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Smart Agriculture: Animal Detection with Soil Moisture Monitoring and Irrigation

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ABSTRACT: In India, cotton is one of the foremost noteworthy commercial crops, with the greatest region beneath development and the second-highest edit generation universally In terms of cotton generation, utilization, and sends out. Cotton is developed in India's central, western, northern, and southern districts, and it gives a way of life for numerous individuals specifically or in a roundabout way. Cotton is either hand-picked or machine-picked fair how cotton is picked by hand over machine in different cotton-producing countries. In India, ladies choose cotton nearly totally by hand. Human hands are utilized to collect cotton from cotton flowers. Our objective is to make an effective machine that can perform work within the field and reduce human endeavours. Ordinarily, individuals go to the field within the morning to start picking and proceed working until the evening. In a cultivate, this machine picks cotton and diminishes the additional work required whereas cotton is being picked. In this paper, a versatile, hand-held cotton picker that's light in weight and appropriate for Indian agriculturists of different cultivate sorts was created. It can spare time and cash. Current work costs, which contribute for around 35% to 40% of all development costs, can be really diminished by the utilization of cotton pickers to a esteem of about 10%. In comparison to shaft collectors, the utilization of a picker as a picking component would lower picking costs whereas keeping up the quality of cotton fibre. This will cut down on the money squandered on gathering hardware. The cotton will not be hurt as it were the cotton is gathered in this machine. The essential goal of this article is to assess the cotton picker's financial reasonability on Indian areas.

KEYWORDS: Agriculture, India, Economy, Food Production Climate Change, Crop prediction, Machine Learning, Seed Data, Crop selection, Animal Detection

I. INTRODUCTION

From antiquated days, agribusiness is considered as the most source of supply to fulfil the day by day needs of human lives. It is additionally considered a essential occupation, conjointly one of the India's major mechanical segments. The ranchers are got to take after a traditional exposed eye perception and yielded solid crops without the association of chemicals for creatures conjointly to their development arrive in arrange to keep solid differing qualities.

But these days, climate conditions are being quickly changing against the natural resources to drain the nourishment and increment the security. In interim, the GDP in agrarian division is keep on diminishing, where in 2005 it was around 17.211.1, in 2018 it was 52020 it came down to 2farmers come from country regions, and in the event that the income from edit generation goes down, their way of life would be impacted by the ranches at industry level.

Agriculture is the main source of income for India's largest population and a major contributor to the Indian economy. Be that as it may, the innovative link and its ease of use needs to be further developed and developed for the agriculture department of India. It was found that the scent of spoiled egg makes a difference avoid the wild pigs and deer from eating the crops, so ranchers splash the spoiled egg solution manually on their areas, and firecrackers are utilized to battle off the wild elephants that eat the crops. This leads to moo trim abdicate and significant money related misfortune for farmland proprietors.

This problem is so extreme that due to such normal assaults on creatures, the agriculturists regularly lean toward to take off the areas desolate. This framework allows us to keep these wild creatures out of the countryside while providing a check on adaptability. India could be a country where businesses related to horticulture and agriculture are the main source of livelihood for individuals. Agricultural activity can be an important source of the national economy.

In addition, it is one of those nations that suffer from great typical disasters, such as a dry season or altitude, which damages cultivation.

This brings enormous financial disaster to the shepherds and forces them to commit suicide. For farmers and government organizations, prevention in the development phase well before harvest can help farm producers and government agencies to create appropriate arrangements, such as set aside, supply, find out the least additional costs, import/export, etc.

II. LITERATURE SURVEY

In [1] Agribusiness isn't as it were a colossal perspective of the developing economy, but it's essential for us to outlive. Anticipating crop yield isn't a straightforward assignment, because it depends on numerous parameters such as water, ultra-violet (UV), pesticides, fertilizer, and the range of the arrive secured for that locale. The above-mentioned parameters are the main parts that affect the supply of crops.

In [2] In recent decades, analysts have been fascinated by arrival mapping and its classification for various reasons. Image classification is one such approach to studying soil and arrival welfare. The focus is on considering various advanced and effective classification components and strategies. Here, it has been endeavoured to consider the components these approaches have tended to improve the exactness of the classification.

In [9] It moreover proposes the fertilizer which should be included to the soil in arrange to extend the edit efficiency. It makes a difference the agriculturist to analyse the richness of their yard and plant the better crop to extend their productivity and benefit. It moreover gives the data almost the fertilizer to be included within the soil additionally give the data approximately the adjacent fertilizer shop.

