

Utilization of IOT and AI for Agriculture Applications

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Abstract: Agriculture is essential for one and all. The demand of Food product is increasing, with the increasing population. It's Axiomatic statement that relentless farmers of late are having impaired status of agricultural products as a result of farming. It seems to be eccentric that there is sluggish advancement in the development of technologies in the field of agriculture that leads to the pertinacious efforts as a result in qualitative as well as in quantities approaches. We have proposed a system that ingress with the use of latest technology i.e. Internet of Things (IOT) in association with Artificial Intelligence and Image Processing which is obliging the agriculture in an efficient way

Index Terms: Internet of Things, Artificial Intelligence, Image Processing

I. INTRODUCTION

IOT has various applications in agriculture. It can be considered to be genesis for the modern agriculture of late. The lands for agriculture can be made propitious by several orders of magnitude. It can be done by collecting data and information's on various factors such as temperature, speed of wind, humidity, rainfall, content of soil and infestation of pest. This information's can be accessorized as a cornerstone for various agriculture techniques. The informed decisions can be used to enhance the qualitative as well as quantitative approaches. Furthermore, to limit the various risks and squander and reduce exertion required to oversee crops. By doing so the farmers can screen soil temperature and content of moisture from far off and may be able to address IOT gained information's or data for accurate fertilization programs.

A. Agriculture

Agriculture is essential for one and all of us by several orders of Magnitude. Every farmers of the world have a wish for the qualitative as well as quantitative farming by the use of latest technology that blaze an ample path for the world to live with lots of happiness with good health. One and all human beings are dependent on agriculture. It is the primary need of survival. For this Purpose, we have

proposed a system so that it can help effective farming in an efficient way which is the need for agriculture. [1-3][8-10]

B. Internet of Things

The internet of Things (IOT) is the part and parcel of interconnected networks of various physical devices, appliances used in home, vehicles and various things embedded and embellished with electronics, which is considered to be a real plum circumscribed by sensors and actuators, software and the type of network which empowers these things of interface and commute data, effectuating opportunities for one and possible integration of real time physical world into pc frameworks, bringing about productivity upgrades, economic improvement and diminished human efforts.

C. Artificial Intelligence

Artificial Intelligence can be defined as the knowledge shown by machines that act and think like human beings. (Fig.1). It performs a crackerjack job that is abiding in an intriguing way. Artificial intelligence plays vital role by several orders of magnitudes in real time. It has various applications in one and all fields of technology applications. It fulfills the necessary requirements without any restrictions.[5-7]



Fig.1 Artificial Intelligence Scenario

D. Image Processing

Digital Image Processing (DIP) is one of the important part of computer science. In order to achieve image processing various computer algorithms are used on digital image. Digital type of image processing has numerous preferences over Analog image processing as a field of DIP.[4] It permits algorithm which is applied to the input and keep away from issues of signal distortion and noise during processing.

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II. EXISTING METHODS

The antiquated methods for agriculture results with the less production in crops, with the increasing population there is more demand of food. In an attempt to proliferate the increasing demands IOT blaze an ample path. In Aug 2018, the commingling efforts of Toyota Tsusho in an association with Microsoft invented a tool for brainstorming prolific fish farming. Such invention foreshadows ameliorated in fish farming by use of Microsoft Azure Application suite for IOT advancements which is completely related with water Management. This system uses Artificial Intelligence to tally the quality and investigate the quantity of fish in a transport line and fro the data provided to derive the adequacy of water flow. The Azure IOT hub and Azure Machine learning uses specific Programming languages to operate. IOT involves numerous innovations that were initially developed for various Purposes like Bluetooth, GSM, Wi-Fi, and LTE yet in addition uses numerous advances, particularly intended for use in IOT. They exist for various instances i.e. SigFox, Dash-7 Alliance type protocol of version 1.0, Lora WAN, RPMA, IEEE 802.11ah, nwave. The Primary trademark of the system is particularly intended for low utilization of energy. Wireless sensor networks in combination with internet of things plays vital role in Agriculture. Using various kinds of Sensors such as moisture sensor, Temperature sensor, humidity sensor, Pressure sensor, rain sensor we can approximate the current information's Regarding the Farm lands. Thereby we can get information's and IOT detects the scenario of farm lands. Automation helps where there is need for the required amount of contents even in our absence.

