Short Communication

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Artificial Intelligence in Irrigation

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Irrigation practices are primitive in nature in India as compared to developed countries. Irrigation extensively influences the crop yield and farmer's income. Agriculture is an unorganized sector still away from modern technology reach in India. Irrigation techniques and marketing businesses are governed by brokers and middle men in India and this lead to unnecessary wastage of water as explained in [1]. However, provides the Automatic Irrigation System based on Artificial Intelligence and Internet of Things, which can autonomously irrigate fields with use of soil moisture data. A prediction algorithm applied over past weather data for rainfall [2]. Refuses to provide any code as a demo but explains with its flow chart their system on irrigation with selective crop field data in real-time soil moisture conditions [3].

Agricultural Automation was increasingly beneficial through the use of [4] the Artificial Intelligence and Machine Learning. Arduino and Raspberry devices may be embedded with moisture and temperature sensors along with the help of Machine Learning algorithms [5]. Data storage and management of sensors is in the online cloud [6]. Highlighted need of Automatic irrigation in the evapo-transpiration process and the crop prediction. Lastly, emphasis on the Artificial Intelligence and embedded systems in the irrigation of agriculture [7].

Irrigation for a wheat crop requires extensive irrigation planning from flood irrigation methods to drip irrigation methods in sub-tropical climates. Classification of wheat irrigation systems using Artificial Neural Network as given in [8] uses a computer vision system. Classify wheat irrigation of the crop species *Triticum aestivum* and *Triticum durum* according to their visual irrigation characteristics using an artificial neural network of the MLP type [9]. The images are obtained by a camera at an angle perpendicular to the plot. These images converted to grayscale, binarized using the Otsu method and segmented by the thresholding operation. The characteristics of plot size, fertigation techniques and availability of water are feeded for each row of the plot, with the purpose of serving as input to the classification method in Artificial Intelligence. Following visual characteristics of the irrigation were selected: length, length and width ratio, green, and blue, green ratio, homogeneity, and entropy. The last two, concerning texture, are obtained using the GLCM method. The ANN (Artificial Neural Network) based on MLP with three layers classified irrigation in bread wheat and durum wheat irrigation systems as explained in [3]. Option of selective irrigation systems in the wheat crop may be possible as shown in [3].

Survey techniques are important in modern irrigation systems. Traditional irrigation technologies rely on manual approach and are time consuming and labor intensive. Unmanned Aerial Vehicles (UAVs) equipped with various sensors are good for the surveying procedure, decrease data collection time, and reduce cost as explained in [10]. This will apply accurately and rapidly in the field and helps in analysis and visualization of collected data from UAVs and similar kind of small airplanes, satellites, ground platforms. This UAV data collected in the cloud and artificial intelligence (AI) based application (named Agroview) which interact with user-friendly application helps in detection, count and geo-location of the plot and plot size (locations in terms of GPS data and local landmarks). It further measures the plot irrigation efficiency. And helps in developing the plant health (or stress) maps to measure the irrigation efficiency. This also provides the specified need of irrigation for a particular row or for a whole plot as explained in [11].

SUMMARY

Artificial intelligence can also be used to predict weather patterns and adjust irrigation schedules accordingly, reducing the need for manual adjustments based on weather forecasts. This can lead to significant water savings and improved crop yields. In terms of optimizing crop selection and planning, AI can analyze historical data and environmental factors to recommend the most suitable crops for a specific region, taking into account factors such as soil type, climate, and water availability. This can help farmers make more informed decisions about what crops to plant and where, leading to higher yields and reduced water usage. Overall, the use of AI in irrigation has the potential to significantly reduce water usage, improve crop yields, and minimize environmental impacts associated with agriculture. As technology continues to advance, we can expect to see even more innovative applications of AI in water management and agriculture specifically on weather forecasts. This can lead to significant water savings and improved crop yields. In terms of optimizing crop selection and planning, AI can analyze historical data and environmental factors to recommend the most suitable crops for

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a specific region, taking into account factors such as soil type, climate, and water availability. Overall, the use of AI in irrigation has the potential to significantly reduce water usage, improve crop yields, and minimize environmental impacts associated with agriculture. As technology continues to advance, we can expect to see even more innovative applications of AI in water management and agriculture. With the use of Drone Technology and UAV use of AI are very much in use in the scientific institutions. Only need of hour is that these technologies need a significant revision to be used on a small and modular format which may offer as a one platform for the farmers as a service.

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