International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 06 Issue: 12 | Dec 2019 www.irjet.net p-ISSN: 2395-0072

IOT BASED ANN FOR PREDICTION OF SOIL USING CLOUD AND AI

Ms. Rachana Mudholkar[1], Mrs. Nalini S. Jagtap[2], Mrs. Pratiksha Shevatekar[3]

[1]Asst. Prof., Dept. of Computer Engineering, Dr D. Y. Patil Inst. of Eng., Mgmt. and Research, Maharashtra, India.
[2]Asst. Prof., Dept. of Computer Engineering, Dr D. Y. Patil Inst. of Eng., Mgmt. and Research, Maharashtra, India.
[3]HOD., Dept. of Computer Engineering, Dr D. Y. Patil Inst. of Eng., Mgmt. and Research, Maharashtra, India.

Abstract – *This is a IoT based artificial neural network for analyzing soil and environmental elements to store and read data. By using this data our smart algorithms and AI system we are going to predict crop production scale and category. We are going to deploy multiple IoT nodes to different geographical area and reading data from that and accessing and processing the data. This smart node is connected to hidden nodes who process the data and send to server and then servers will clone this data to cloud. This system will help full to describe soil analysis and categorize the soil for different purpose like construction, farming, industrial use. Also this system will detect the soil for better and proper use of particular type land.*

Key Words: IoT, Soil, AI, Network, Arduino, Controller, C Programming, ANN

1. INTRODUCTION

Soil testing is often performed by commercial labs that offer a variety of tests, targeting groups of compounds and minerals. The advantages associated with local lab is that they are familiar with the chemistry of the soil in the area where the sample was taken. This enables technicians to recommend the tests that are most likely to reveal useful information. The amount of plant available soil phosphorus is most often measured with a chemical extraction method, and different countries have different standard methods. Just in Europe, more than 10 different soil P tests are currently in use and the results from these tests are not directly comparable with each other. Do-it-yourself kits usually only test for the three "major nutrients", and for soil acidity or pH level. Do-it-yourself kits are often sold at farming cooperatives, university labs, private labs, and some hardware and gardening stores. Electrical meters that measure pH, water content, and sometimes nutrient content of the soil are also available at many hardware stores. Laboratory tests are more accurate than tests with do-it-yourself kits and electrical meters. Here is an example soil sample report from one laboratory. Soil testing is used to facilitate fertilizer composition and dosage selection for land employed in both agricultural and horticultural industries. Prepaid mail-in kits for soil and ground water testing are available to facilitate the packaging and delivery of samples to a laboratory. Similarly, in 2004, laboratories began providing fertilizer recommendations along with the soil composition report. Lab tests are more accurate and often utilize very precise flow injection technology (or Near Infrared (NIR) scanning). In addition, lab tests frequently include professional interpretation of results and recommendations. Always refer to all proviso statements included in a lab report as they may outline any anomalies, exceptions, and shortcomings in the sampling and/or analytical process/results. Some laboratories analyze for all 13 mineral nutrients and a dozen non-essential, potentially toxic minerals utilizing the "universal soil extract ant" (ammonium bicarbonate DTPA).

