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Soil And Water Testing with Irrigation Controller System

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Abstract

Due to an ever-increasing population, crowd density estimation is an extremely significant factor that must be considered in today's times, and people counting is a critical subject in video surveillance applications. When a large group of people gathers, there is a risk of loss of life, property, and other things. Human action identification, crowd anomaly detection, and behavior analysis are some of the most popular disciplines of video processing study. This is where crowd density estimate, which is based on image and video processing, can help organizers of public events, railway security, college campuses, and other places maintain track of crowd density. Various image processing and video processing techniques are employed in this project effort to estimate the number of persons from a given video footage or image.

Keywords: *Crowd Detection, deep learning, image processing, video processing*

1. Introduction

As we know our Country belongs art of agriculture. To be specific more than 2/3% of our population is involved directly or indirectly in crop production sector of the agriculture. This agricultural sector contributes a great deal to our Countries economy. It contributes almost over 16.89% to 21.34% nearly the total of the Gross Domestic Product (GDP). Without using these smarter methods, the agricultural domain will remain in the backlogs. And thus there is a need for a smarter way for management of crop growth and production using Internet of Things (IOT) and Machine Learning techniques to enhance agricultural production.

But agricultural practices is not an easy task, it face many problems like, proper water supply, degrading soil quality , lack of market value and poor understanding, and also the need of manpower etc. As well as many farmers still don't have full control over there crops. Massive amount of crop gets destroyed due to unknown weather conditions and it also includes large amount of crops production damaged which happens due to heavy rain or no water, over exploitation of same land, mining activities, and improper negligent maintenance of the crops farms and supply of water. So there is a need to make some changes in the agriculture pattern and to gain and make use of information techniques to speed up the development to avoiding effect of land degradation and to make land reusable and reproductive.

2. Literature review

According to survey in India for the reduction of the Land degradation sustainable land management is done in which new technologies also have taken part. For e.g.; Soil and Water testing, Automated Irrigation system etc.For the reduction of land degradation not only sustainable land management but different types of analogy is also used which depends upon the data collected of soil and water testing and analysing it for the perfect or acceptable solutions for the problem related to it. In[1], Generic model based on constraint programming and multi-agent system for M2M services and agricultural decision support, the work is proposed to show the scheme of decision support system model which is able to use in

agriculture. In this paper basically the explanation and justification of hybrid system is given which uses the MAS that is multi-agent system and constant programming which includes its paradigm also then the show their specific approach to it controller agent concept is the base of MAS and CP systems as mentioned. Also they have presented the tactile of constrain and technologies to be used in distributor type of architectural upon their proposed approaches of various system. Likewise mention in above paper we have also used the system of sensors which basically focus on sensing with the help of Aurdino chip and all the various property of soil and water according to field area to bring land productivity again and also ensure that the crops remain in healthy environment in various areas of soil content it provided after sensing information data of that field. And the method search in agricultural field having soil and water combinations can be used for avoiding land degradation with the help of sensor device. In [2], Salvati, L., Zitti, M. et. al. the research work titled "assessing the impact of ecological and economic factors on land degradation vulnerability through multi way analysis" has proposed that the land degradation is the problem across the world due to changing climatic conditions. Here the author have introduced to a time series evaluation of land degradation Vulnerability and this whole analysis was done with 'GIS procedure' about 30 years at level of municipality and they have made the 'regional vulnerability evaluation model' by including the deep study of data indicators. Vulnerability increased in last years in the main city that is in the 'central Italy' of it on which it is based. And they have done the analysis to find out the relationship between indicators in the study period. They have uses multi-component analysis and the whole paper so as to calculate the 'Land Vulnerability Index 'and 'Environmental Sensitive Index' based on MDA. In [3], Soil moisture analysis is proposed in the interest of soil quality and the importance has come to forefront of environment sustainability. Over 25 billion dollars is spend in USA for soil improvement (1998,wallencw and terry). The need to improve our quality of life and we have to recognize the importance of soil resources. Soil quality is depend upon water quality also (Doran & parkinn,1994)(kennedie and pependick ,1995). So total availability of water is key factor ,therefore its important to find different soil texture and their water holding capacity. In [4], Water provision and Environmental usability was proposed and water provisioning was highlighted.Without proper distribution of water many challenges are faced by the environment globally as well as locally. After studying different water types proper chemical analysis can be done and solutions can be provided. In [5], snaking et al..proposed the detection of soil quality. Total 2 types of soil testing methods were proposed : i) soil testing in labs (in this method testing of soil sample is done in labs and it takes long period of time); ii) mobile testing method (it is easy and it may not required long period, with this technique people will test the soil and suggest the farmers about fertilizers or other methods of improving the quality). Again in 1996 doran and parking developed the minimum dataset for soil quality. In [6], P.R. Owens, E.M. Rutledge et.al., Soil texture and types were proposed using different types of soil that has different requirements and they have different properties as well. Soil texture is the most important for deciding which crop is the most suitable for this type of land only some particular crops can be grown or planted are decided according to soil properties itself.

