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ANALYZING IRRIGARION QUALITY TO POTENTIALLY IMPROVE SUGARCANE YIELD USING AGRICULTURE DATA ANALYTICS

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Abstract— Agriculture is the foundation of Indian economy. Sugarcane is one of the widely developed harvests in Tamilnadu. Big data are emerging précised and viable analytical tool in agricultural research field. This study paper facilitates the farmers to improve the crop yield. The object of the present study was to investigate the relationship between the chemical properties of water and sugarcane yield, by this means identifying the water parameters that determine the final productivity of the yield. The Sugarcane fields monitored during the cultivation for water samples and yield data collected annually. A random forest algorithm applied to investigate the influence of different water attributes on yield using by collected data, over the study period. The irrigation mainly depends on several parameters of water, which is termed as Electrical Conductivity (EC) node and Sodium Absorption Ratio (SAR) node under the Residual Sodium Carbonate (RSC) finalized. From the final report of the RSC that concluded with four types of Soil. The water irrigation prediction is important for farmers and it maintained with the help of previously available data. An irrigation influenced by salinity, alkalinity, sodicity and surface hardening of the soils. The results show that the amount of available water EC, PH, and Alkalinity. Sugarcane farmers are consistently in the expedition for higher harvest yields, higher expanded profit.

I. INTRODUCTION

The huge information examination is the logical informational index with a mix of information volume, information speed and information assortment that incorporate complex investigation and complex information type. Huge information gets the change accuracy horticulture, continuous the verifiable information gathered from the informational index. The water Irrigation is a significant issue in farming issue. The water system investigation is helpful for farmers to choose which sort of harvests to be developed in a specific area. In water system framework, we have different issues like saltiness, PH, CSR, EC, RSC. Mostly the Natural happening of salt blend in bore well water. The acidity or basicity of water system anticipated as pH. Typically, low pH or High pH is in the basic quickened water system framework. pH <7.0 acidity>7.0 is Basic. In bore well water, we should valuate under CSR condition EC-Electricity Connectivity availability, Sodium Absorption Ratio (SAR), and Residual Sodium Carbonate (RSC). The Irrigation water estimated quantitatively in term of EC and all respects firmly identified with the real alert or Anions controlled by synthetic Analysis. The Sugarcane is an important cash crop that grows in different agro-climatic zones, tropical and subtropical regions in India. It is the second-largest growing non-food crop.

RELATED WORK

Sirisha Adamala introduced and actualized in this investigation papers with huge information applications and water Resources building by utilizing AI, inquire about [1] the water administrators, is demonstrating huge guarantee in many water related application, for example, arranging ideal water frameworks, identifying biological system changes through enormous remote detecting and land data framework, estimate, anticipating, recognizing normal and man-made disasters, booking water systems, relieving natural contamination, contemplating environmental change impacts etc.

International Journal of Engineering Research and Science & Technology

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Vol. 21, Issue 1, 2025

Shruti Bonsod Arduino based water Irrigation system [2] this paper introduces a novel methodology towards viable water system framework. Dampness sensors, submersible water siphon and hand-off instrument. The two dampness sensors sense the state of dryness of soil at two better places on the field feed the sign to the framework will take the contributions from both the sensor and dependent on that it will choose how much water ought to be provided. This framework will keep on taking the contribution from the sensors until there is adequate measure of dampness in the soil and after that, it will naturally kill the siphon. This water system framework will diminish the hardship of farmers.

D. S. Dasare Automatic irrigation control system [3] In this paper displayed the field of horticulture utilization of legitimate technique for water system is significant and it is notable that water system by dribble is exceptionally practical and proficient, water level of stream water siphon position and so on is must to know to farmer. Low cost answers for water irrigation and obtain good yield on crops.

S. P. P. Kolhe, [4] Data innovation is generally utilized in present day rural water system frameworks to improve the nourishment creation. In this paper we present for different purposes about current water system frameworks with the utilization of data innovation in water system framework in water system area of farming whether parameter, water accessibility, water request, crop water prerequisites, crop generation depends water supply to make water supply plans. The board of water accessibility in water system booking crops the board-mechanized water system.

