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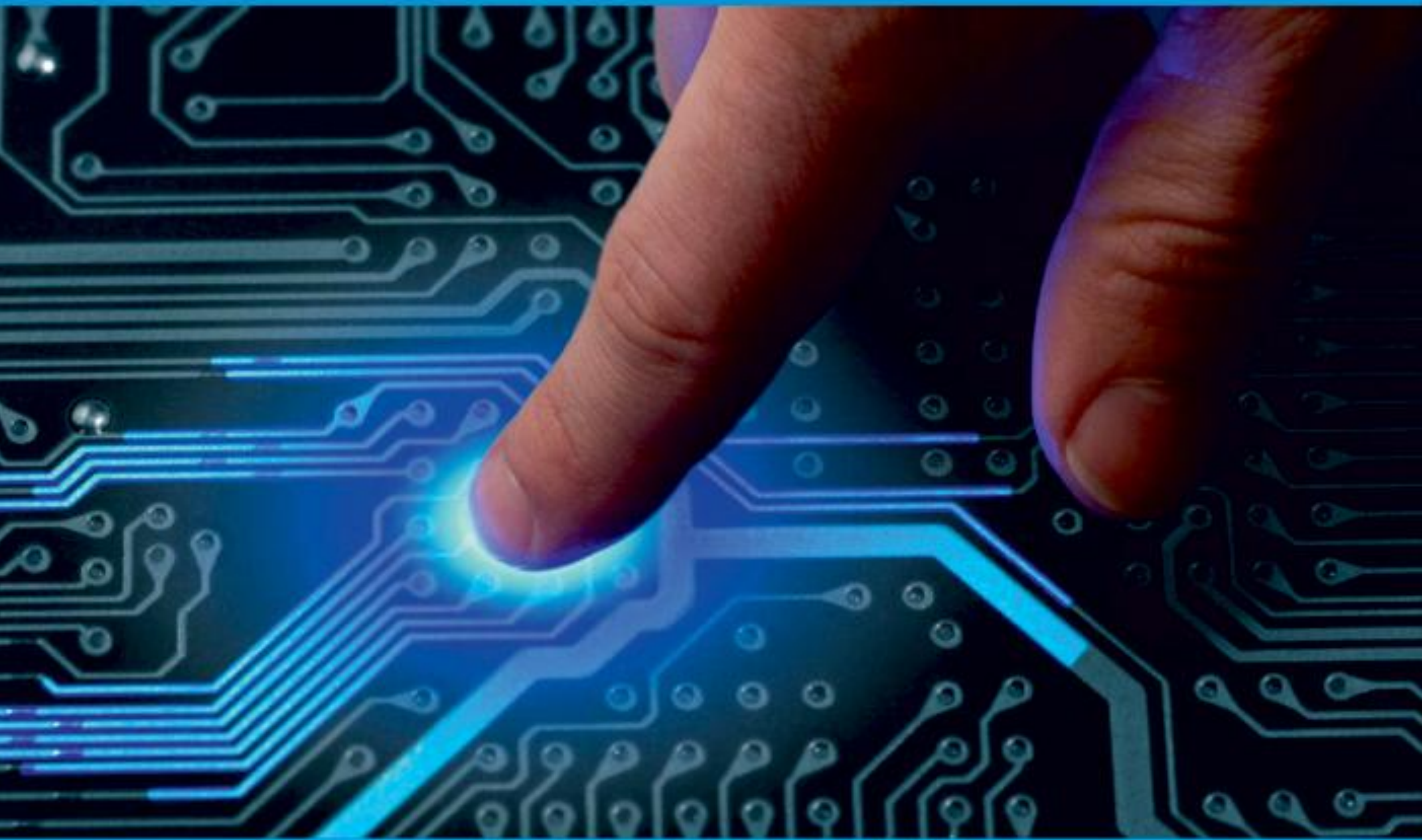

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# Identification and Classification of Drones Using KNN

