

# Artificial Intelligence in Indian Irrigation

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## ABSTRACT

Agriculture Automation is the major concern for India owing to the agricultural complexities resulting in decreased production of the crop and farmers commit suicide due to the heavy loss incurred. India is considered to be an agricultural country where farming and agriculture is the main occupation throughout. With the increase of population, the food demand is ought to increase manifold, thereby, the need of advanced agricultural systems has been elevated. It is imperative to apply artificial intelligence in irrigation process to increase the production. Various implementations have been made with the help of Artificial Intelligence and other Expert Systems. This research paper focuses on the use of Artificial Intelligence in Indian Irrigation. Further it focusses on the blending of embedded technology and Artificial Intelligence in agricultural sector. There are some areas which create hindrance in the agricultural fields like storage management, water management, control of pesticides and fertilizers, crop diseases, and lack of irrigation. These are some of the major problems that are faced by the Indian agricultural sector. India is facing a lot of issues of availability of water for irrigation and government is working for the same in order to implement automation in agricultural sector. Agricultural Automation concentrating more on efficient irrigation can be achieved by making use of the latest technologies like Artificial Intelligence and Machine Learning. Arduino and Raspberry devices can be embedded with moisture and temperature sensors along with the help of Machine Learning algorithms to attain advancement in irrigation. The world is getting advanced in terms of technology and the data storage as well as management of sensors is shifted towards online cloud. This makes it easy for the users to access the data from anywhere at any moment. Automatic irrigation is a vital topic for the evapotranspiration process and the crop prediction. Evapotranspiration process is the process of water management and the hydrologic cycle to develop a sustainable irrigation method. The paper discusses the application of Artificial Intelligence and other embedded systems in the agricultural sector by keeping in mind the past breakthroughs. The problem of water usage that is faced by the farmers will be solved with the help of the smart irrigation system. It is a fully automated irrigation system that is easily accessible and very beneficial for the future of agriculture.

**Keywords :** Artificial Intelligence, Irrigation, Automation

## I. INTRODUCTION

Irrigation system and Agriculture automation are becoming one of the significant concerns and emerging subject for each country. When various kinds of research have been approved like the application of fuzzy logic and Neuro-Fuzzy logic,

automation applying skilled systems and AI that led to significant aids. Primarily, this research will propose the issue of AI, machine learning, and embedded systems related to this field. It will further underline the blending of Artificial Intelligence and embedded technology in the Irrigation systems in India. There are still some kinds of challenges that are causing the

difficulties to agriculture area such as Crop diseases influxes, deficiency of storage management, pesticide control, weed management, deficiency of irrigation and water channelized system. In an emerging country like India, where water is one of the main constraints for people in agriculture industries, and the government is trying to offer more and more supports to apply automation in irrigation and agriculture. As the researchers suggest, the automation could be successfully attained along with implanted system through applying the Arduino and Raspberry pi3 with the moisture and temperature sensor through increasing the machine learning procedures as well as increasing important IoT.

As global trends are more tuning to the online storage resources; cloud computing is the main selection for information storage and management came from the sensors and effectively accountable from the user's devices. The automation in Irrigation with the application of the implanted process is also a crucial topic for the crop forecast, evapotranspiration procedure. This study will discuss the penetration of AI and implanted technologies in the irrigation industry and system through underlining prior innovations. The challenge of water usage around the farmers in India leads to smart irrigation process that would also result in the effective application of water resources. Through qualitative and quantitative research methods, this paper will endeavour to prove the irrigation system projected in India is a fully computerised and efficiently reachable process that would be helpful to the agriculture automation to future scopes.

## II. METHODS AND MATERIAL

### SCOPE OF ARTIFICIAL INTELLIGENT IN IRRIGATION

Irrigation is seeing quick implementation of Machine Learning (ML) and Artificial Intelligence (AI) as far as

both agricultural products and in-field irrigation systems. Psychological processing specifically, is good to go to turn into the most problematic innovation in irrigation benefits as it can comprehend, learn, and react to various circumstances (in light of figuring out how) to expand effectiveness. Giving some of these resolutions as an assistance like chat bot or other conversational stage to every one farmer will enable them to keep pace with innovative progressions just as apply the equivalent in their day-by-day irrigation to get the profits of this service. Recently, Microsoft is operational with over 175 farmers in India to give recommended services to planting, land, manure, etc. This activity has just brought about 30% better return per hectare on a normal contrasted with a year ago. Given underneath are top six areas where the utilization of cognitive solution can profit irrigation.

### INTELLIGENT IOT BASED IRRIGATION DEVELOPMENT

The current Agricultural checking framework has utilized remote sensors for observing the soil condition for irrigation. Additionally a portion of the framework has utilized versatile handset likewise for conveyance. In none of these frameworks, there exists intelligence, which examines the constant information dependent on experience for watering the field. The greater part of the framework just captures the information from the field. In terms of AI, research has been done towards harvest yield and crop disease expectation as it were. There has been no exploration detailed which utilizes AI analysis towards breaking down the soil condition based on prepared informational set for irrigating the field naturally with no human involvement.

