International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 07 Issue: 03 | March - 2023 Impact Factor: 7.185 ISSN: 2582-3930

BIRD REPELLENT ON FARMING LANDS USING COMPUTER VISION

Ms Devi P[1], Kavin Kumar T R[2], Kumaravel H[3], Nakul R[4],

[1]Assistant Professor (Sr.Gr), Department of Electronics and Communication Engineering, Sri Ramakrishna Institute of Technology, Coimbatore, Tamil Nadu, India.
[2]Final Year Student, Electronics and Communication Engineering, Sri Ramakrishna Institute of Technology, Coimbatore, Tamil Nadu, India.
[3]Final Year Student, Electronics and Communication Engineering, Sri Ramakrishna Institute of Technology, Coimbatore, Tamil Nadu, India.
[4]Final Year Student, Electronics and Communication Engineering, Sri Ramakrishna Institute of Technology, Coimbatore, Tamil Nadu, India.

Abstract - India owns 60% of the world's second-largest agricultural land area. Around 10% to 40% of the crops are impacted by birds. We'll attempt to find an answer to the following questions in this project. Our main objective is to repel the birds without hurting them, so we are driven to complete the task without using any human effort. We have selected one crop and analyzed. There are four types of birds that are harming the paddy, according to the survey that was done. The peacock, house sparrow, pegion and grey patridge have the biggest effects as compared to other species. For machine learning and digital image processing, we use the ORB algorithm approach. The primary library employed is the open CV. The Pictures of birds entering the agriculture field is captured and compared with the above four species. If the result is positive then the signal is transmitted to the microcontroller. Then the microcontroller functions the necessary hardware to repel the birds.

***Key Words*:** Birds, ORB Algorithm, Affecting birds, Features of image.

I. INTRODUCTION

It is mandatory to protect the agricultural field from the entry of birds. This problem, we have developed a system which will monitor the field. All around the world, the birds are a major threat in the field of agriculture causing damage to economic field corps, storage houses and dirtying human life areas. This can be stopped by using bird repellent. Bird repellent is a device usually employed by farmers to scare birds and preventing them from eating planted crops. Devices that repel birds are made to deter them from places, like crops, structures, and airports. These devices employ several strategies, such as chemical, acoustic, and visual deterrents, to prevent birds from flying into or landing in the protected area. The type of birds present, the size of the region, and environmental considerations all play a role in the selection of a bird repellant device. In general, bird deterrents are a necessary tool for farmers, building owners, and other businesses who need to safeguard their assets from bird damage. There are various sorts of bird repellant devices on the market, each with its own set of pros and downsides. The type of bird repellant device used is determined by the situation and the level of bird control sought. An ORB algorithm is used by this system to identify approaching birds to the field and compare the images with the bird if the bird is affecting the crop or not. The actuation parts can be used for repelling process. This method used to protect farms typically causes discomfort to birds. It disturbs birds behavior and seriously harms resources. In order to improve agriculture and the rule of the fittest, hardware may be used to continuously disturb and redirect birds that invade farms. This ensures complete safety of crops from animals thus protecting the farmer's loss. Our main aim to design a system that can help to farmer to protect his farm from birds without getting harm to them.

II. LITERATURE SURVEY

1.Meena et.al [1] developed the Multi-part Convolutional Neural Network (MP-ORB), which uses semi-supervised learning to categorize 35,992 animal photos from ImageNet into 27 different animal classes. The suggested classification system divides the creatures into broad and specific categories. Using a multi-part convolutional neural network and a hybrid Fisher vector based stacked autoencoder feature extraction framework, the animal breeds are correctly categorized. The model also classifies new classes of unlabeled photos using semi-supervised learning-based pseudo-labels. Retraining the animal classes that were incorrectly classified has been done using a modified Hellinger Kernel classifier, which has improved MP-performance. ORB's The model has tried with a variety of tasks to evaluate how well it performs in every situation. The results of the experiments have shown that the proposed model, which combines the MP-ORB merged technique with pseudo-labels, can reliably categorize animal breeds with an accuracy of 99.95%.

