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Machine Learning for the Identification of Groundwater resources in the context of Image Processing

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ABSTRACT
Water is the most valuable resource on earth and to find the water sources and to keep its safe prom pollution is essential. To avoid drought and maintain water sustainability, prediction of groundwater availability is important. The modern-day most promising technology can be used to discover groundwater. Machine learning can be used to find water sources in areas where water samples are not taken and intense zones. It can also be used to design models for targeting. It can be used to create strategies for the protection of groundwater. It can be used to form such a strategy which will be used to evaluate the strategy to find out the sustainability of the groundwater in remote areas. In this article, the main focus is on the machine learning strategies, focusing on using the following machine learning models. Features selection is performed using machine learning approach to predict the groundwater images is used in this paper.
Keywords: *Groundwater Resources, Image Processing, Machine Learning Algorithm, Quality Identification.*

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INTRODUCTION

In most of the world, groundwater is the only source that is used for all the day-to-day activities drinking, agriculture, or industrial use. Water is being used in most countries that are available by ground sources. This water is used by the farmers for agriculture purposes, it is used in households for cleaning, drinking, and other activities. It's used in industries especially the food processing industry and agriculture industry. Apart from the ground sources, water is also being used from springs, rivers, ponds, and bays.
Predicting the availability of groundwater is important to ensure the sustainability of the water and also drought protection. These predictions can be used to inform us about the insights that how the villages and cities are effects, how the level of water drops underground when water or any bay changes its flow direction. In this paper, much focus is being given to the regression-based model to predict the ground water images. It can be obtained by observing the groundwater maps' monthly sequences. These maps can be obtained with the help of an experiment known as the gravity recovery climate experiment.
In vast technologies, real-time applications are being handled with the robot interaction, apart from the direct human communication to the system the machines or the robots are better knowledgeable to complete the work as sooner, in this paper [1], the author has introduced the concept of convergence of a three-dimensional image which is represented and identified with the projection tool using digital visualization system. Ground secretion is a kind of natural resource. Usually, the groundwater is collected from five different stations, and all are monitored from 2014. The author who concluded the paper [2] had gone a deep study about the fitting app, which is based on the Artificial Neural Network, and a few thematic map connections that impact the underground water. Image processing acquires a standard place with the machine learning concepts while installing algorithms in ML modules it gets with the image processing concept; in this paper [3], the author has to use the ML concepts for the training medical images, and finally, he used to compare it with a comparison ratio format. Using machine learning modules, such ideas can also be used for groundwater resource management. In this article [4], the

author did research based on machine learning and approached tea bud identification. Here the importance of this module is to create an automated grading machine for tea leaf management. Even in the article [5], the author has discussed the image processing techniques. Still, the main motive of this paper is to find out the snake type and to create a list by identifying whether the snake is venomous or non-venomous; such a technique can be utilized with groundwater management with the k-nearest neighbor algorithm.

Usually, people deal with image processing methods in their day-to-day life. Still, they do not understand how the face detection locking systems work flawlessly, like the paper [6]. The author has been investigated by facilitating the analysis of gender differences and other predictions of BMI. Water is the most important thing for people to survive in this world; in such case, if there is no more secretion of groundwater, then people will not get enough water supply for them, at the same time even If there is an availability of enough groundwater resource. Still, separating the water quality is a bit harder; according to that paper, [7] deals with the techniques with the internet of things that are to be deployed in agriculture with a central perspective domain. Image processing methods are getting deployed in enough things in this world, according to that article [8] and [9] mostly speaks about the detection process, which means the first part discusses about the identification of tablets and their accuracy, at the same time, the second process is about to find the automatic fire pixel detection in state of the art and color variation. The paper [10] contains enough details and importance of water resources and how to make some difference in water quality to have some enrichment regarding the phenomena of the geological systems [11].