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**ABSTRACT:** Drones are not permitted to be flown in safety zones. Anti-social forces, on the other hand, are likely to use drones to hit significant targets in such areas. The goal of this project is to use photos to continuously monitor safety zones and to issue an alarm if a Drone is identified. There are three modules in this project: The DII (Drone Image Input) module is utilised to give the system with various drone photos as input. The DI (Drone Identification) module is used to keep an eye on the photographs of the safety zone and recognise drones that enter it. When a Drone is identified in the safety zone, the 'alert' module is utilised to send a message to the safety officers. This project employs the OpenCV algorithm to recognise various types of drones, as well as a distance calculation technique to determine the drone's distance from the safety zone. An image file system is used to store the photos of many types of drones. The file system will be saved in a certain directory structure location. The system will be provided the location as an input. The drone is classified as one of the drone kinds using the KNN classification system. The k-nearest neighbours algorithm (KNN) is a classification approach that is non-parametric. In the feature space, the input consists of the k closest training instances. The result is a membership in a class. The class that is most common among an object's k closest neighbours is used to classify it. The length, width, height, and curvature of the drones are used to classify them.

**KEYWORDS***:* Drones , OpenCV algorithm, knn classification.

## I. Introduction

The Unmanned Aerial Vehicle (UAV) (or uncrewed aerial vehicle, also known as a drone) is a form of unmanned vehicle that does not have a human pilot on board. Unmanned aerial vehicles (UAVs) are part of an unmanned aircraft system (UAS), which consists of a UAV, a ground-based controller, and a communication system between the two. UAVs can fly with varying degrees of autonomy, depending on whether they are controlled remotely by a human operator or autonomously by onboard computers.

This study, named "Identification and classification of drones using KNN," is helpful in overcoming the problem of drone attacks. There are a variety of methods for detecting drones, but they all require expensive technology and software. However, this project is cost-effective, accurate, and simple to utilise. This project has three goals: the first is to identify drones near safety zone locations, the second is to classify the type of drone, and the third is to compute the distance between the drone and the safety zone.

To classify the type of drone, the KNN algorithm is utilised. A non-parametric method for classification and regression is the k-nearest neighbours algorithm. The input is the k closest training instances in the feature space in both situations. The distance calculation algorithm is used to calculate the distance between the drone and the

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safety zone, as well as to detect the drone's movement direction. The time taken by the ultrasonic sensor is used in the calculation.

This project is written in Python, which is a strong and easy-to-understand programming language. Using Python's predefined functions, we can reduce the amount of code we write. We used a variety of tools to create this project, including PYQT Designer, PYUIC, and Python. Every tool has a significant impact. The PYQT Designer tool is used to develop needed Graphical User Interfaces, while the PyUic tool is used to build code for PyQt's Front End User Interfaces. This programme generates all of the front end python code by transforming the user interface (.ui) files into.py files. The PyQt tool is used to develop the required graphical user interfaces, and the PyUIC module is used to build the code automatically. The PyUic programme is used to automatically generate code for PyQt's front-end user interfaces. This utility generates all of the front end python code by converting the user interface (.ui) files to python (.py) files. .

## II. LITERATURE SURVEY

- The first reported use of an unmanned aerial vehicle for warfighting was in July 1849, when it served as a balloon carrier (the predecessor to the aircraft carrier) in naval aviation's first offensive use of air power. UAV development began in the early 1900s, with the goal of providing practise targets for military troops. During World War I, the Dayton-Wright Airplane Company developed a pilotless airborne torpedo that would detonate at a predetermined moment.
- Drones come in a variety of shapes and sizes, and they are employed for a variety of reasons. There are four major types of drones available right now:
- Multi-Rotor
- Fixed-Wing
- Single Rotor
- Hybrid VTOL