2. Munian, Yuvaraj et.al [2]. Roadkill, also known as animal vehicle collision, is a growing concern to both people and wild animals, with an increase in fatalities every year. Animal behaviour (such as deer) on roads is unpredictable and erratic,

contributing to vehicle collisions. The use of infrared image processing over a camera car mount in the vehicle in this article reveals a newer dimension for wild animals' auto-detection during active nocturnal hours. To implement effective hot spot and moving object detection, obtained radiometric images are transformed and processed by an intelligent system. This intelligent system extracts the features of the image and subsequently detects the existence of an object of interest (i.e. deer). The main technique to extract the features of wild animals is the Histogram of Oriented Gradient (HOG) transform. The radiometric image is first normalized to identify the features, which are then processed by determining the magnitude and gradient of each pixel. The extracted features are given as an input to the basic deep learning model, a one- dimensional convolutional neural network (1D-ORB), where binary cross-entropy is used to detect the existence of the object. This intelligent system has been tested on a set of real scenarios and gives approximately 91% accuracy in the correct detection of the wild animals on roadsides from the city of San Antonio, TX, in the USA Diyana Kinaneva, Georgi Hristov, Jordan Raychev and Plamen Zahariev ," Early Forest Fire Detection Using Drones and Artificial Intelligence."-University of Ruse, Department of Telecommunications, Ruse, Bulgaria.

3. Ranparia, Devsmit, et al [3]. The primary goal of the ongoing effort is to create a device that will prevent wild animals from damaging crops by deterring them from fields without physically harming them. In this situation, an Acoustic Repellent System has been developed that can recognize target species including wild boar, nilgai, and deer using an IR camera and a convolutional neural network (ORB) based machine learning model. An Arduino module has been integrated with a camera and a frequency generator to recognize different animals and produce corresponding frequencies that keep them away from the farms of interest. Also, the architectural components of the suggested solution have been described in detail. Lastly, the potential impact of the proposed solution has been discussed.

4. Gobhinath, S., et al [4]. Industrial progress has been steered by automation, which is now essential across the majority of the area. But the contribution of automation to agriculture is in a lower degree. So, by incorporating automation in the field of agriculture, productivity can be increased to manifolds. This essay explores agricultural automation strategies that improve irrigation, farmland protection, and disease management. By taking into account the soil moisture content, temperature, and humidity, crop irrigation can be done economically.

An autonomous agricultural rover that roams the field and collects data using a camera mounted on it is used to monitor health. The images are processed using algorithms in MATLAB to identify the disease affecting or nutrition deficit in the field. The farmer is informed of the flaw. When a fire mishap occurs, it is discovered by an ultraviolet flame sensor, and the fire is extinguished. The farm is additionally secured against animal entry with a PIR sensor and buzzer. These techniques are integrated to improve the standards of agricultural farming.

