly the premise of the fertilizers because the 3 numbers that can be seen on a plant food label, indicates the proportion of each macronutrient that the plant food contains. Soil take a look at is conducted to spot the nutrient level of the soil. There area unit totally different soil take a look at techniques used and results of this take a look at will be analyzed to return up with a plant food recommendation applicable for a definite crop. 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 on dry or wet season. The objective of this paper is to style a symbolic logic program that may offer plant food recommendation supported the season and Nitrogen-Phosphorus-Potassium (NPK) level of the soil.

II. RELATED WORKS

Fuzzy logic is one among the techniques usually use by researchers for agricultural advancement and exactness farming. Developing agriculture with technology improves the crop production considerably and guaranteeing the quality of the crop. within the previous study, applications of mathematical logic in agro-industrial engineering ar mentioned. These includes assessment of land property, crop management, prediction of climate and digital soil mapping. Fuzzy may also be employed in classifying soil moisture. Another study uses mathematical logic to regulate lighting intensity for soil pH scale supported the temperature, humidity and lighting within the plant space. There ar many studies that uses completely different technologies for characteristic soil nutrients. In nutrients of the soil were detected victimization optical electrical device. NPK soil nutrients in ar measured supported the textural characteristics and evaluated with native binary pattern and back-propagation neural network. Another study uses embedded systems to analyze the

macronutrients in soil. There also are papers with quantitative analysis and vision system with fuzzy logic that uses Soil check Kit to see the extent of soil nutrients. In fuzzy system is employed to optimize the fertilizer rates for wheat crop. However, application of the fertilizer isn't mentioned within the study. Also, plant food is merely based on the NPK level of the soil.

III. FUZZY LOGIC

Fuzzy Logic (FL) was first of all introduced by L. A. Zadeh at the idea that characterised every object of a collection by a degree of membership functions from the interval [0,1]. Degree of similarity of associate degree object to the fuzzy set is outlined by the membership perform. In Sunshine State ideas like slow, fast or quick|in no time} are often developed mathematically and processed by the computers supported however human brain thinks and able to rationalize. A symbolic logic system has four parts particularly, fuzzifier, rule base, abstract thought engine, and defuzzifier. The first part is that the fuzzifier. This converts crisp inputs into fuzzy sets. Rules may be noninheritable from information or might be provided by AN skilled. These ar expressed as a gaggle of If Then statements. The reasoning engine combines these rules and therefore the membership operate to provide a fuzzy output. The form of membership operate like triangular, trapezoidal, Gaussian, sigmoid, hyperbola, triangular, etc. can be chosen indiscriminately. In this study, the researchers develop a fuzzy logic-based program which will offer AN acceptable quantity of plant food to soil considering the parameters like N (N), phosphorus (P), metallic element (K) level and season (S). The triangular membership operate is employed during this study. The parameters N, P, K and S were assessed within the fuzzification process. The vary of the values for these parameters ar. The membership functions for N ar Low (L), Moderately Low (ML), Moderately High (MH) and High (H). Rules area unit created once setting the values for the membership functions to see the suggested plant food supported season and NPK level of the soil. sixty-four rules area unit created and a few of them area unit shown in table a pair of. Figure a pair of- four shows the fuzzy rules surfaces pairing 2 parameters against the output. The defuzzifier is that the last element within the symbolic

logic System (FLS) that converts the fuzzy controller output to a crisp output

IV. RESULT AND DISCUSSION

In this study, totally different values of every parameter wherever used to take a look at the program. Figure five shows 5 samples of fertilizer recommendation for wet season whereas figure vi shows plant food recommendation for season. the worth of the NPK and season is evaluated by the fuzzy system to compute the acceptable quantity of plant food. The output of the symbolic logic is employed in an exceedingly easy algorithmic program to look at the results as shown within the figure. Four types of plant food area unit planned during this paper like 14-14-14 Complete, 46-0-0 or organic compound, 0-18-0 or Solophos and 0-0-60 or Muriate of potassium hydroxide. within the initial 2 example, similar NPK values however totally different season is evaluated by the system.Noticeably, the quantity of plant food for season, specifically organic compound is larger than the quantity in wet season because the season greatly affects the element nutrient of the soil. The counseled plant food is appropriate to use for rice in an inbred light-weight soilNoticeably, the quantity of plant food for season, specifically organic compound is larger than the quantity in wet season because the season greatly affects the element nutrient of the soil. The counseled plant food is appropriate to use for rice in an inbred light-weight soil.

CONCLUSION AND FUTURE WORKS

The result shows that the formal logic system is successfully developed and simulated so as to allow appropriate chemical recommendation. Season, nitrogen, phosphorus and K level is employed as input parameter of the fuzzy system. completely different chemical combination is made depending on the vary of input parameters used. The program was with success dead and done; However, the researchers would love to create the subsequent recommendations to more improve the research; (1) Used the counseled chemical to spot the accuracy of the result and (2) Connect the program to a soil check instrument.