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Crop Management Action Using IoT

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ABSTRACT: The United Nations states that the world population would increase by another 2 to 3 billion in 2050. While the additional land area under cultivation will only 4% at that time. In such case more efficient farming practices can be attained using the recent technological evolution and solutions to current technique in farming. A direct application of AI (Artificial Intelligence) or data analysis across the farming sector could act to be an epitome of shift in how farming is practiced today. Farming solutions which are AI powered enables a farmer to do more with less, enhancing the quality, also ensuring a quick action for crops. The current paper throws a vision of how the farmers do crop management action using efficient way.

KEYWORDS: Crop management, Artificial Intelligence, Crops, Farming, IoT

I.INTRODUCTION

India is an Agricultural country, and population of India is nearly about 130 Million. Due to the lack of expert, very big population every farmer is not able to take advise.The major anticipated applications of artificial intelligence technology in agriculture, the use of expert systems to plan and schedule in-season management activities for crops.Agriculture can be divided into multiple stages like sowing, irrigation, fertilization, etc. automating certain phases of agriculture like irrigation and pest control using artificial intelligence can be done, so there is an no need of expert. This can be achieved by using data analytics by storing the data about moisture in the soil over the period of year.If a crop is affected by any disease, then using AI farmer know which pesticides have to use, when to irrigate crop according to the moisture of soil which crop is better for sowing. After selecting the crop, using AI he get information about, how many distance is required between two seed particle

II.RELATED WORK

In [2] This paper deals with automating certain phases of agriculture like irrigation and pest control using artificial intelligence. This can be achieved by using data analytics by storing the data about moisture in the soil over the period of year. In [3] automation the system uses this data to maintain the moisture of soil to grow desired crops. The moisture level of the soil is recorded using the sensors which are located all over the soil. The automated system compares this data which is recently gather with the standard data which was stored in the system. In [4] automated system decides the amount of water needed to maintain the moisture level in soil and irrigates accordingly. Using a system of mechanical valves which are already installed in agriculture farm. But Valves are controlled electronically using predefined command from users. In [5]the proposed system automates this system by integrating it, using the concept of IOT, to its centralised computer system. Currently farmers use chemicals to kill the pest in farms whereas the proposed system uses ultrasonic sound emitter to keep the pests and rodents away. It is also scientifically proven that certain frequency of ultrasonic sound helps plant grow faster. So using all these techniques, low cost and efficient growth of crops can be achieved, which can help in development of agriculture and help farmers.

Agriculture is an important economic sector and provides employment to a large number of people throughout the globe. Automation in the agricultural sector is an important and emerging topic in the world. The need for automation is real and important because of the increasing global population. It is estimated that the world population can reach upto10 billion in the next 30 years. To full-fill the need of food to the increasing population is not possible with traditional methods. The main concern of this paper is to Audit the various applications of artificial intelligence in agriculture such as irrigation, fertilization, weeding, spraying etc with the help of sensors and other embedded in robots and drones. These technologies can save excess use of water, fertilizers, and pesticides. [10]

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Various ways in which AI can be used in agriculture are image recognition and perception, skills workforce, maximizing output and chatbots for farmers. Robots can also be used in agriculture for various tasks such as irrigation. Agriculture sector consumes 85% of available fresh water and the number is increasing with increase in population. This leaves us with the need to come up with more efficient irrigation techniques.

A smart irrigation technique is developed to increase the productivity without increasing the manpower, by detecting the moisture level, temperature of soil, nutrition available in the soil and weather forecasting. Drones can be used for Crop monitoring and Crop spraying[17]

III.PROPOSED WORK

Design:

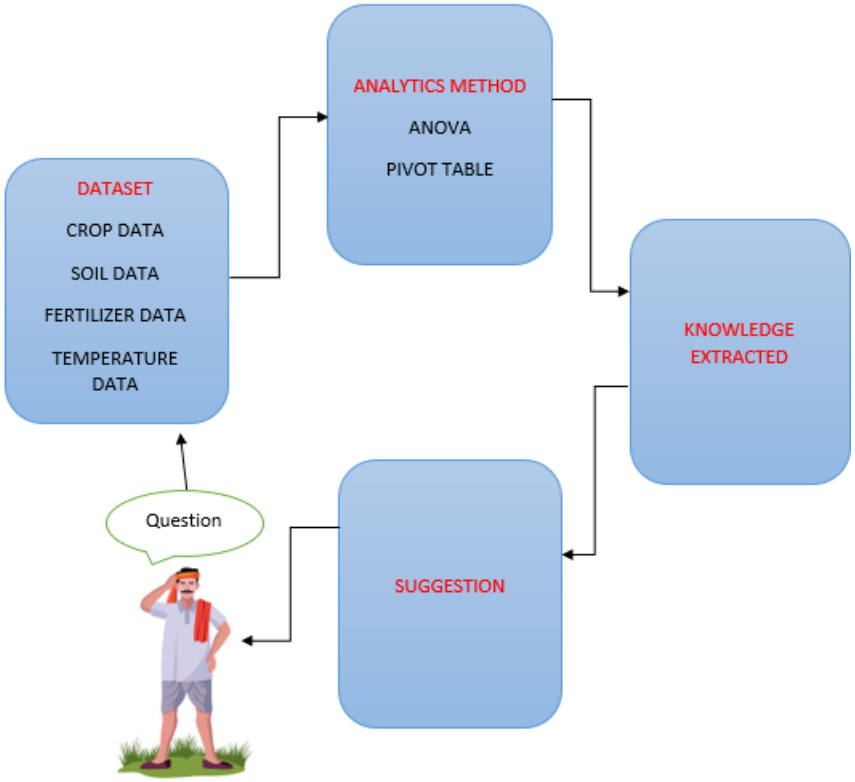

Figure 1: Design Model

Proposed system is slight differing from the existing system by applying our ideas and slight modification to the existing system. This work will give all the information together related to agriculture in a single system. It is mainly concentrated on various diseases of crops, irrigation insecticides or pesticides that should be used, and how and which fertilizer should be used to get more benefit. It also gives the information about crops according to the soil type, types of nutrients are presents in the soil

Do the following steps:

Step 1: Click Data Analysis on the Data tab.