Y. Shekhar Intelligent IoT Based Automated Irrigation System this paper exhibited Internet of Thing based robotized water system framework where Sensor information relating to [5] soil dampness and temperature caught and in like manner, KNN order AI calculation conveyed for examining the sensor information for forecast towards flooding the dirt for expectation towards inundating the soil with water.

S. Kumawat, Sensor Based Automatic Irrigation System and Soil pH Recognition utilizing an Image Processing Development of agribusiness is necessary [6]. The ranchers are experiencing the absence of downpours and shortage of water. The primary target of this paper is giving a programmed water system framework, along these lines sparing the time, cash and intensity of the rancher. The customary farmland water system strategies require manual intercession can be limited. Soil is perceived as one of the most profitable characteristic asset whose dirt pH property used to portray the level of sharpness or basicity, which influences supplement accessibility, and at last plant development.

A. Kartakoullis, A Review of the Practice of Big Data Analysis in Agriculture [7] the investigation of huge information would empower ranchers and organizations to concentrate an incentive from it improving their productivity. Perform a survey of flow studies and research works in horticulture which utilize the ongoing routine with regards to enormous information examination so as to illuminate different significant problems. The developing water requests have raised genuine worry for the fate of Irrigated agribusiness. The information of harvest water request is a significant thought to improve the water use proficiency in water system rehearses. The water system frameworks give superfluous water system to one piece of the field while prompting an absence of water system.

R.Goyal, Sensor based Irrigation System [8] Review and Aim of this paper is to survey the need of soil dampness sensors in water system, sensor innovation and their applications in various parts of horticulture and in water system planning.

D. Haryana, Evaluation of ground water quality for irrigation [9] the nature of groundwater, water tests was gathered from all the villages. Water test were gathered and examined for pH, EC, soluble cations (ca, mg, Na and k) and anions. The estimations of sodium adsorption apportion (SAR) and lingering sodium carbonate (RSC). Spatial changeability maps of EC, pH, SAR, RSC and water nature of groundwater utilized for irrigation. The examination of different parameters showed that nature of groundwater is not ok for water system reason.

Zhu, Ming Studies on high-resolution remote sensing sugarcane field extraction based on deep learning. [10] Deep learning strategy for sugarcane field extraction from high-goals remote detecting pictures is proposed dependent on Deep Lab pictures combination, which builds the capacity of Deep Convolution Neural Network (DCNN) fleeting elements preparing. The analysis demonstrates 94.32% extraction precision of sugarcane field. Likewise, its handling velocity is better than the customary article situated extraction technique, which tackles the issues of low extraction precision and moderate preparing pace utilizing conventional strategies. The sugarcane-developed regions evaluated by means of examining information insights for quite a while when compelling and exact unique checking information keeps missing. The edge disarray ought to be upgraded to further improve the extraction exactness.

Ma, Dedi Impacts of plastic film mulching on crop yields, soil water, nitrate, and organic carbon in northwestern China: A meta-analysis Therefore, a far-reaching survey of the effects of PFM on soil water content, soil supplements and sustenance generation is required. [11]We assembled the after effects of 1278 perceptions to assess the general impacts of PFM on soil water content, the dissemination of nitrate and soil natural carbon, and harvest yield in downpour nourished horticulture in Northwestern China. Our outcomes demonstrated that PFM expanded soil dampness and nitrate focus in topsoil (0–20 cm) by

International Journal of Engineering Research and Science & Technology

ISSN 2319-5991 www.ijerst.com

Vol. 21, Issue 1, 2025

12.9% and 28.2%, individually, however somewhat diminished (1.8%) soil natural carbon (SOC) content in the 0–10 cm soil layer. PFM essentially expanded grain yields by 43.1%, with most noteworthy impact in spring maize (79.4%). At the point when identified with combined precipitation during the harvest developing season, yield increment from PFM was most prominent (72.8%) at 200–300 mm, which was ascribed to the enormous increment for spring maize and potato, im-utilizing that harvest zoning would be gainful for PFM in this locale. At the point when identified with N application rate, crop yields profited most from PFM (80.2%) at 200–300 kg/ha.