MATERIAL AND METHODS

Water, nature's most precious gift to humans, is becoming increasingly contaminated as cities grow in size. Although water surrounds three-fourths of the world, just a small percentage of it may be to use for consumption. Fluorosis1, a tooth or bone condition caused by the use of fluoride-rich water, affects approximately 62.5 million individuals in India. Just about all of India's surface water is unsafe for direct drinking. Despite the fact that almost all cities get their city water from treated groundwater, due to the contamination, additional stringent procedures would indeed be needed to make this surface water consumable. Domestic wastewater, wastewaters, with storm water run are the most common sources of water contamination. As a result, we must rely on ground water. The largest cause of bored well groundwater contamination in very many communities is the usage of fertilisers, pesticides, fertilizers, limestone refuse dumps, and etc. Numerous researchers have studied the physicochemical parameters of groundwater sources or potable water in different areas across the state. 2-4. Bore sure water is commonly used for groundwater in studies of the quality of underground water to drink and farming. A quantitative examination of water quality was also performed and is represented as in the following equation (1)

$$M = \sum_{i=0}^{n} \{M1, M2, \ldots . Mx\} + \sum_{j=1}^{n} (n_i - \bar{n})\left(n_j - \bar{n}\right) (1)$$

The broadcaster and g_{ij} the reception must be distinct from other two, and also the operators must be undeniably connected to the appropriate device. Transition $n_i - \bar{n}$ is described to the instantaneous transfer and temporal change.

$$MX = x \sum\nolimits_{i=1}^{x} \sum\nolimits_{j=1}^{x} g_{ij}(n_i - \bar{n})\left(n_j - \bar{n}\right) \qquad (2)$$

Time space transformations, including the previous MX, need some time to complete, as can be seen in Equation (2) and (3)

$$MX = \sum\nolimits_{i=1}^{x} \sum\nolimits_{j=1}^{x} g_{ij}(n_i - \bar{n})^2 \qquad (3)$$

The increase in transition time is represented by Equations (4).

$$MX = \sum \frac{x \sum_{i=1}^{x} \sum_{j\neq 1}^{x} g_{ij}(n_i - \bar{n})\left(n_j - \bar{n}\right)}{D^2 \sum_{i=1}^{x} \sum_{j=1}^{x} g_{ij}} \qquad (4)$$

RESULTS AND DISCUSSION

Nitrate poisoning of groundwater sources has developed significantly in several places of the world. Levels of nutrients in most governments' drinking water sources have also been rising1-5. In 1990, the Environmental Agency (EPA) reported that 250,000 groundwater sources exceeded the maximum contamination level (MCL) for nitrate6.

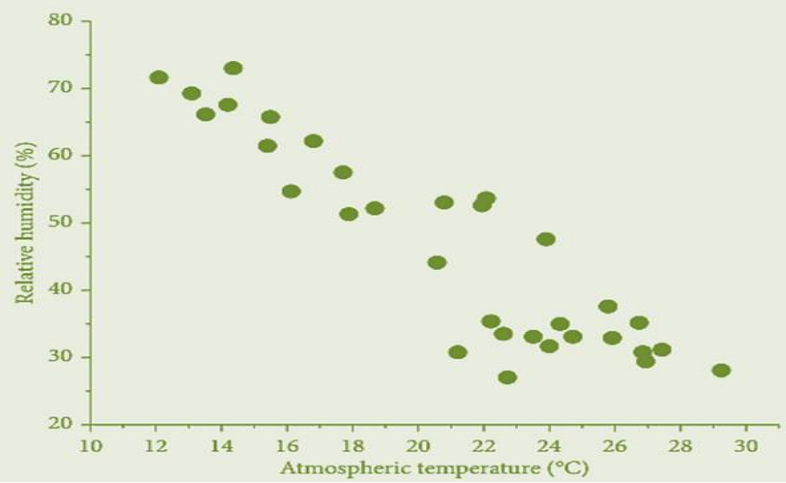

Figure 1: Identification of Ground water Atmospheric Temperature resources using Machine learning

They World Health Assembly (WHA) discovered in 2004 that 30% of a 2,000 streams studied around the world had much more above 24 mg/L. Nitrate levels have risen as a result show in Figure 1 of increased Atmospheric Temperature nitrogenous fertiliser use, alterations in property patterns, with greater home wastewater recycling7-8. While nitrates is regarded generally a non to humans, in newborns, NO3 - is converted to NO2 -, which mixes with haemoglobin in the blood to create methamoglobin, resulting in the condition called as "blue baby syndrome." The Health and Wellbeing International Guidelines9 set a maximum of 45 mgNO3 - / L. Several technologies for removing nitrate form water have already been developed backed by scientific advances.

