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SOIL ANALYSIS TO YIELD CROPS USING ANN

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Abstract - *The objective of this paper is to analyse the different parameters of soil to yield crops using Artificial Neural Network (ANN) in agricultural fields. Crop yield prediction has been a topic of interest for producers, and agricultural related organizations. To attain this Neural Network should be trained to perform correct prediction for farmers. After the network has been properly trained, it can be used to categorize the crop suitable for particular type of soil. Neural networks provide a very general way of the problems faced by the farmers regarding yielding of crops in the fields. We can predict the type of crop on the basis of their physical and chemical properties and specially the type of soil where the crop has to be grown. With the help of these testing techniques for examining the quality of the soil and crops suitable for cultivation in the soil, it is possible to determine the exact crop , irrigation patterns and types of crops suitable for the soil. By studying the various properties of soil, to determine the type of crops suitable for particular region can increase the yield to a great extent, which reduces the expenditures involved in irrigation and application of fertilizers. So the main aim is to analysis, adjustments, and establishment of crops growth factors and soil properties.*

Key Words: Artificial Neural Network (ANN), Crop Yield, Training, Pattern, Soil Parameters, Testing techniques, Neural Networks.

1.INTRODUCTION

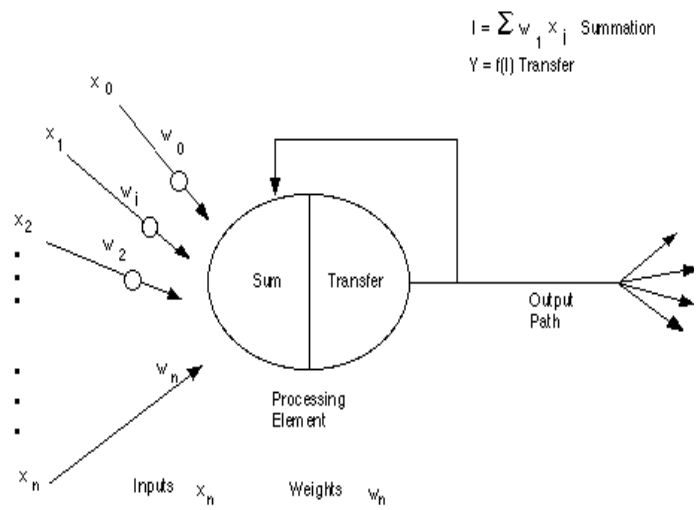
India is an emerging economic power with natural and human resources and also with a huge knowledge base. Ensuring security regarding food is the major problem our country is facing. The main aim of this project is to develop an auto-irrigation system which measures the moisture of the soil and other parameters including humidity, chemical composition, temperature etc. this project requires very less human involvement. The designed system can be used in turf grass or small gardens plants or fields.

An Artificial Neural Network (ANN) is a computational model based on the structure and functions of biological neural networks. Information that flows through the network affects the structure of the ANN because a neural network changes in a sense based on that input and output. It is an interconnected group of nodes, to the vast network of neurons in a brain. ANN is used in this project to calculate the different parameters of soil having different composition. The response curves generated by ANN are more informative than simple correlation coefficients in multiple regressions.

1.1 Artificial Neural Networks (ANN) :

Artificial Neural Network is based on the human brain's biological neural processes. ANN learns to recognize the patterns or relationships in the data by observing a large number of input and output examples. Once the neural network has been trained ,it can predict by detecting similar patterns in future data. They include the ability to learn and generalize to produce meaningful solutions to problems even when the input data contain errors or are incomplete, and to adapt solutions over time to compensate for changing circumstances and to process information rapidly.

Furthermore, A system may be nonlinear and multivariate, and the variables involved may have complex interrelationships. ANNs are capable of adapting their complexity, and their accuracy increases as more and more input data are made available to them. They are capable of extracting the relationship between input and output of a process without any knowledge of underlying principles. This adds analytical value, since it can extract relationship between governing the data that was not obvious using other analytical tools.



They help to characterize relationships via nonlinear, nonparametric interference technique; there is very rare and has many uses in a host of disciplines.

1.2 COMPONENTS USED :

1.2.1 PH PROBE:

FIGURE 1.2.1 PH PROBE

It is used for measuring the quality of water which depends upon the ph range of water required for a particular soil type. It is also used to measure the semi-solid substances such as food. It has the electrodes materials compatible with ingredients of food and is resistant to clogging. This probe can be used by dropping its nip into the soil to check its ph value for suitability of the crops.