In [10] Based on a given set of predictors, ML can predict the goal/outcome using supervised learning. Crop forecasting involves predicting yield based on past historical data, which includes factors such as temperature, humidity, ph, rainfall and crop name. These predictions can be made using a machine learning algorithm called a Random Forest. The random forest algorithm obtains the best registration pattern with the smallest number of patterns.

III. METHODOLOGY

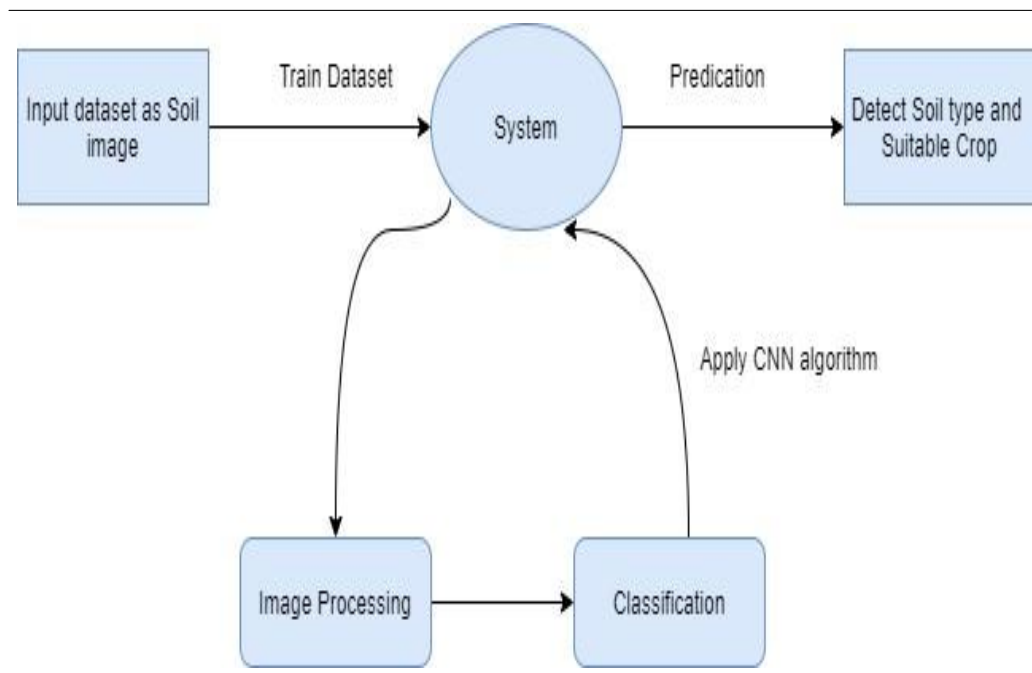
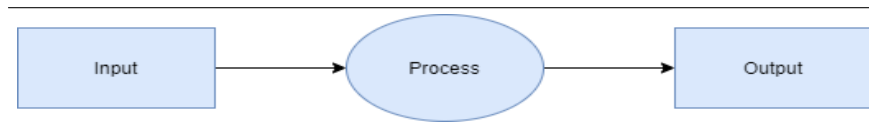
Animal Detection Methodology