III. PROBLEMS BY BIRDS IN FARM LANDS

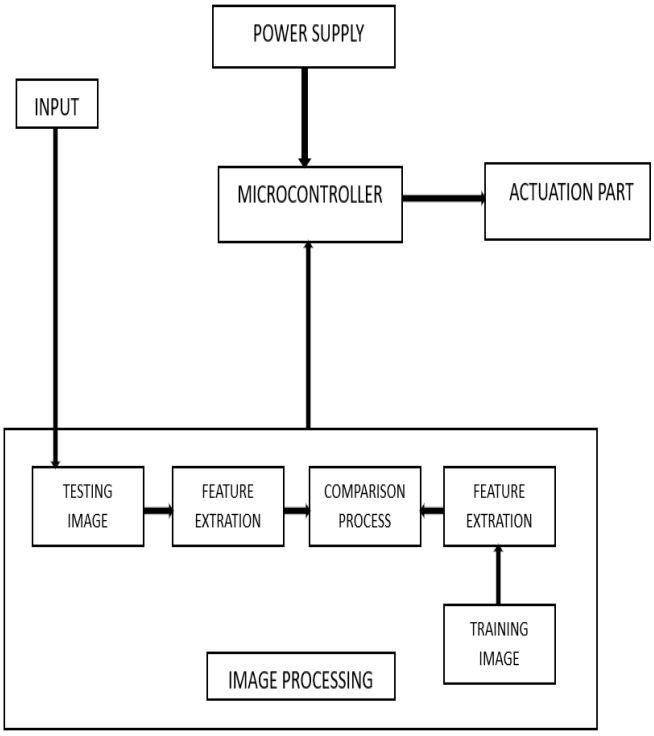
- Birds can cause crop damage at many times of crop production, including after seeds are sown, after seedlings are uprooted, and when grains are in the milky or ripening stages.
- The management of birds necessitates a good awareness of the bird pests in various places as crop losses by birds are known to vary in different seasons and in different countries.
- Each day, a single bird eats 8 to 25 grams of fruit and grain. With their pecking, scratching, faeces and feathers, birds can ruin crops.
- Wheat, barley, maize, mustard, sorghum, sunflower, and pearl millet are a few of the crops that are frequently harmed by birds.
- 1,364 bird species from 19 groups, totaling 63 species, were found to have harmed numerous crops.
- 52 bird species attacked cereals, 14 bird species attacked pulses, 15 bird species threatened to damage oilseeds, and 23 bird species threatened to harm fruits. In addition to maize, they also harmed the crops of lesser grains like sorghum and pearl millet.

IV. METHODOLOGY

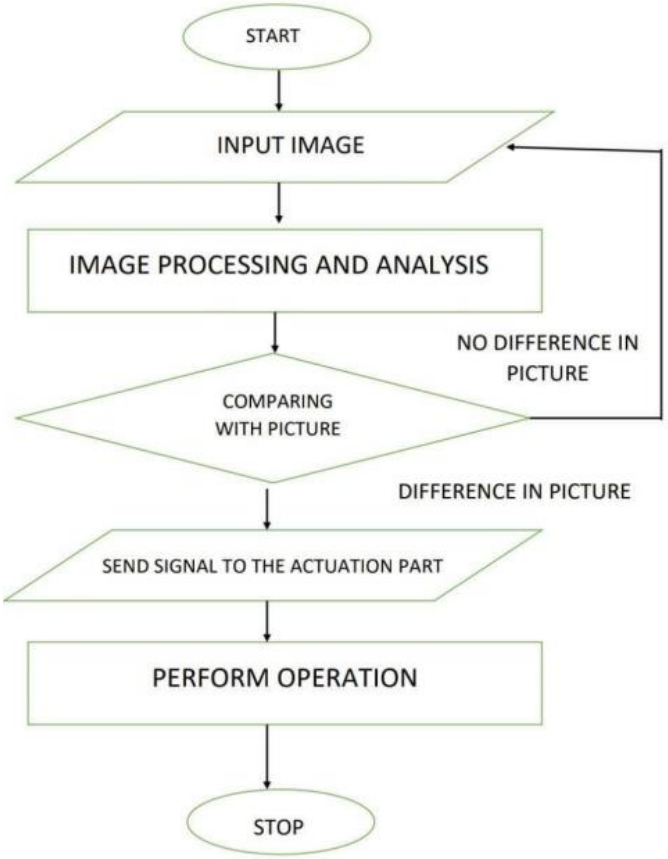
4.1 Overview

There are a group of birds which will help the crops and some group of birds damage the crops. We have selected one crop in one region and identified the birds which are affecting that one crop. The crop is paddy and the birds affecting that crop are pigeon, house sparrow, peacock and grey patridge. The database containing the images of these four birds are created. There are many stages in this project. A bird in that database will be pushed out of an agricultural field if it is there.