3. METHODOLOGY

Production of crop primarily depend on soil fertility and moisture level present in soil and water & PH of soil and water. For suitable fertility level the soil and water nutrients or PH analysis is done mostly in lab & the manual or traditional methods of measuring soil nutrients are time consuming. Many farmers abstain to perform soil techniques in lab and grow some type of crop continuously so soil loses its level of fertility. So there are many systems that has been proposed to adopt site specific farming using soil texture and water provision table comparing to what % of water is required by what type of soil and until how long.

1.Soil Testing Device**:** we used it to measure humidity ,moisture ,temperature of soil to ensure the fertility of soil in agriculture & due to this we can easily select the suitable crops and fertilizer to be used.
2.Tensiometer: Tensiometer devices help us to measure the tension of soil water.
3. Soil/Moisture Sensors: In this the main purpose of soil and moisture sensor is measure the condition of water and soil. It is used in irrigation planning, climate research as well as in environmental science.
4. Arduino Chip: Arduino Chip which is electronic device based on hardware as well as software. We used it to read the data collected by the sensors and convert it into readable form , so with the help of Arduino chip we can easily read data .
5.Temperature probes: We use it to measures physical quantity of soil like temperature and all.

Hence to make it reproducible we have come up with new technology of using sensors to detect deficiencies of the particular barren land and afterwards we can allow that much amount of water, nutrients, and fertilizers to that land so that it can be reproducible again for taking crop production on it. And the sensor also uses the soil Testing device, Tensiometer, Soil Moisture Sensors, Arduino Chip and Temperature probes like wise.

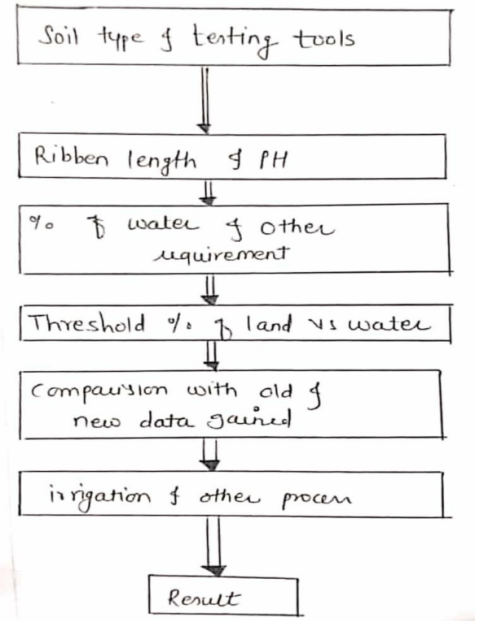

Figure 1. Flowchart for Proposed Controller system

A.Soil Type and Testing Tools:

There are mainly 4 types of soil – Sandy, Slit, Loam and Clay. Which differ each other by features such as ribbon length, root growth restriction, water holding capacity, particle size. For differentiating between these soil types some traditional as well as modern methods/tools are used as shown below:

Feel and appearance method- (traditional method) It is traditional method to find amount of water present in the soil. The feel and appearance of a soil depending on its texture and water content present in soil.

Soil moisture – (Modern Method) Soil moisture represents the percentage of water present with in a soil. With help of this method we can calculate percentage water present in soil.

B. Soil pH

Soil pH is a measure of the amount of acidity or alkalinity (basicity) that is present in the soil. Soil pH is a very import soil property Because Soil pH affects the amount of nutrients and chemicals that are soluble in soil water, and therefore we can find the amount of nutrients will plants need.

1.Plants cannot survive if the soil is too alkaline or acidic.
2.Different plants have there different requirements.
3.Plants like Indigo and Jute absorbs a lot of nutrients which later causes the land to turn barren.