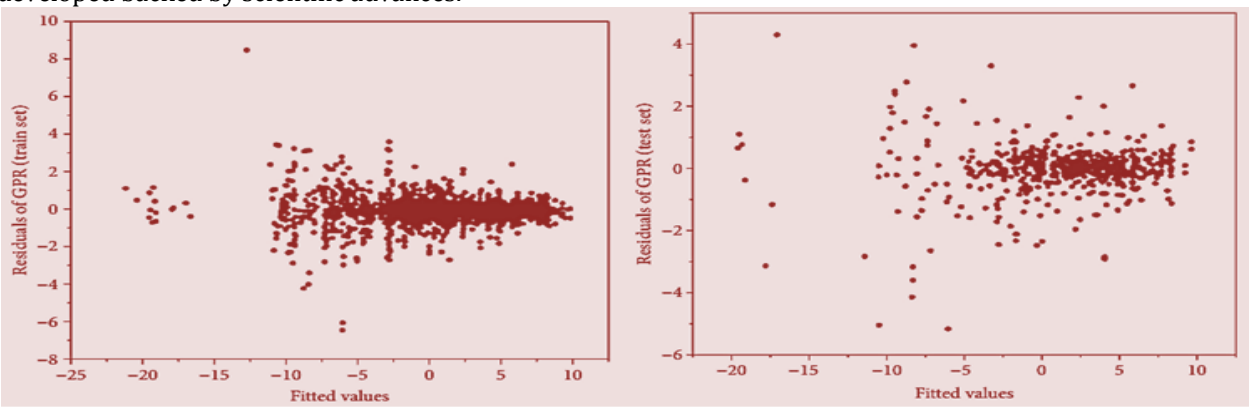

Figure 2: Analysis of Ground water resources using Machine learning algorithm based Image processing

Electron transfer, microbiological de-nitrification, while deionized water are the three nitrates removal processing techniques which have been used on a large scale. Some other methods suggested have restricted practical potential on such a large scale. This literature suggests that mixotrophic biological nitrogen fixation is more widely used than photosynthesis denitrification. In the some European countries, environmental technological and economic viability of organism's volatilization has been proved at large scale.Because the photosynthesis rate of the reaction is modest, huge reactors are necessary to provide sufficient absorption for volatilization, raising capital costs. The removal of fertilizers with drinking water is a vital and growing field of study. Although technological advancements have happened in this field, more improvement of present technologies is required. Attention must be paid to the functioning of biological nitrogen removal reactors in relation to the microbiological features of biologically communication channels water. The performance measures for RO as well as ED for dyes removal is limited, and also the influence of rapid developments in this technology should be investigated.

CONCLUSION

In this paper, our primary focus was on developing and studying such machine learning algorithms that can predict where the groundwater is present from the images taken from different sources such as satellites or aerial vehicles. The set of images that is obtained is processed then essential features are selected from the images. The large set of data of images is then split into two sections. After data is trained, it is then used to make necessary predictions about where groundwater sources can be found on

earth. The primary purpose of this study was to focus on these models, which can give us such models that can find the groundwater sources. It's essential for water sustainability, an indication of where water will deplete in the coming years, and which area is near the drought's hit.

The field of machine learning that can improve these studies is the use of images processing. The most commonly used machine learning models are required to make predictions when data is trained in these models. Since these are conventional models and give optimized results. There is still a need for those models that will use less amount of data for training the model and can provide the more optimum prediction can use that to improve not only image processing but also other fields such as the manufacturing and tech industry.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest for this study

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