4.2 Block Diagram



4.3 Flowchart



4.4 Working

- The first stage is to detect the presence of bird in the crop area. It is done by using camera and input image is obtained. The Input image is resized to the desired resolution.
- The second stage is to detect the features in the images for comparison process. Features includes Keypoints and Descriptors. The keypoints and descriptors are identified and stored using ORB algorithm and its function. The keypoints and descriptors of the input and database images are derived and stored.
- The third stage is to match and compare the descriptors of images. Once it is calculated, the descriptors in input image is compared with the descriptors in the images of database. First one descriptor in input image is matched with all descriptors in first image of the database. It is done by using Brute Force Matcher. Like this every descriptors in input is matched with database in a loop. For the comparison process good matches are identified among the matched descriptors. Good matched pairs are calculated using Lowe's Ratio test. A particular number of good matches is set as threshold. If the good matches calculated meets or above the threshold then the input image is considered as the one of the bird in the database. The Matched bird's name is displayed in the input image window for confirmation of the user.
- In this case there will be some unwanted pixels in the input and database images. These unwanted pixels will reduce the accuracy and not useful for comparison. In order to reduce the unwanted pixels background segmentation is done with respect to the subject of the image. This background removal process will remove the background leaving the subject of the image which is the bird. This process is done to input and every images in the database. After this process dilation is done to every images. This morphological process is done to fill the breaks and intrusions in the background removed images.
- Then the third stage is done for the background removed images. After the completion of threshold comparison, on the basis of the result signal is sent to the hardware for repelling process of birds.

V. SCOPE OF THE PROJECT

- Human intervention is low.
- High efficiency.
- This system protects the crops from birds without affecting the crops.
- Various stages are involved in the repellant of the birds and improvement can be done easily on future.
- Wastage of crops are reduced and the profits are increased for the farmers.
- No need of manpower to repel the birds.

- This process will not give any harm to birds and won't affect the health of birds.

VI. RESULT

We have used only peacock database for the sample process. We are giving several inputs for testing the program. If the picture is matched with database, it will display the bird name in red color. If not it will display 'Not a Bird in the database' in white color. **First input** is the image picked from the database. It is matched with the database giving maximum threshold. (Fig 1)

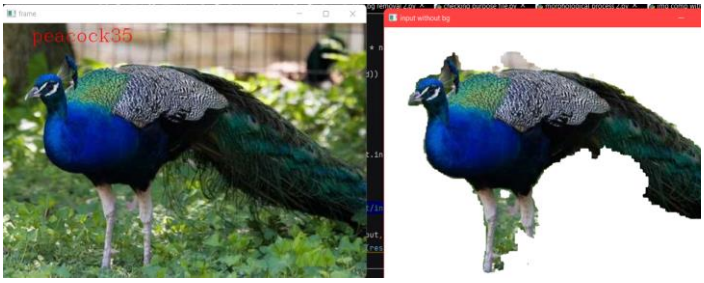


Fig -1: One of the Image stored in database is compared with database

Second, third and **fourth input** are three different images which is randomly picked form the internet. These three images are not matched with the database. (Fig 2)