III. CHALLENGES IN THOSE SYSTEMS

Technology is changing the entire world. One and all the things are related with technology by several orders of magnitude. These pulchritudinous changes with plethora of facilities made us as fit as fiddle. In the ancient days' people were dependent on traditional farming. Health is the basic need for everyone and life is for living. Therefore, an unhealthy person cannot make proper use of his/her life. He/she is not only deprived of his/her life but also of joys and pleasure. Health is essential for one and all. With the growing human population, the demand of food items is also decreasing. With limited land there is need to grow enough food items for everyone. For that we are completely dependent on modern agriculture. This consists of use of Internet of things, Artificial intelligence techniques and digital image processing. the main goal is to surmise the condition of crops and what next is to be done for the betterment of the crops in qualitative as well as in quantitative ways.

IV. PROPOSED METHODOLOGY

In this system we have planned for using Artificial Intelligence (AI) associated with IOT using drones over the Agricultural lands. Drones help to check the current status of the farm lands and sends the information's through image Processing. Drones helps mostly in soil field Analysis, crop Monitoring, health assessment of the crops in the field. This helps the farm lands by all odds. The Artificial Technique helps in progress of the crops. The current status of the crops can be observed through Image Processing Technique. Overall the whole farm lands can be controlled by IOT (Fig.3,4). Therefore, the plants growing in an unhealthy way can be observed and necessary treatment is automated were required.

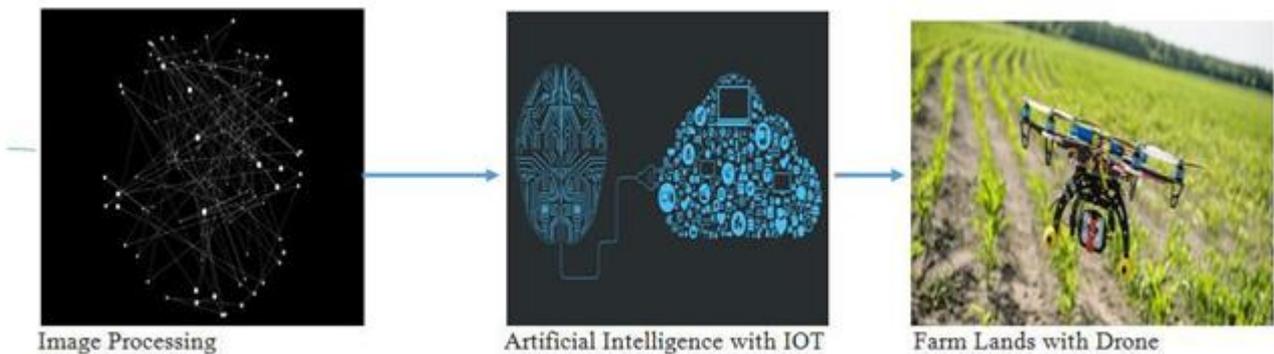


Fig.3 Processing Stages

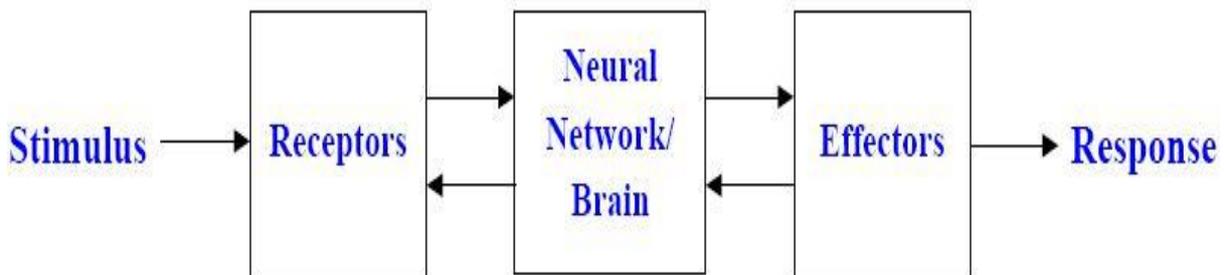


Fig.4 Outline network

Neural Networks of Artificial Intelligence are abridged with artificial neurons that blaze an ample path for approximations part of genuine type brains professed by either simulation results on computers or might be physical devices. (Fig.5). It can also be described as one and only parallel type computational framework comprising of numerous basic preparing components associated together with a particular goal in mind so as to play out a specific role. One and all information's are transferred as a progression in the form of electric impulses. Furtherance encoding of the information's is done with the help of frequency in addition to the phase that lend credence of spikes. In the framework of biological interconnected systems, one neuron can be associated with upwards of 10,000 different neurons. For the most part, there exists a receptive field circumscribed in an area where one neuron gets information from different neurons. The artificial neurons are simplified models of their biological counterparts. ANN is a technique for solving problems by constructing algorithm that works like our brains.