Day, W. Computer applications in agriculture and horticulture: a view [12] Therefore, a far reaching survey of the effects of PFM on soil water content, soil supplements and sustenance generation is required. We assembled the aftereffects of 1278 perceptions to assess the general impacts of PFM on soil water content, the dissemination of nitrate and soil natural carbon, and harvest yield in downpour nourished horticulture in Northwestern China. Our outcomes demonstrated that PFM expanded soil dampness and nitrate focus in topsoil (0–20 cm) by 12.9% and 28.2%, individually, however somewhat diminished (1.8%) soil natural carbon (SOC) content in the 0–10 cm soil layer. PFM essentially expanded grain yields by 43.1%, with most noteworthy impact in spring maize (79.4%). At the point when identified with combined precipitation during the harvest developing season, yield increment from PFM was most prominent (72.8%) at 200–300 mm, which was ascribed to the enormous increment for spring maize and potato, im-utilizing that harvest zoning would be gainful for PFM in this locale. At the point when identified with N application rate, crop yields profited most from PFM (80.2%) at 200–300 kg/ha.

Gandhi Rice crop yield prediction using artificial neural networks [13] planned to utilize neural systems to anticipate rice creation yield and research the elements influencing the rice harvest yield for different areas of Maharashtra state in India. The Information sourced from freely accessible Indian Government's records for 27 regions of Maharashtra state, India. The parameters considered for the present investigation were precipitation, least temperature, normal temperature, most extreme temperature and reference crop evapotranspiration, zone, generation and yield for the Kharif season (June to November)Irrigation quality of PH, CSR, EC, and RSC is acquired by field sampling. These samples sent to chemical and physical analysis at the testing laboratories. This water irrigation range is required for this work. Dataset need to analysis Comparison Accuracy using the Predicting irrigation quality and Enhanced performance Algorithm.

Biqing, Li Design and implementation of sugarcane growth monitoring system based on RFID and ZigBee the development of Internet of Things [14] technologies such as wireless sensor technology, ZigBee, RFID, etc., as well as the application of technologies such as video image processing, automatic control, and 3S, etc. have provided technical supports for precision planting of agricultural production, visual management, and intelligent decision-making. This paper, relying on the Internet of things technology, has designed and implemented a set of sugarcane growth monitoring system according to the growth characteristics of sugarcane crops, this system has passed the test, and results showed that it can effectively monitor growing environment of sugarcane, such as temperature, humidity, crop plant height, thus realize the whole process management of agricultural automation.

Magalhães, P. S G Yield Monitoring of Sugar Cane [15] the general framework incorporates a mass stream sensor, a worldwide situating framework recipient, and an information-obtaining framework. The idea for the sensor depends on the sugar stick yield screen sensor grew already at The State University of Campinas. An adjusted form of the sensor intended to address the particular needs of a collecting framework, including a few sensors to kill signal impedance, and to screen the reaping activity. The field testing of the sugar stick yield screen framework was finished during the 2004–2005 collecting season. The framework mounted on a Case 7700 sugar stick gatherer. To assess the precision of the framework, each stacked truck was burdened an electronic stage scale upon landing in the sugarcane plant. The outcomes demonstrated that the yield of the sugar stick yield screen and the gathered burden weight present a connection of 0?66, and the framework execution was steady and solid during tests. A sugar stick yield guide was produced in a 43 ha region plot of a sugar manor, situated in Araras, the province of Sa˜o Paulo, Brazil. The outcomes demonstrated that the yield screen planned and assessed is exact, with a mean blunder of 4?3% where the greatest mistake never surpasses 6?4%, and is fit for estimating the yield changeability.

International Journal of Engineering Research and Science & Technology
ISSN 2319-5991 www.ijerst.com
Vol. 21, Issue 1, 2025

Table1 : Attribute Description	
Attribute	**Description**
pH	pH value of soil data
EC	Electrical Conductivity
OC	Organic
N	Nitrogen
P	Phosphorus
S	Sulphur
Zn	Zinc

III. DATASET COLLECTION

The dataset is part of primary data for Water, Irrigation EC and PH acquired by field sampling. These samples sent to physical and chemical analysis at the water testing Laboratories. The Irrigation quality analyses and dataset required for this work.