Step 2: From the Data Analysis key, choose one-way Anova: Single Factor.

Step 3: Under Input bar, select the ranges for all columns of data.

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Step 4: In Grouped By, you have to choose Columns.

Step 5: Check the Labels checkbox if you have meaningful variables labels in row 1. This option helps make the output easier to interpret. Ensure that you include the label row in step3.

Step 6: Excel uses a default Alpha value of 0.05, which is usually a good value. Alpha is the significance level. Change this value only when you have a specific reason for doing so.

Step 7: Click OK.

IV.SIMULATION RESULTS

One-way Analysis of Variance (ANOVA) requires one categorical factor for the independent variable and a continuous variable for the dependent variable. The values of the categorical factor divide the continuous data into groups. The test determines whether the mean differences between these groups are statistically significant. For example, if fertilizer type is your categorical variable, you can determine whether the differences between plant growth means for at least three fertilizers are statistically significant.

Attributes Used:

1] Temperature 2] Humidity 3] Moisture 4] Soil Type 5] Crop Type

6] Nitrogen 7] Potassium 8] Phosphorous 9] Fertilizer Name

Based on this information you will know which crop is best for the soil in your field. You will also know which fertilizer to use by looking at the amount of Nitrogen, Phosphorus, Potassium in your soil. For this System we use ANOVA and Pivot table method. the test determines whether the mean differences between these groups are statistically significant. For example, if fertilizer type is your categorical variable, you can determine whether the differences between plant growth means for at least three fertilizers are statistically significant

Anova: Single Factor

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
Temparature	99	2998	30.28282828	12.26613069
Humidity	99	5856	59.15151515	34.10946197
Moisture	99	4275	43.18181818	127.0482375

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	41408.94	2	20704.46801	358.1595678	1.55E-79	3.026466
Within Groups	16995.54	294	57.80794338			
Total	58404.47	296				

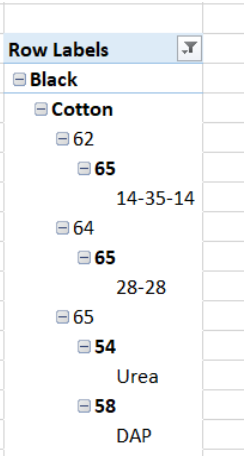

Figure 2: Choosing Crop

Attributes Used:

1] N(Nitrogen) 2] P(Phosphorus) 3] K(Potassium) 4] Ca(Calcium)

5] Mg(Magnesium) 6] Grain Surface 7] Particle Spacing 8] Particle Width

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Based on this you will know the particle spacing, particle width by looking the amount of Nitrogen, Phosphorus, Potassium, Calcium, Magnesium.

Anova: Single Factor

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
Sample ID	48	1176	24.5	196
ph	48	327.3505	6.8198	0.669
Temperature	48	1202.018	25.042	19.919
Humidity	48	3178.642	66.2217	333.54
Density	48	65.85	1.37188	0.0367
Electrical Conductivi	48	322.4	6.71667	10.167
N	48	3076	64.0833	1903.2
P	48	2644	55.0833	174.46
K	48	1615	33.6458	323.38
Ca	48	896.3	18.6729	278.16
Mg	48	567.65	11.826	27.044

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	264253	10	26425.3	88.985	1E-105	1.84901
Within Groups	153530	517	296.964			
	417783	527				

Figure 3:Variance Of Crop

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Row Labels	Sum of N	Sum of Mg	Sum of Ca	Sum of P	Sum of K
fibrous	**62**	**41.14**	**27.03**	**240**	**200**
close	**62**	**41.14**	**27.03**	**240**	**200**
narrow	62	41.14	27.03	240	200
girtty	**91**	**21.46**	**44.58**	**56**	**36**
crowded	**91**	**21.46**	**44.58**	**56**	**36**
broad	91	21.46	44.58	56	36
gritty	**1686**	**263.97**	**589.58**	**739**	**604**
crowded	**1686**	**263.97**	**589.58**	**739**	**604**
broad	1686	263.97	589.58	739	604
scaly	**629**	**139.03**	**123.81**	**992**	**512**
close	**629**	**139.03**	**123.81**	**992**	**512**
broad	531	111.78	106.94	792	398
NA	25	9.4	7.24	62	21
narrow	73	17.85	9.63	138	93
smooth	**608**	**102.05**	**111.3**	**617**	**263**
close	**504**	**63.98**	**84.88**	**365**	**185**
broad	300	37.48	42.58	268	124
narrow	204	26.5	42.3	97	61
crowded	**104**	**38.07**	**26.42**	**252**	**78**
broad	52	20.57	12.17	140	40
narrow	52	17.5	14.25	112	38
Grand Total	**3076**	**567.65**	**896.3**	**2644**	**1615**

Figure 4: Size between Two seeds

V.CONCLUSION AND FUTURE SCOPE

Simulation result showed that

- Farmers can perfectly schedule their farming activities.
- Farmers not require expert advice for farming.
- Farmers save their time and money for advice.
- Farmers will know which disease is affecting the crop, which spray to apply and when to apply it
- If the crop needs watering and spraying, then with the help of this system it will know what the crop needs first.

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