Multi-Rotor: Multi-rotors are inherently inefficient, requiring a significant amount of energy only to defy gravity and stay in the air. When carrying a lightweight camera payload, they are limited to roughly 20-30 minutes with current battery technology. Heavy-lift multi-rotors can carry more weight, but at the cost of a substantially shorter flight time.
Fixed-Wing Drones: Fixed-wing drones (as opposed to ‘rotary wing' drones, such as helicopters) use a wing similar to that of a regular aeroplane to create lift.Vertical lift rotors are preferred over horizontal lift rotors. They just need to spend energy to move ahead, not to hold themselves up in the air, as a result ,are far more effective.
As a result, they can traverse greater distances, scan far larger areas, and watch their subject of interest for longer periods of time. In addition to increased efficiency, gas engines can be used as a power source, and because to the higher energy density of fuel, many fixed-wing UAVs can fly aloft for up to 16 hours. Fixed-Wings may fly up to 100 metres in the air. A single-rotor

A single-rotor helicopter has the advantage of being significantly more efficient than a multi-rotor helicopter, as well as being able to be powered by a gas motor.even greater stamina The larger the rotor blade and the slower it spins, the more effective it is, according to aerodynamics.
A single-rotor heli is your best bet if you need to hover with a hefty payload (e.g., an aerial LIDAR laser scanner) or if you need to combine hovering with extended endurance or fast forward flight. Hybrid VTOL: A

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new category of hybrids that can take off and land vertically combines the features of fixed-wing UAVs with the ability to hover. There are just a few hybrid fixed-wing aircraft on the market.
now on the market, but as technology improves, you may expect this to become a lot more common alternative in the coming years.

It's not easy to track down the pilots of remote-controlled drones. Drones are now inexpensive, simple to fly, and widely available to customers. Criminals use the drone to carry out an attack. As a result, police departments are turning to drone forensics squads, whose mission it is to seek down rogue drone flyers. Only when a drone is discovered at a crime scene will a drone forensics team be able to identify the perpetrators.
When just fragments are discovered at a crime scene, or when only a controller or phone is discovered. Investigators began to comprehend the situation.Drones constitute a massive forensic resource around the crime site.

## III. RELATED WORK

Using machine learning methods such as KNN and Templet Matching, we focus on detecting and classifying the drone in this suggested system. We suggested the system "Identification and Classification of Drones Using KNN," in which we used a template matching algorithm (part of the OpenCV Algorithm) to identify the drone and a KNN algorithm to classify different types of drones (K-Nearest Neighbors algorithm We were able to train the machine using numerous parameters such as length, width, height, and curvature of different types of drones in this suggested method to recognise the type of drone that has entered the safety zone. To train the model, we used csv data from various types of drones. To solve the challenge, we primarily used two machine-learning packages. The first was opencv's cv2, which is used for drone identification via template matching. It accepts two inputs: a real image and a template, which is compared pixel by pixel in the actual image. The second was numpy, which was used to calculate the values of each and every pixel on the screen and compare them to the template's pixel values for drone identification. For identifying different sorts of drones, the KNN method is utilised. This algorithm creates clusters based on the length, height, breadth, and curvature of the drone, with each cluster indicating a different type of drone..

The supervised learning model's core approach is to learn patterns and correlations in data from the training set and then replicate them for the test data. We used a dataset that was designed to be utilised for both training and testing. The dataset is divided into two halves, with the largest portion serving as training data and the remaining portion serving as testing data. This dataset is a CSV file that includes attributes such as the drone's length, breadth, height, and curvature, as well as the label, which indicates the type of drone, such as multi-rotor, single-rotor, fixed-wing, and hybrid VTOL.. All of these characteristics were utilised to train the machine on the KNN model and classify different types of drones.

A distance computation algorithm is used to calculate the drone's distance from the safety zone. The time taken by the Ultra sound wave during the first measure and the time taken by the Ultra sound wave during the second measure are the parameters used by this algorithm. The programme calculates the drone's distance and estimates its direction based on the values.