MOISTURE DETECTOR PROBE:

FIGURE 1.2.2 MOISTURE DETECTOR PROBE

The moisture detector probe is used to help farmers to know the exact soil moisture on the fields. It helps the farmers to manage irrigation in the fields which increases the yield and quality of the particular crops. It takes time of 60 sec to detect the soil texture.

1.2.3 SOIL HUMIDITY SENSOR :

This sensor helps to detect the amount of water required in the crops in order to prevent the wastage of excess water. It is able to read the specific soil moisture content in both dry and wet soil and is based on soil restivity measurement.

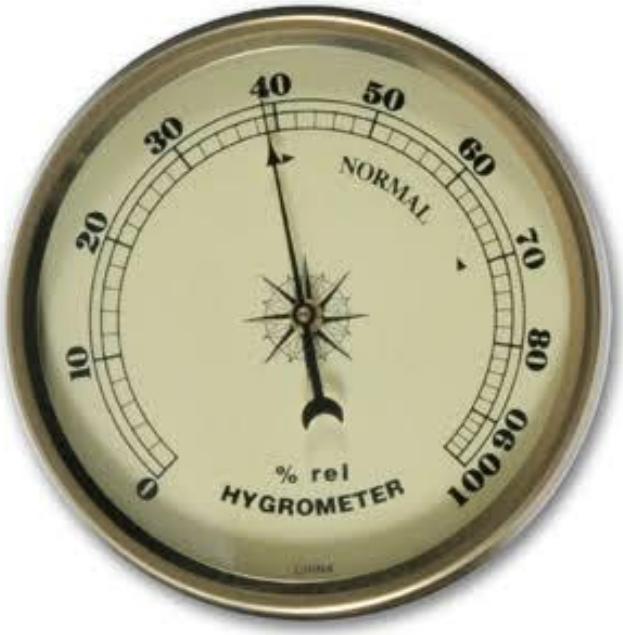


FIGURE 1.2.3 SOIL HUMIDITY SENSOR

1.2.4 TEMPERATURE SENSOR PROBE:

FIGURE 1.2.4 TEMPERATURE SENSOR PROBE

LM35 can be used as the temperature sensor in order to measure the temperature of the soil used for the crops. It has low self heating and also low cost due to low water level trimming.

2. SOIL ANALYSIS TO YIELD CROPS

This tabular form gives the information about the different parameters of soil used for yielding different crops in order to increase the cultivation in the fields. The different soil parameters include the different chemical and physical composition used for growing different crops in the fields. In order to test the soil composition different probes are used for measuring different parameters of soil and testing its texture.

Table -

SOIL ANALYSIS TO YIELD CROPS						
PH VALUE	TEMPERATURE	SODIUM (Na)	SOIL MOISTURE	POTASSIUM (K)	NITROGEN (N)	TYPE OF CROPS
3.3 - 8.5	18-27 C	35 mg	46-52%	12	1.2 kg/ha	MAIZE
5.5 - 6.5	21-24 C	2 mg	85%	1182 mg	1.6%	WHEAT
6.0 - 6.7	35 C	1mg	14%	43 mg	40%	RICE
5.0 - 6.5	27 C	187 mg	50%	30 g	0.3-0.5%	SUGAR - CANE

3. WAYS IN WHICH AVRs ARE BETTER THAN PICs.

AVR Good: Add with carry, and compare with carry simplify multiple precision arithmetic. Good range of conditional branches.

PIC bad : Unconventional mnemonic names. Only one pointer for indirections, inefficient lookup tables. No add/subtract with carry, small stack. Paged architecture becomes a real pain on larger projects, although the PIC 18 architecture addresses many of the issues.

More instructions per oscillator clock, but as most instruments take 2 cycles, and more instructions are often necessary for IO intensive tasks, this advantage is 2:1 at best. Most embedded apps are not especially throughout dependent. Also, crystals and resonators get bigger and

harder to get much belie about 3MHz,so the speed advantage over 4MHz PIC can often not be major issue.Power Consumption: Brownout detector on recent parts has much lower consumption than the PIC one, which is often useless for battery- powered apps.

3. CONCLUSIONS

Instead of random values if real values of soil properties of examining field are taken and if they are compared with standard data set, the above algorithm and code will give the accurate updation needed for soil composition. In present days, especially farmers are facing major problems in yielding their agricultural fields, it's because they don't have proper idea about what type of crop is suitable to their field. The technology helps them to yield more and more crops.

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