Table: 2 Classification of Irrigation Water

Class	C1	C2	C3	C4	C5
EC	<1.5	1.5-3	3-5	5-10	>10
Water Quality	Normal Waters	Low Salinity Waters	Medium Salinity Waters	Saline Waters	High Salinity Waters

A. Analysis Irrigation Quality

With adequate supplies of water, irrigation can increase crop yield drastically. Different irrigation systems are suited for different soils, climatic conditions, crops and resources. Irrigation quality, acceptable range of nutrients from other components of irrigation system itself, many such factors are considered together to determine the quality of water for irrigation of the corp. The chemical constituents of irrigation water can affect plant growth through toxicity or deficiency, directly or indirectly by altering availability of nutrients for the crop. Other elements of water after experimental analysis of inorganic elements include; EC electrical conductivity (soluble salts), pH, alkalinity, nitrate nitrogen, ammonium nitrogen, calcium, magnesium, sodium, potassium, phosphorus, zinc, copper and aluminum. In water irrigation system we have multiple problems like salinity, PH, CSR, EC, SAR, and the RSC. Generally, the natural occurring of salts mixture in bore well water. The acidity or basicity of water irrigation is predicted as PH.

International Journal of Engineering Research and Science & Technology

ISSN 2319-5991 www.ijerst.com

Vol. 21, Issue 1, 2025

Table: 3 Water Quality Parameters

T.S	TOP SOIL
LS	LATERITIC SOIL
S	SAND
S.St	SANDSTONE
CS	COARSE SAND
MS	MEDIUM SAND
FS	FINE SAND
GS	GRAVELLY SAND
CS	CLAYEY SAND
SC	SANDY CLAY
C	CLAY
L	LIGNITE
L	LIMESTONE
GP	GRAVEL & PEBBLE
FSS	Ferrugenous SANDSTONE
S	SAND (Saline)

IV. PROPOSED FRAMEWORK

This current system provides suggestions to farmers to find out appropriate crop suitable for the different EC levels of water. Using big data analytics approach here in the proposed system for optimal usage of input to improve profitability by maintaining irrigation quality and by doing analysis of cropping pattern system in land areas we can find with higher level of confidence an appropriate crop suitable for the farmer society. This study will highly be helpful to the farmer's community to augment the productivity and the profitability using the collection of data for water irrigation quality. The crop production depends upon many factors, including EC, pH, water quality, soil type, crop parameters variety, crop Management, flexibility and reliability to maximize the Productivity and Profitability to Farmer.

A. Data Analysis

Partial least squares (PLS) is a measurable strategy that bears some connection to head segments relapse; rather than discovering hyper planes of most extreme change between the reaction and autonomous factors, it finds a direct relapse model by anticipating the anticipated factors investigation were performed to distinguish relationship designs between WATER credits and respect recognize the significant water qualities that impact sugarcane yield.

B. Water Analysis

The underneath graphical chart demonstrates the water nuances of a square. A block comprises of many villages. In the figure 1, X-pivot demonstrates the composites of the water in a square for example, PH, Alkalinity, TDS, TH, Nit, Cal, Sul, and Y-pivot demonstrate the greatest to least varieties alongside its mean and engendering dissemination of the water properties in block.