## IV. METHODOLOGY

### Template Matching

It is a method for searching and locating the location of a template image inside a larger image. For example, OpenCV has a function called cv.matchTemplate(). It simply compares two images by sliding the template picture over the input image (as in 2D convolution).

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Underneath the template image is a patch of input image. OpenCV includes a number of comparison algorithms. It gives you a

Each pixel in a grayscale image indicates how closely the pixel's surroundings resemble the template.

1. Import the cv2 and numpy libraries.
2. Look at the main image / image taken using the webcam
3. Create a grayscale version of the main image.
4. Take a look at the template image.
5. Save the template's width and height as w and h.
6. Use the matchTemplate() function to do match operations.
7. Set a value for the threshold.
8. In a numpy array, store the coordinates of the matching area.
9. Encircle the matched region with a rectangle.
10. Display the finished image with the corresponding region.

**KNN Classification**:

In Machine Learning, K-Nearest Neighbors is one of the most fundamental yet important classification techniques. Pattern recognition, data mining, and intrusion detection are just a few of the applications it finds in the supervised learning domain.

1. Find “d(x, xi)” for I = 1, 2,...., n, where d is the Euclidean distance between the positions.
2. Arrange the n Euclidean distances calculated in a non-descending sequence.
3. Take the first k distances from this sorted list, where k is a positive integer.
4. Locate the k-points that correspond to the k-distances.
5. Let ki signify the number of points in the ith class out of a total of k points, i.e. k 0.
6. If ki > kj I j, place x in class i.

## V. EXPERIMENTAL RESULTS

Registration:

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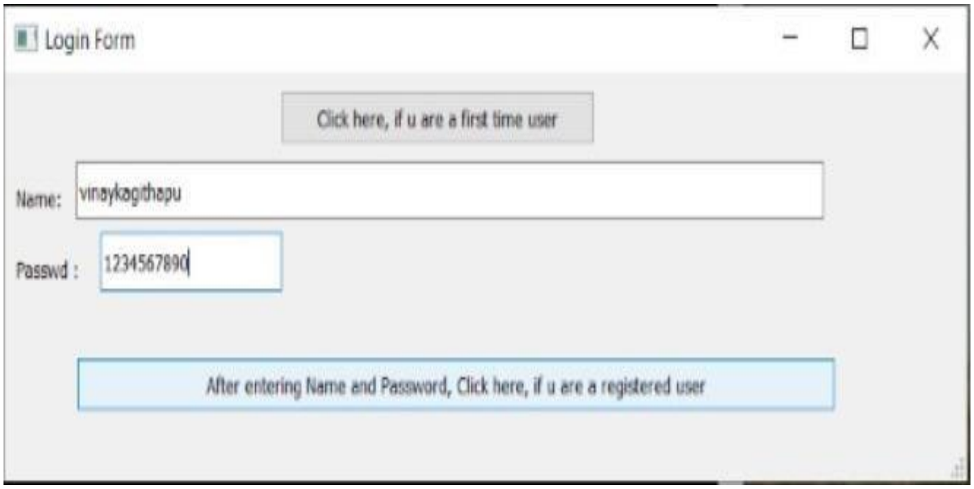
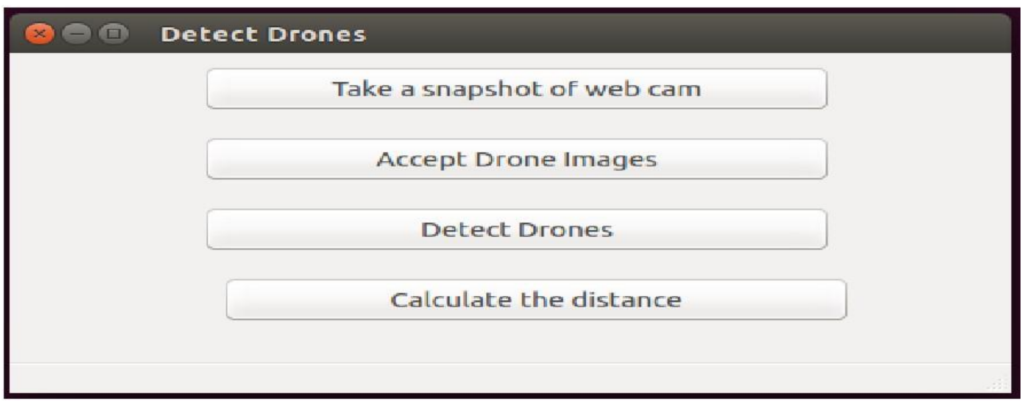
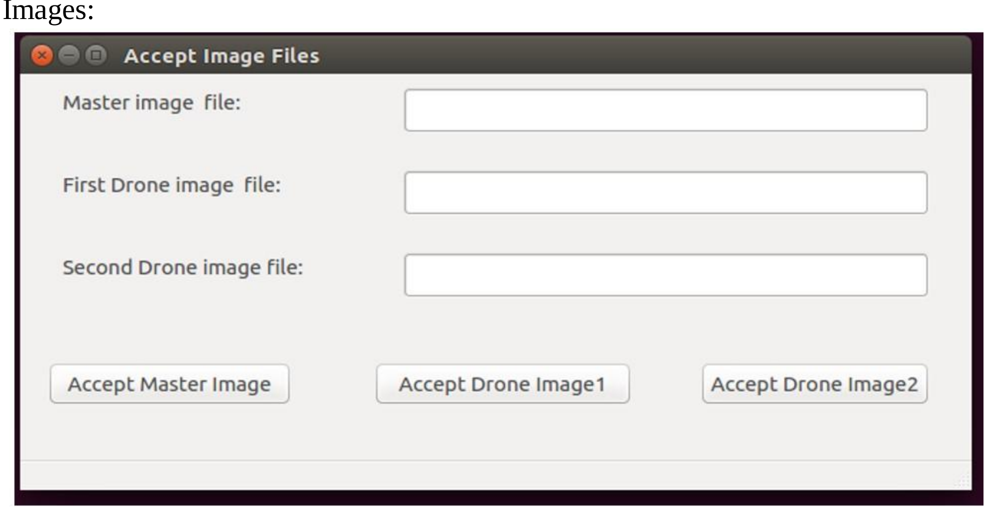
Login:




Main Window:




Accept Drone Images:



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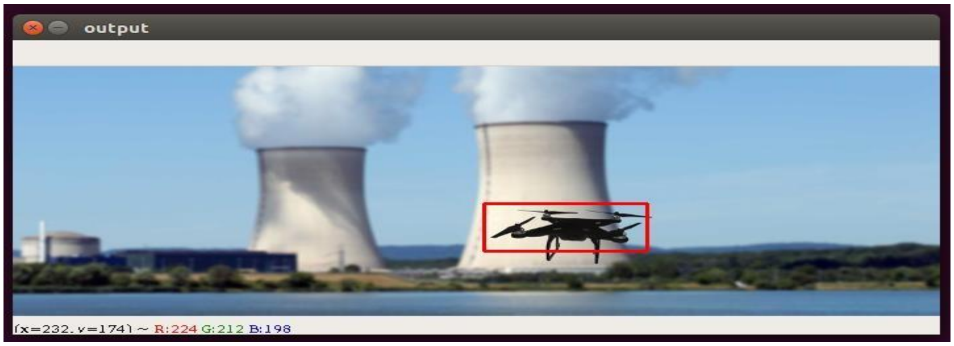
Detect Drones:




Calculate the Distance:


## VI. CONCLUSION

This paper, titled "Identification of Drone Type Using KNN Classification," describes a method for automatically identifying drone types using KNN classification. Security officials benefit greatly from the project since they receive quick security alerts whenever a drone enters the security zone. The project is beneficial since it protects people's lives and valuable properties against drone assaults.

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