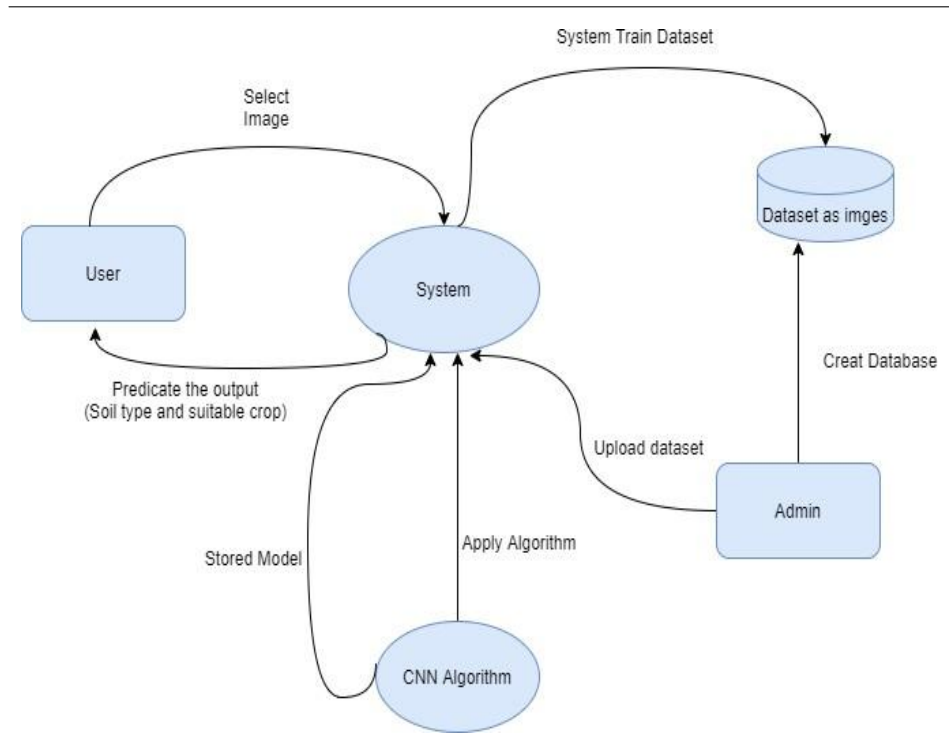
- 1. Data Collection:** Collect a dataset of images or videos containing various animal species. This can be done using wildlife cameras, drones, or other appropriate equipment. Ensure that the dataset represents a wide range of lighting conditions and diverse backgrounds.
- 2. Annotation:** Annotate the collected images or videos to create a labeled dataset. Identify and label the animal instances in each image or frame. This can be done manually or by using automated annotation tools.
- 3. Feature Extraction:** Extract relevant features from the annotated dataset. This can include visual features like shape, color, texture, or more advanced features extracted using deep learning techniques, such as convolutional neural networks (CNNs).
- 4. Model Training:** Train a machine learning or deep learning model using the labeled dataset and extracted features. Popular algorithms for animal detection include Faster R-CNN, YOLO (You Only Look Once), or SSD (Single Shot MultiBox Detector). Fine-tune the model using appropriate optimization techniques to improve its performance.
- 5. Model Evaluation:** Evaluate the trained model using a separate test dataset. Measure metrics such as precision, recall, and F1-score to assess its performance. Iterate and refine the model if necessary.
- 6. Deployment:** Deploy the trained model to detect animals in real-world scenarios. This can be done by integrating the model into a monitoring system, such as a camera network or drone-based surveillance system.

Soil Moisture Detection Methodology:

- 1. Sensor Selection:** Select appropriate sensors for soil moisture detection based on the specific requirements. Common options include Time Domain Reflectometry (TDR) sensors, Capacitance sensors, or Tensiometers. Consider factors such as accuracy, cost, and ease of deployment.
- 2. Sensor Placement:** Determine the optimal locations for sensor placement within the soil. This may involve considering factors like soil type, plant root depth, and topography. Install the sensors at the desired depths and ensure they are properly calibrated.

- 3. Data Collection:** Collect data from the soil moisture sensors at regular intervals. This can be done manually or using automated data logging systems. Ensure that the data collection period covers a sufficient range of soil moisture conditions.
- 4. Calibration:** Calibrate the sensor readings by correlating them with gravimetric measurements or other established soil moisture measurement techniques. This step helps in obtaining accurate soil moisture values.
- 5. Data Analysis:** Analyze the collected data to extract meaningful insights. This can involve statistical analysis, data visualization, or machine learning techniques. Identify patterns, trends, and thresholds related to soil moisture levels.
- 6. Integration and Monitoring:** Integrate the soil moisture detection system into a monitoring setup. This may involve connecting the sensors to a central data logger or IoT (Internet of Things) platform for real-time monitoring. Develop appropriate visualization tools or alerts to assist in decision-making based on soil moisture levels.





IV. RESULTS

Agriculture is the field that helps in the economic growth of our country. But this is lacking behind in using new technologies of machine learning. Hence our farmers should know all the new technologies of machine learning and other new techniques. These techniques help in getting the maximum yield of crops. Many techniques of machine learning are applied to agriculture to improve the yield rate of crops. These techniques also help in solving problems in agriculture. We can also get the accuracy of yield by checking for different methods. Hence, we can improve the performance by checking the accuracy between different crops.

V. CONCLUSION

In summary, the goal of the Smart Agriculture project is to develop a farmer-friendly control system that would meet the challenges of animal invasion and soil moisture management. Using cameras, PIR sensors and machine learning techniques, the system detects and classifies farm animals and alerts the farmer in real time via a GSM module. In addition, soil moisture sensors allow the system to monitor moisture levels and automatically turn on the irrigation system when moisture is low. This integrated solution offers better security, better plant protection, efficient water management and data-driven decision making. Regular calibration, testing and error checking of mechanisms are used to ensure reliability and durability. Costs, resources and infrastructure requirements must be assessed when considering feasibility. Ultimately, this project aims to provide farmers with a comprehensive control system that improves productivity and protects their crops from animal damage while managing water resources effectively.

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