International Journal of Engineering Research and Science & Technology

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Vol. 21, Issue 1, 2025

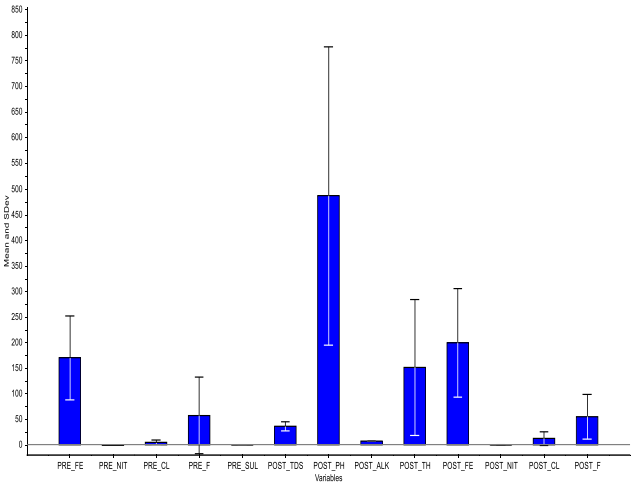

Fig.4.2.1. Water used to assign the yield data to the water sampling Grid

C. Sugarcane Yield Analysis

The underneath graphical diagram exhibits the Sugar stick nuances of a square. In figure 1 the score plot demonstrates the circulation of squares into towns which develop sugarcane on the right.

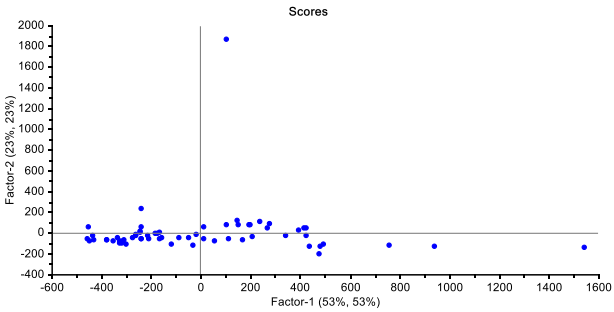

Fig.4.3.1. Scores Partial Least Square of water property and sugarcane yield projection of the factors and instance.

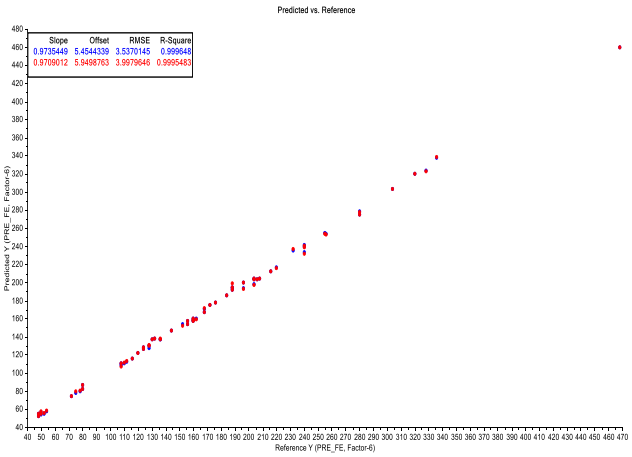

Fig.1. Partial Least Square of water property and sugarcane yield projection of the factors and instance.

International Journal of Engineering Research and Science & Technology

ISSN 2319-5991 www.ijerst.com

Vol. 21, Issue 1, 2025

V. RESULT AND DISCUSSION

The above data for analysis is finalized and achieved. The field sampling gives the primary data for water survey. The dataset has 15 attributes including the village name, water properties and field crop information. In this work, we have proposed modeling of water properties and field crop information data using classification techniques and prediction techniques to predict the status for maximized yield. We have reported a comprehensive study of various classifications algorithms with the Partial Least Squares Discriminate Analysis (PLS-DA), Descriptive statistics and Partial Least Square Regressions for predictions of crop yield. This study and models developed and effectively used to predict the Crop yield depending on the water properties for a particular gramma.

CONCLUSION

The cultivation information development and circumstance of fundamental administration helps in getting the farmers with a better yield. In this paper assessment of the Irrigation quality and crop information have been used with different algorithm and techniques for developing predictive model. The model for crop yield prediction is used to improve the productivity of agribusiness knowing the water parameters and to gain more knowledge about the agricultural practices. The analysis and modeling identifies that EC, pH and Alkalinity are the most significant attributes that clearly influence the crop yield. Mapping water parameters can help in the development of the ideal agricultural zones/gramma to improve the productivity of sugarcane fields. Finally we can conclude that a higher pH level of water may be directly associated with the quantity of water available for irrigation purposes, exhibiting significance of dynamic organization approach in achieving the base water quality parameters. In the future, we can estimate the quantity of calcium carbonate present and develop methods for soil texture and terrain analysis for fertility predictions.

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