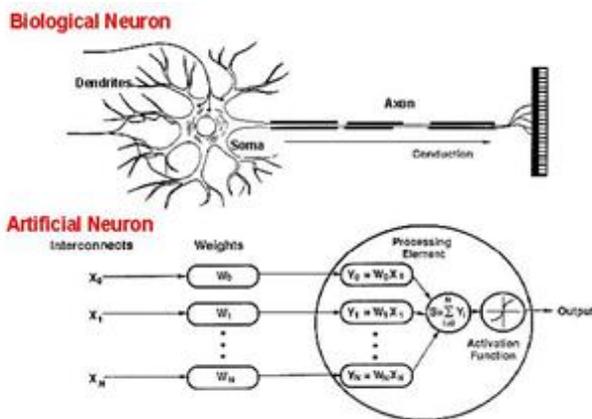


Fig.5 ANN structure

V. ANALYSIS

The main purpose of our proposed project is identifying the condition of farming lands in real time i.e. identifying the current scenario of the crops in one and all the seasons. The desired response of the system is that —cold is perceived if a cold stimulus is applied for two time steps|

- $y_2(t) = x_2(t-2)$ AND $x_2(t-1)$
- It is also required that —heat be perceived if either a hot stimulus is applied or a cold stimulus is applied briefly (for one-time step) and then removed (Fig.6)|
- $y_1(t) = \{x_1(t-1)\}$ OR $\{x_2(t-3)$ AND NOT $x_2(t-2)\}$

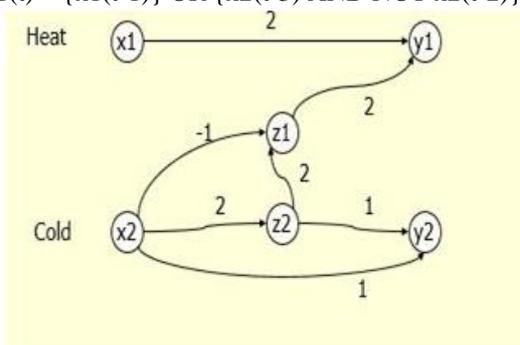


Fig.6 Hot or a cold stimulus representation

The McCulloch-Pitts Neuron is boundlessly streamlined model of neurons and is otherwise called a Threshold Logic Unit. It comprises of a lot of neural connections and activation is done from different neurons. Moreover, when the total sum of inputs is being processed with the activation of non-linear function, the output line transmits the outcome to different neurons. It consists of a number of nerves which is the right way to bring neurons in activation. In addition, the input lines gather in multiple input signal that can be multiplied by a weight to supply a weighted signal to the summation unit where the values are summed to supply the input activation to the threshold logic unit. The threshold logic unit compares the input activation to a threshold value. By using this process, we can use it to implement the basic logic gates To locate the proper association weights and neuron limits to create the correct outputs for each arrangement of inputs is to be done. It is then an outstanding outcome from these logics that can be used to develop any consistent capacity from these three tasks. As a result, there exists a boggling design than a straightforward perceptron. We for the most part need to abstain from breaking down complex issues into basic logics, by analyzing the thresholds and weights that work legitimately in a Perceptron design. (Fig.7).

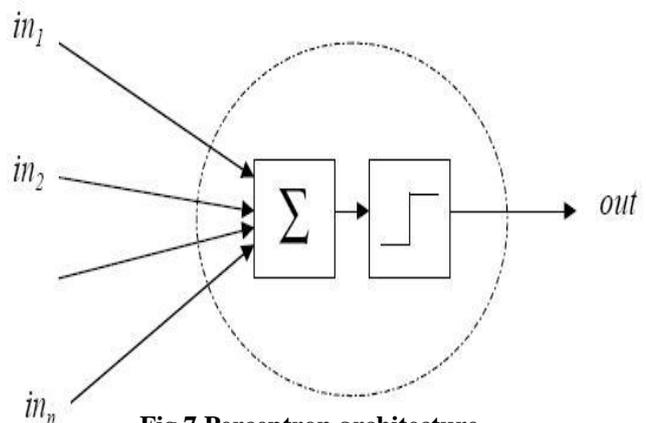


Fig.7 Perceptron architecture

The McCulloch-Pitts neuron model (Threshold Logic Unit) is an unrefined estimation to neurons of real types that plays out a basic summation and thresholding capacity when gets activated. We can interface any number of McCulloch-Pitts neurons together in any capacity we like. the set of arrangement that includes one input A course of action of one input layer of McCulloch-Pitts neurons encouraging forward to one output layer of McCulloch-Pitts neurons is known as a perception (Fig.8)



