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Drone Buddies

Video Motion Tracking and Use in Unmanned Drones

Introduction

Video tracking is the process of identifying a moving object using a camera. The video records the device and is able to detect the presence of an object through two separate algorithms. One of which is Kernel-based tracking, and the other, is contour based tracking. Both of these practices have been used for a while, and are most commonly associated with graphic editing. This process can take a good amount of relative time and requires a lot of computing power. This can be an issue however, on drones as they are limited by their low computing power, in order to be light enough to fly [1]. The most effective way to implement it, would be to combine motion tracking and object detection, as object detection is less costly from a computing perspective.

Security Systems

In the past few years, research has been poured into companies trying to figure out how to automate security systems, and lessen the costs of a surveillance team. The video system records the area, sending a constant stream of the videos. Videos are just a series of pictures, which are represented by an array of color values [2]. The video sends the information to the computer where it'll use shading techniques to determine how many people are there, and to track them. This is done using the background subtraction method [2]. This type of technology is still fairly new, and is only obtainable for high end companies. Cameras that can both track often use infrared for a more efficient analysis. These infrared system camera's costs can cost upwards of $68,000 [3]. To implement this in everyday life, motion sensors are added to reduce the cost of running the camera system at all times. Unfortunately, this type of system works best with a static background. This means that video cameras mounted on a moving drone may not

be accurate, even if they did have the processing power on board to consistently compute the object in question.

Drone Tracking

The drones themselves can be equipped with powerful enough cameras to detect certain objects [4]. Equipping this with the ability to communicate remotely should theoretically be enough to track and follow an object. After all if the drone was being controlled entirely remotely through a video camera, the human brain should be enough to track an object. The next step would be to automate that thinking and tracking process. For computers, through implementing the contour technique, with enough machine learning they can learn to recognize objects, including people. This makes it theoretically possible for a computer and for a drone to track an object if two conditions are met. The computations are done on a separate computer not attached to the drone, and the communication between the drone and the server are quick enough.

Cloud Computing

Cloud computing allows instant access to a nearly unlimited resource of computational power. Newer self-driving automobiles have started using cloud computers in order to load maps without needing to store all of its data at once. [5] For drones however that need to be running a constant stream of calculations, a more reliable source may be needed. Some limitations from cloud computing include the consistency of the signal, and problems arise if the system is computing too much information. [6] If there is a whole system of drones, all relying on the same servers to compute their information, it can slow down how effective the drone will be able to track its target.

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