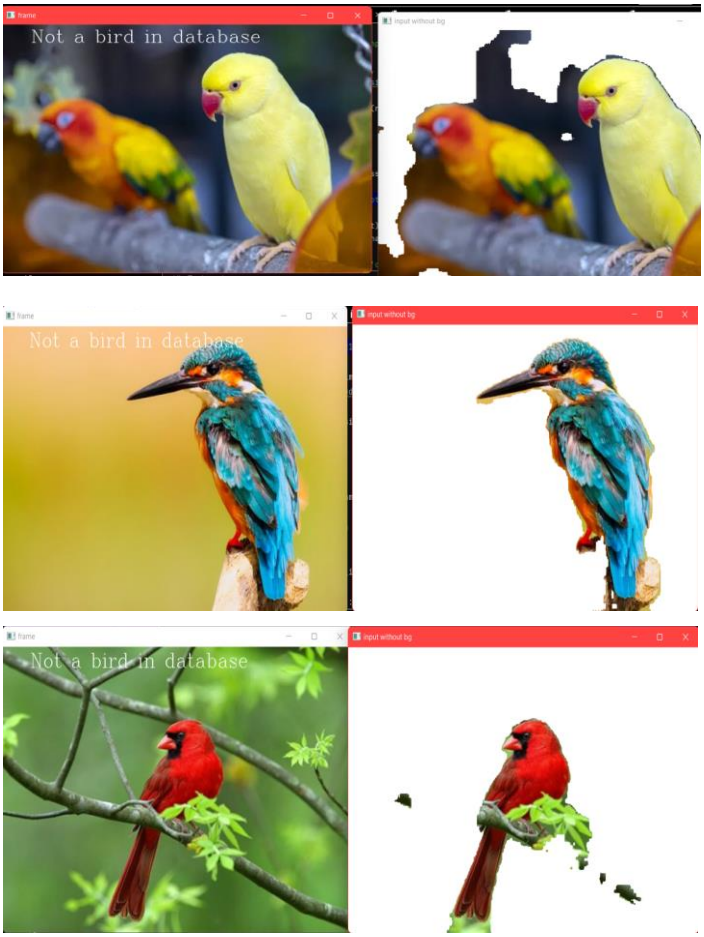


Fig -2: Random Images from Internet is compared

Fifth input image is peacock which is picked on internet excluding the images from database. It is matched with the database and displayed.

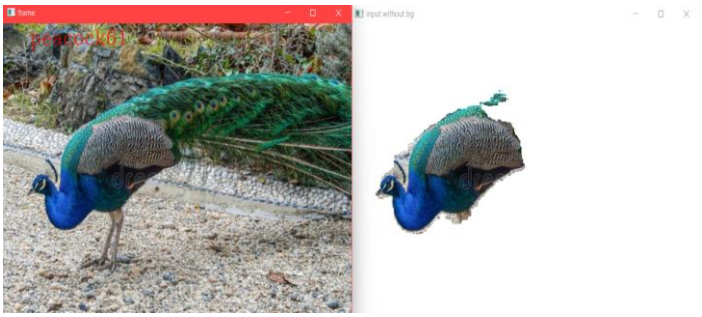


Fig -3: Random peacock Image from Internet is compared

VI. CONCLUSIONS

In this paper we concentrated on classify and compare the images. Using ORB and digital image processing, we were able to accurately compare and categorize the birds at finer level. We are particularly interested in working with a bird detecting system to track its activity on agricultural land. In order to further raise the stiffness of the training dataset, we intend to incorporate photographs of the Birds in various postures (looking away from the camera) and with various lighting (day and night) in our future work. We also intend to expand the suggested model to include support for thermal imaging. We will publish a fresh dataset of different Bird's photos as part of our effort.

REFERENCES

[1]. Meena, S. Divya, and Loganathan Agilandeeswari. "An efficient framework for animal breeds classification using semi-supervised learning and multi-part convolutional neural network (MP-ORB). IEEE Access 7 (2019): 151783-151802.

[2]. Munian, Yuvaraj, Antonio Martinez-Molina, and Miltiadis Alamaniotis. "Intelligent system for detection of wild animals using HOG and ORB in automobile applications. 2020 11th International Conference on Information, Intelligence, Systems and Applications.

[3]. Ranparia, Devsmit, et al. "Machine learning-based acoustic repellent system for protecting crops against wild animal attacks." *2020 IEEE 15th International Conference on Industrial and Information Systems (ICIIS)*. IEEE, 2020.

[4]. Gobhinath, S., et al. "Smart irrigation with field protection and crop health monitoring system using autonomous rover." 2019 5th International Conference on Advanced Computing & Communication Systems (ICACCS).

[5]. El Abbadi, Nidhal K., and Elham Mohammed Thabit A. Alsaadi. "An automated vertebrate animals classification using deep convolution neural networks." 2020 International Conference on Computer Science and Software Engineering (CSASE). IEEE, 2020.

[6]. Giordano, Stefano, et al. "IoT solutions for crop protection against wild animal attacks." 2018 IEEE international conference on Environmental Engineering (EE). IEEE, 2018.