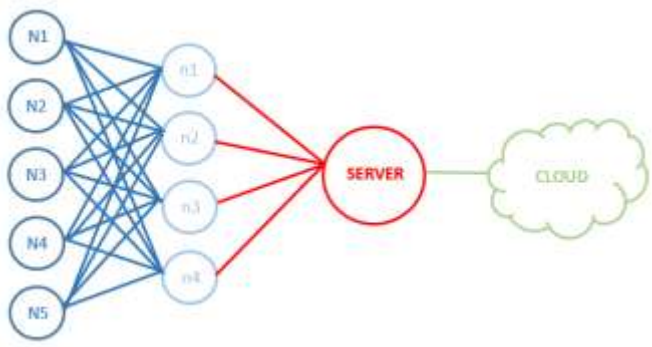

Fig -1: ANN Architecture

In agriculture, a soil test commonly refers to the analysis of a soil sample to determine nutrient content, composition, and other characteristics such as the acidity or pH level. A soil test can determine fertility, or the expected growth potential of the soil which indicates nutrient deficiencies, potential toxicities from excessive fertility and inhibitions from the presence of non-essential trace minerals. The test is used to mimic the function of roots to assimilate minerals. The expected rate of growth is modeled by the Law of the Maximum. Labs, such as those at Iowa State and Colorado State University, recommend that a soil test contains 10-20 sample points for every 40 acres (160,000 m2) of field. Tap water or chemicals can change the composition of the soil, and may need to be tested separately. As soil nutrients vary with depth and soil components change with time, the depth and timing of a sample may also affect results. Composite sampling can be performed by combining soil from several locations prior to analysis. This is a common procedure, but should be used judiciously to avoid skewing results. This procedure must be done so that government sampling requirements are met. A reference map should be created to record the location and quantity of field samples in order to properly interpret test results.

2 Literature Survey

Throughout the 1990's interest in soil quality and understanding its importance has come to the forefront of environmental sustainability. Over $25 billion is spent in the United States annually for soil care and improvement

(Wallace & Terry, 1998). The terms soil quality, soil degradation, soil health, and soil resilience are being used more frequently and with greater urgency in connection with strategies to protect our global environment. The needs to improve our quality of life and protect many scarce natural resources are forcing society to recognize the importance of their soil resource. Soil quality is frequently over-looked in a society that places more emphasis on water and air quality, likely because these resources have a more apparent connection to human health and existence. However, soil quality and land management both have a direct influence on water and atmospheric quality and, by extension, to human and animal health. Soil is a vital resource for producing the food and fiber needed to support an increasing world population . While seemingly a straight-forward concept, soil quality has been difficult to define and more difficult to quantify . Many feel that soil quality cannot be defined for a complex system as diverse and dynamic as soils. "Quality" and "soil quality" are seen by some to have infmite meanings and basically are indefinable . Others, however, have taken on the challenge of converting a subjective term such as "soil quality" into an objective characterize able term. The difficulty in establishing a definition comes from the variety of land uses, locations, environments, types of soils and general lack of understanding between the interactions 1 of a multitude of processes occurring within the soil . The definition of soil quality (and some may argue soil) is controlled by a multitude of variables. Additionally, not all involved accept the same terminology. Soil quality and soil health are often considered to have the same meaning (Chen, 1999). The term soil health is often preferred to soil quality by farmers, while scientists relate the term "soil health" to the status of various biological properties in the. A sound definition of soil quality.

3. PROPOSED SYSTEM

This is a IoT based artificial neural network for analyzing soil and environmental elements to store and read data. By using this data our smart algorithms and AI system we are going to predict crop production scale and category. We are going to deploy multiple IoT nodes to different geographical area and reading data from that and accessing and processing the data. This smart node is connected to hidden nodes who process the data and send to server and then servers will clone this data to cloud. This system will help full to describe soil analysis and categorize the soil for different purpose like construction, farming, industrial use. Also this system will detect the soil for better and proper use of particular type land.