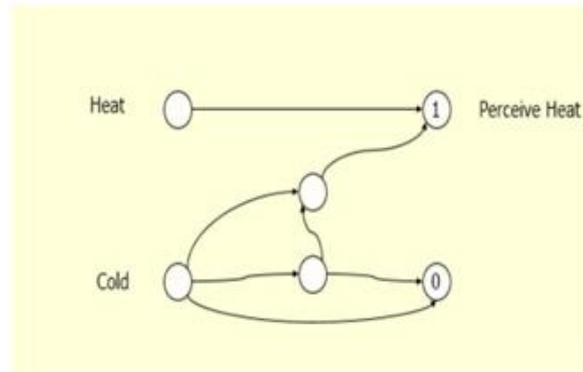
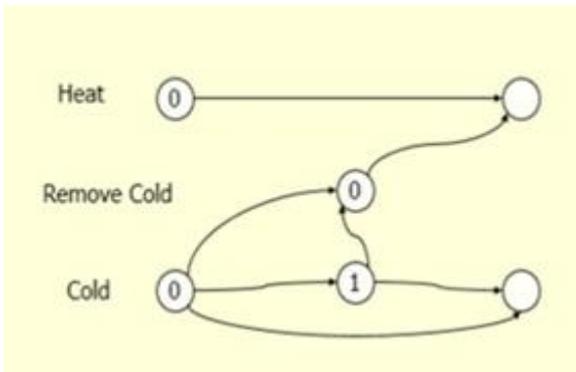
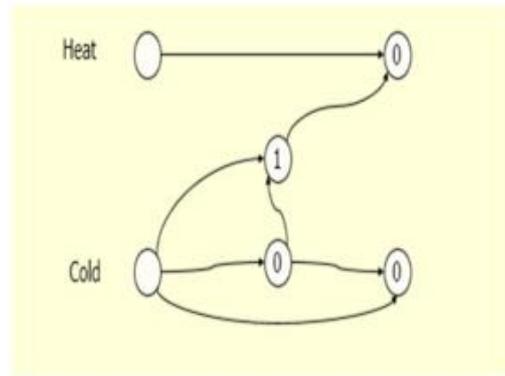
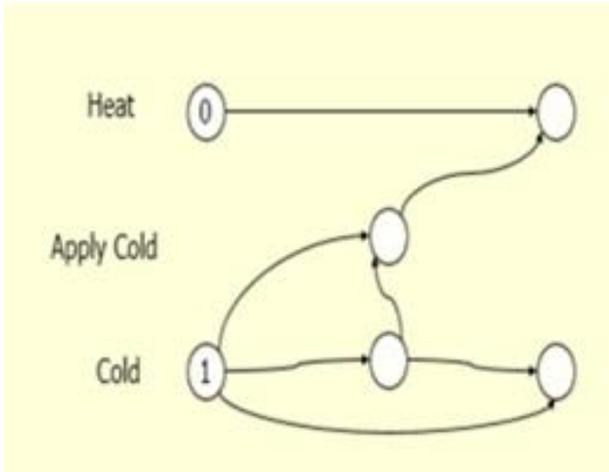


Fig. 8 Removal of Cold stimulus

One individual neuron can't do much without anyone else. Generally, we will have numerous neurons as, k, i, j and activation streams between them by means of neural connections i.e. synapses with qualities w_{ki} , w_{ij} (Fig.9)

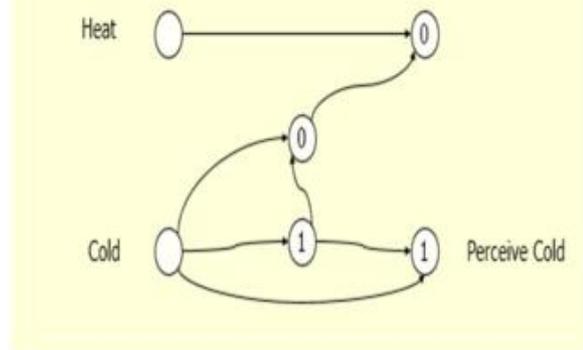


Fig.9 Activation flow stages

Implementation of Logical NOT, AND, and OR is done and in rare case we are using Logical XOR. Each preparation design creates a straight disparity for the results regarding the sources of information and the system parameters. These can be utilized to figure the thresholds as well as weights.

VI. CONCLUSION AND FUTURE SCOPE

Thus we can say that Artificial Intelligence plays significant role in the field of Agriculture. To recapitulate the proposed model in several orders of magnitudes, we have chosen the concept of Artificial Neural Network, Internet of things, Digital Image processing and Concept of logic gates. The condition of environment will help to know the overwhelming understanding of the current situation of the Agricultural Lands. This will help one and all the farmers of the world to have digital understanding, its use in efficient ways.

Thus, in this we can increase the Agricultural Products in qualitative as well as in quantitative ways which will help the entire world with the necessary food items in efficient ways. We have plan in future to use the concept in the real time environment and to update it with more latest concepts.

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