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IMAGE PROCESSING IN UNMANNED AERIAL VEHICLE

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Abstract :

Unmanned Aerial Vehicle (UAV) is used for various purposes ranging from military, agriculture, surveillance, photography etc. UAV's have been majorly involved in the advancements and developments in many leading areas. These Unmanned aerial vehicles are also known as drones which are capable of capturing the aerial view or the birds eye view.

The scope of drones is widened after a healthy collaboration of Image processing with the Drone Technology. Real time image processing has enabled drones to execute object tracking, remote sensing etc. Drones can now monitor a certain area and can automatically perform operations which can be controlled by the user. Various algorithms are being tried and tested to obtain results which can reduce human effort and develop a automatised working ecosystem.

Introduction :

The field of Information Technology and Computer science has contributed immensely in the smooth functioning of human life. The collaboration of engineering and computer technology has resulted in the evolution of technology and has provided some leading innovations such as Self driving cars, Robots, home automation etc.

One such great innovation of the modern era has been the Drone technology. Drone technology has extended its support towards minimising the problems on mankind. The working principle of this technology is most based on Artificial Intelligence and Control system engineering. As this vehicle is Unmanned and also Aerial, it is possible to reach out to unexplored and unreachable places with ease. The research is being conducted and many successful attempts are being made to improve the efficiency of drones and to make it more advanced by using the technique of background camouflage. With the advancements in technology, the real time application and the use of Image processing has grown its potential by eliminating the possible errors which were earlier significant.

This paper highlights the use of Image processing and real time tracking using the drone technology and its scope in near future.

Keywords

Image Processing, Machine Learning, Deep Learning, Artificial Intelligence, Radio Controlled, angular velocity, Infrared Image.

Working of Drone

Flying a drone seems simple from a viewers point of view as it just appears as if the Drone pilot is playing a video game, But is is not as simple as it looks. The working of drones is mostly physics. The most important part of its working are the rotors which push the air and there is a force couple and hence a lift is created. The howering of drones depends on the spin of rotors. The blades attached to the rotor push the air downwards, as the forces act in pairs, this means that when the rotor pushes the air down the air pushes the rotor upwards. There are two more basics in the working of drone. It's not just ascending, descending or hovering that a drone does but also it is important for a drone to rotate and move along a path (straight or backwards).

Now to rotate the drone the concept of angular momentum and torque is used. The angular momentum is calculated by multiplying the angular velocity by the moment of inertia. The angular momentum depends on the spin of the rotors. So if the drone is to be rotated to its right, the angular velocity of the top left rotor is decreased this would cause a positive angular momentum and the drone would rotate clockwise. Similar concepts can be used for counter clockwise, sideways and forward movements.

Basics Of Image Processing

Image is an array and a spatial representation of a 2D or 3D pixels. Image Processing is a method by which certain operations are executed on the image to extract information from the image. Image processing is amongst the growing trends nowadays. It basically includes Importing the image by means of image acquisition tools then Analysing the image and finally generating a report for the imported image. There are two methods for image processing , The analogue method and the Digital method processing. In drone technology Digital image processing is used to manipulate the digital images.

Google lens is a perfect example of image processing as it uses Artificial intelligence and combines complex structures of an image and makes it simpler for the user to understand the image.

Image Processing in UAV

Image Processing in an Unmanned Aerial Vehicle is a complex technique as it requires rectification and stitching of images from a data set of over a hundred pictures. It is quoted that the best results can be achieved by photogrammetric processing.

Earlier Image Processing was only used to examine certain targets in an image, After the introduction of machine learning and AI to image processing technological advancements took place in the processing. When Image processing was implemented in the Unmanned Aerial Vehicle along with AI and ML the image could be processed with intelligence even from certain heights and the unexplored regions could be explored with ease, These technologies when combined can be termed as Deep Learning

Implementation of Image Processing in UAV

Image Processing in UAV have various applications which have proved to be useful for humans, to enlist a few:

- I) Defence - Defence sector faces a lot of challenge to access certain specific locations since they aren't aware of what lies ahead. The implementation of AI based Drones has revolutionised warfare effectively. RC drones can be used to capture these locations and later analyse it using deep learning algorithms.
- II) Agriculture - Image Processing in UAV can be defined as the game changer in this era of agriculture. It helps in increasing the quality of crops , detection weeds etc. This image processing can also help to rate the fruits on color, volume and shape. Infrared image analysis when combined can also help in achieving proper harvest time.
- III) UV Imaging - The area of earth is scanned by certain UAVs from a high ground and then processed to extract the information. The remote sensing technique is generally used to detect infrastructure damages caused by earth quakes or natural calamities.

Conclusion

There has been a rapid growth in the technology with the implementation of Image processing in Unmanned Aerial Vehicles (UAV). Its rise and a user friendly experience is paving way for much scope and future expansion of the technology. This technology can become an important asset for human life provided that it is used judiciously. The combination of Machine learning and Artificial intelligence has supported the advancements of drone technology which was possible because of the Image Processing, It has given an all new dimension the the way people look at the future of technology. It is now easier to explore the unexplored places and process those images to gather information for the betterment of society. The future scope of Image Processing in Unmanned Aerial Vehicle is immense and can collaborate along with Artificial Intelligence and Machine Learning to produce technologies that were beyond imagination before these techniques were implemented.

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