4. SYSTEM ARCHITECTURE

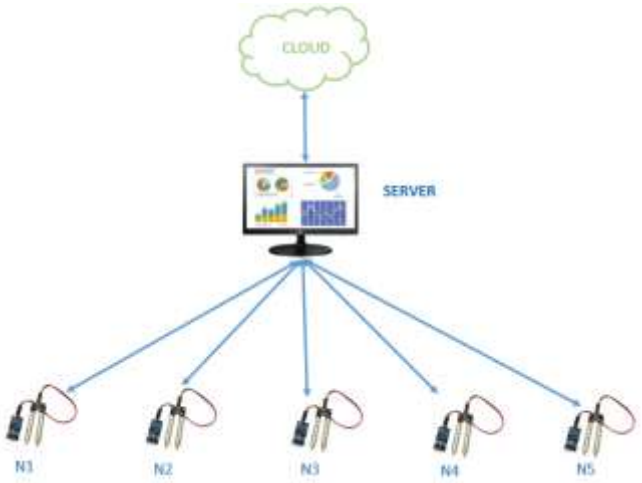

Fig -2: System Architecture

The purpose of this project is that to find usability of land for different categories like agricultural, industrial, construction and finding required element data centrally. All data is stores to cloud for global access.

In this system small wireless IoT nodes deployed on soil where need to get data from soil and that nodes connected to server where data will be validated and formatted and then stored to server.

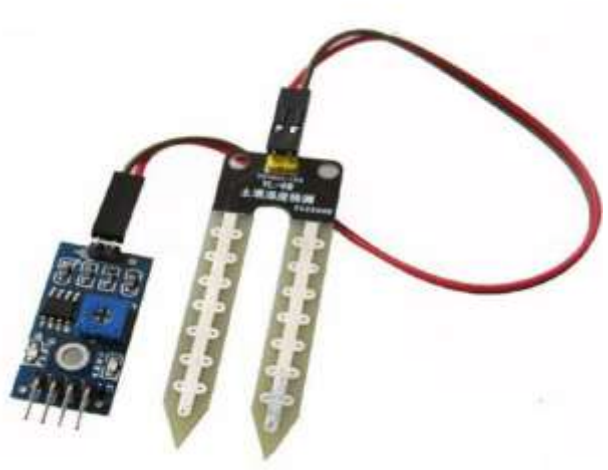

Fig -3: Soil Sensor

5. REQUIREMENTS

- OS : Android, Windows
- Device : Soil Sensor Module
- Microcontroller : Arduino Uno
- Sensor : Soil, Rain
- Platform : WEB, Cloud

6. CONCLUSION

This system is very useful for land management and testing centrally you will get information about nearby land and you can easily search required type of land. This system will find usability of land for different categories like agricultural, industrial, construction and finding required element data centrally. All data is stores to cloud for global access. In this system small wireless IoT nodes deployed on soil where need to get data from soil and that nodes connected to server where data will be validated and formatted and then stored to server.

REFERENCES

[1] Abdelhafid, R., S. Houtot, and E. Barriuso. 2000. Dependence of atrazine degradation on C and N availability in adapted and non-adapted soils. Soil BioI. Biochem. 35:389-401.

[2] Alef, K. 1995. Soil respiration. p. 214-219 In K. Alefand P. Nannipieri (ed.) Methods in applied soil microbiology and biochemistry. Harcourt Brace & Company, New York.

[3] Bonde, T.A., J. Schnurer, and T. Rosswall. 1998. Microbial biomass as a fraction of potentially mineralizable nitrogen in soils from long-term field experiments. Soil BioI. Biochem. 20:447-452

[4] Anderson, J.P.E., K.H. Domsch. 1989. Ratios of microbial biomass carbon to total organic carbon in arable soils. Soil BioI. Biochem. 21:471-479

[5] Blum, W.E.R. 1998. Basic concepts: Degradation, resilience, and rehabilitation. p. 1-16 In R.Lal et al. (ed.) Methods for assessment of soil degradation. CRC Press, Boca Raton, FL.

[6] Azevedo, J., and P.R. Stout. 1974. Farm animal manures: An overview of their role in the agricultural environment. California Agric. Exp. Stn. Manual 44

[7] Barker, A.V., M.L. Stratton, and J.E. Rechcigi. 2000. Soil and by-product characteristics that impact the beneficial use of by-products. p. 169-213. In D.L. Karlen et ai. (ed.) Agricultural utilization of urban and industrial by-products. ASA Spec. Pubi. 58. ASA, CSSA, and SSSA, Madison, WI.