Method	Low cost	Low technology	High accuracy	Low difficulty	Low need for training	Low maintenance or need to replace components	Less time consuming
pH meter	**	**	***	**	**	*	**
Color cards	*	**	**	**	**	*	**
pH strips	**	**	**	***	***	*	***
Vinegar and Baking Soda	***	***	*	***	***	***	***

Figure 2. pH table and rate of Alkalinity

C. % Of water and other requirement

Every crop require a fixed amount of water but is each and every crops on that field is receiving water or not is more important. With proper distribution of water, fertilizers and different weed protectors is also required but if used in more than required amount it can destroy the whole field even after all the efforts made for taking care of the crops.

So proper precautions should be taken and adequate and appropriate farming methodologies should be implemented and be taken into practice. Requirements Such as %of water, soil texture, Fertilizers, Proper farming methods and usability, ideologies used by farmers, weather conditions and crop breeding are the most important in the field of agriculture.

D. Threshold % of Land vs Water

This method determines the perfect value of water and soil type which are compatible for farther testing and plantation purpose. What type of land will be the most favourable and how much volume of water will be required can be retaliated together to get the perfect proportion or water vs land.

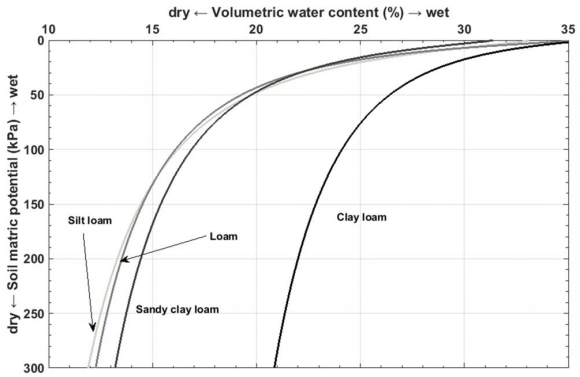

Figure 3. Volumetric water content vs soil matric graph

Various methods where in soil & water combinations are proposed in agriculture for more agricultural production of such system, the methods are like:

- Irrigation

- Dry farming
- Strip farming
- Contour farming

1) **Irrigation:** In irrigation the more important is soil and water quantity and also requires a through evolution of particular soil properties which will help to manage crops of irrigator.
2) **Dry farming:** it can be done on the dry lands by using irrigations in the regions where there is less availability of water and moisture less than 20 inches.
3) **Strip farming:** cultivation of field is done by forming long and narrow furrows, strips which needs repeatedly crop rotations. Used to overcome soil erosion effect also.
4) **Contour farming**: it has arrow patterns on fields on hilly areas and strips of equal widths. It is sustainable way of farming.

E. Soil and water relationship:

This is necessary to do the study of soil and water relationship, as the soil structure affect free path of air, water and plant roots in the soil. So to do any type of farming we need to focus on firstly soil and water's quality and quantity in particular field area. For sensing all this type of the information we have made this system efficiently.
We have increase the productivity of land by providing the appropriate amount of water and soil content as well as more important nutrient present in soil for healthy development of crops. And because of this the land degradation problem is come in our hand with a great solution as well as this sensor system can work greatly in any type of soil.

4. OBSERVATIONS

Some changes can be seen such as Improvement in land or soil quality and increase in productivity of land. If each and every step is considered and been implemented accordingly.
As problem faced during working with new data collected and the old data already present and preserved years after years for agriculture practices can lead to some errors or problem. Therefore different methodologies are being practiced which leads to different solutions so the conditional errors will be reduced and favourability for the crop production and other agricultural related fields can be increased.

Different practices leads to different results. The results can be favourable as well as non -favourable but using revised methods and technologies reduces the chances of failure.

5. CONCLUSION

This work concludes the Various Methods Where in Soil & Water Combinations Are Proposed in Agriculture for More Production for implementing SWOT system and evaluates the soil and water combinations to make use of barren lands for cultivation. Along these lines, for controlling land degradation this work gives a practical solution also for boosting the product yield of barren lands. This study has found that generally by using sensors we can enhance production and avoid the land degradation in better way.
The current way of agriculture practices feels outdated and needs to be improved as well as evolved and some significant changes in the way of agriculture need to be designed and implemented. We feel our project could help in evolving the way of farming and providing soil maintenance and most importantly provide specific data which is required, our way of farming will be very beneficial to all farmers or people. It will prove the fact that this new way of agriculture will develop and increase crop production.

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