### MACHINE LEARNING IN IRRIGATION MONITORING

Machine learning has numerous usages in the field of irrigation. In one of the examinations, Machine

learning been useful towards Grape development. In here, farmer's can't recognize the ailment physically on the grapes. The infection on grapes is recognizable simply after the disease, which takes a parcel of time and furthermore has a negative impact on the vineyards. Therefore, a monitoring framework is created for grape development where relative humidity, temperature, and leaf wetness sensors are conveyed in the vineyard. The information gathered at customary interims are sent using the ZigBee module to the server. The server here utilizes the shrouded Markova model calculation towards preparing the informational collections relating to Temperature, relative moistness and leaf wetness for dissecting the information towards foreseeing the chance of illness on grapes before being contaminated.

#### IMAGE-BASED INSIGHT GENERATION

Accuracy irrigation is one of the most debated fields in agriculture currently. Drones can aid in top to bottom areas of investigation, crop checking, examining of farms, etc. PC vision innovation, IOT and automaton information can be consolidated to guarantee fast activities by farmer's. Feeds from automaton image information can create alarms continuously to quicken exactness agriculture.

Firms like Aerialtronics have actualized the Visual Recognition APIs and IBM Watson IoT in business rambles for picture examination continuously.

#### AUTOMATION TECHNIQUES IN IRRIGATION AND ENABLING FARMERS

Regarding the human intensified forms in agriculture, irrigation is one such procedure. Machineries set on chronicled environment design, quality of soil and sort of harvests to be advanced, can computerized irrigation and rise generally income. With nearly seventy percent of the country's crisp water used in

the irrigation, computerization can empower growers to more readily deal with their water issues.

### III. RESULTS AND DISCUSSION

#### PRECISION IRRIGATION

This is a progressively exact and controlled procedure that replaces the dreary and work escalated some portion of cultivating. In addition gives direction about yield pivot, water management, harvesting time, optimum planting and crop rotation.

##### A. Objectives for precision irrigation

- Profitability: Recognizing yields and marketplace deliberately as well as foreseeing return on investment dependent on expense and margin.
- Effectiveness: By putting resources into accuracy calculation, improved, faster and less expensive irrigation prospects can be used. It allows general accuracy and effective use of resources.
- Sustainability: Advanced, ecological social and financial act guarantees gradual upgrades each season for all the presentation pointers.

#### INSTANCES OF PRECISION IRRIGATION MANAGEMENT

Observation of stress and anxiety in a seedling is got from the 3D pictures and various sensor information on. This huge set of information from various sources should be utilized as a contribution for Machine Knowledge to empower information combination and highlight observation of stress acknowledgment.

AI models prepared on crop pictures can be used to perceive feelings of anxiety in crops. The whole method can be grouped into four phases of observation, qualifications, evaluation plus forecast to settle on better choices.

## NEED FOR SMART IRRIGATION SYSTEMS

Brief Report on water problems in India: India and China alone constitute 2.7 billion people living under the stress of water shortage. Out of overall water consumption, 70% is consumed in the agricultural process. Remaining is used in infrastructural pipelines and other miscellaneous works. Water leakage is inevitable and uncontrollable in cities. Water demand will shoot up by 50% shortly and this fact cannot be vetoed away.

## CHALLENGES IN AI ADOPTION IN IRRIGATION IN INDIA

There are a number of environmental factors that plays a vital role in the usage of irrigation system. Weather is unpredictable and can cause quite a lot of challenges due to its nature. Let us look at the same with an example. Corn is one such crop which is quite tricky since the growth of the crop slows down if there is too much of dryness due to warmer temperatures. The Artificial Intelligence based algorithm helps to identify factors like air temperature and the changing weather conditions to ensure the crop gets the right amount of irrigation for its growth.

Notwithstanding the fact that AI provides tremendous open doors for use in irrigation, there still subsists lack of familiarity machine learning AI preparations in farmers oblique over most places in India. Exposure of irrigation to external variables like environment conditions, nature of soil and occurrence of pest is a significantly a lot. Therefore, what may look like a decent agreement while arranging during the commencement of harvesting, may not be an ideal one on account of variations in outer factors. Artificial intelligence structures likewise need an unlimited deal of data to make machines and to create exact expectations. If there should arise an occurrence of immense irrigation area, however spatial data can be accumulated efficiently, fleeting material is hard to get.

For example, a large portion of the harvest clear data can be obtained annually in a year when the yields are emerging. Since the information framework sets apart effort to advance, it necessitates a lot of time to construct a vigorous AI model. It is one drive behind why artificial intelligence gets a great deal of operation in agricultural items, for instance, pesticides, manure, seeds, etc. as opposed to in-field exactness preparations.

## IV. CONCLUSION AND RECOMMENDATION

In conclusion irrigation farming depends generally on selection of subjective preparations. Though enormous scale study is still in expansion and a few applications are now available in the marketplace, the production is still profoundly underserved. Concerning taking care of practical problems observed by growers and using self-ruling basic leadership and perceptive solutions to tackle them.

In order to explore the entire extent of artificial intelligence in irrigation, usage should be gradually hearty. At precisely that argument it will have the alternative to deal with unvarying variations in external conditions, facilitate real-time simple control and use proper system for collecting relevant information in a skillful way.

Another important viewpoint is the extravagant expenditure of several particular preparations available in the marketplace for irrigation. The preparations ought to turn out to be progressively moderate to assure the invention reaches the majority. An exposed source phase would make the preparations increasingly equitable, bringing about fast reception and higher entrance among the farmers.

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