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A SURVEY ON MOBILE REMOTE SURVEILLANCE TOWER

Yash Kale[1], Kirtan Chauhan[2], Harshad Jain[3], Siddhesh Chavan[4], Supriya Dicholkar[5]

[1-4]BE Student, Electronics and Tele-Communication, Atharva College of Engineering, Mumbai, India
[5]Professor, Electronics and Tele-Communication, Atharva College of Engineering, Mumbai, India

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Abstract - *India is sharing it's geographical borders with 7 nations also surrounded by water from three sides .So there is indeed a high need of army and machinery to keep eye all the time on the borders and to see that there is no blindspot or less chances of blindspot. We today live in an advanced world but there are still some blindspots due to the diverse terrains and inhabitability which give rise to illegal cross bordering and terrorism. This results into terrorist attacks, damage to infrastructure and life insecurity. To overcome this hurdle of blindspots our team came up with an idea of remote mobile surveillance tower which can be remotely controlled over RF signals.The system that we are going to design is a hardware solution which is capable of detecting humans, cars using TensorFlow and opencv libraries and sending an alert to the nearest base army station.*

Key Words: **Object detection, OpenCV, TensorFlow**

1. INTRODUCTION

Object detection is a computer based technology that deals with the advent of computer vision and image processing with the help of this technology we can detect objects using digital images and videos stored in its libraries. Object detection includes a variety of important techniques such as image processing, pattern recognition, artificial intelligence and machine learning. It can be used for various purposes such as security, observation and surveillance. In our project we would use object detection for security and surveillance purposes helping us to identify any threat or suspicious movement along the border areas. Our project will provide better, efficient as well as modern solution to problems such as reachability and diverse terrains. Our system will also be connected to a server located far away in a control room where one can easily monitor the region and receive time to time updates.

2. Literature Review

Significant efforts to introduce OpenCV basics to people within the most easiest method possible without the requirement of inquiring any lengthy manuals and scary reference books were taken by Ivan Culjak, David Abram, Tomislav Pribanic, Hrvoje Dzapo, Mario Cifrek are often seen in their research paper[5].In their paper, They proposed that OpenCV is an open source library for image and video analysis, originally introduced quite decade ago by Intel. They revealed since then, variety of programmers have contributed to the foremost recent library developments. The newest major change passed in 2009 (OpenCV 2) which incorporates main changes to the C++ interface. Nowadays the library has >2500 optimized algorithms. It's been discovered that it's extensively used around the world, having >2.5M downloads and >40K people within the user group. No matter whether one could be a novice C++ programmer or knowledgeable software developer, unaware of OpenCV, the most library content should be interesting for the graduate students and researchers in image processing and computer vision areas. They concluded that to master every library element it's necessary to consult many books available on the subject of OpenCV. Though, reading such more comprehensive material should be plenty easier after comprehending some basics about OpenCV from this research paper.

Research paper by Brent Griffin and Jason Corso focuses on the problems associated with learning the way to estimate the depth of detected objects given some measurement of camera motion (e.g., from robot kinematics or vehicle odometry).The authors achieved this mainly due to following reasons 1) designing a recurrent neural network (DBox) that estimates the depth of objects employing a generalized representation of bounding boxes and uncalibrated camera movement and 2) introducing the article Depth via Motion and Detection Dataset (ODMD).These sets include mobile robot experiments using an end-effector camera to locate objects from the YCB dataset and multiple examples with perturbations are been added to camera motion or bounding box data. In addition to the ODMD benchmark, we evaluate DBox in other monocular application domains, achieving state-of-the-art results on existing driving and robotics benchmarks and estimating the depth of objects employing a camera.

Research paper by Onkar Kriplan, Pooja Bavisar, Shivani Khawase, Anjali Mankar, Karishma Ramteke on the subject of Object discovery and following listed are essential and testing undertakings in numerous PC vision applications, such as, reconnaissance, vehicle route and self-sufficient

robot route. Question recognition consists of finding objects within the casing of a video succession. They discovered that every following strategy requires a matter recognition component either in each edge or when the protest first shows up within the video. For example figuring, the measure of a planet(astronomy), distinguishing disease in an exceedingly mammography scan(medicine), abstaining from controlling an obstacle(robotics), and identifying a man's eye shading or hair color(security). The goal of the research is to construct a model that may recognize the protest of indicated shading that produces utilization of open source equipment which chips away and offers insights of visual information caught from a normal webcam which includes a reasonable lucidity. Having an image preparation calculation which distinguishes a protest first and afterward tracks the length of it within the observable pathway of the camera. As the protest moves , the PC/portable, PC/implanted Board offers a flag to the engine to indicate the camera which is mounted on a stepper engine. We executed the proposed calculation on a Raspberry Pi board utilizing OpenCV on Linux foundation. it's a proficient protest following technique which takes care of the subsequent issues.

Rajeshwar Kumar Dewangan, Yamini Chouhan thanks to object detection's close relationship with video analysis and image understanding, it's attracted much research attention in recent years. As we know, Traditional object detection methods are built on handcrafted features and shallow trainable architectures. With the assistance of advanced development in deep learning, more powerful tools which are able to learn semantic, high-level, deeper features, are introduced to handle the problems existing in traditional architectures. It's been found that such models have the tendency to behave differently in spec, training strategy and optimization function, etc. during this paper, they supply a review on python based object detection frameworks. Their main focus is on typical generic object detection architectures together with some modifications and useful tricks to enhance detection performance further. As distinct specific detection tasks exhibit different characteristics, they also briefly survey several specific tasks, including salient object detection, face detection and pedestrian detection. Experimental analyses also are provided by them to match various methods and draw some meaningful conclusions. Lastly, many encouraging directions and tasks are provided to function guidelines for future add both object detection and relevant neural network based learning systems.

Aneesha Maddineni, Dr. Sk Jakeer Hussain Tensorflow has better help for distributed systems too. The elemental application is image recognition and object detection. The principal target of this project is implementation of object detection agenda by utilizing tensorflow and Raspberrypi because of the framework. Because the world searches for the more intelligent way, this can be useful to actualize and also applicable for the 000 time applications.

Ajay Talele, Bhushan Barse, Aseem Patil, are detecting and recognizing objects in unstructured likewise as structured environments. It's one amongst the foremost challenging tasks in computer vision and computing. This paper lets us realize a brand new computer vision-based obstacle detection method for mobile technology and its applications. It has been revealed that each individual image pixel is assessed as belonging to an obstacle supporting its appearance. The tactic employed in this paper may be a single lens webcam camera that performs in real-time, and also provides a binary obstacle image at high resolution. within the adaptive mode, it's been observed that the system keeps learning the looks of the obstacle during operation. This method has been tested successfully in a variety of environments, such as ,indoors and outdoors, making it suitable for all types of hurdles. The paper also tells us the kind of obstacle which has been detected by the system.

3. DETAILED INFORMATION

3.1: OBJECT DETECTION

The working of the system starts with setting up tensorflow's object detection with the Raspberrypi3 B+. After setting up this we would be able to use Raspberry Pi 3B+ to perform object detection on live video feeds from the camera on the tower. We have to train the neural network which will help us to identify specific objects, and then we would use pi for unique detection applications.

We'll use the ssd_mobilenet_v1_coco_2018_01_28 from the tensorflow detection zoo model. The model zoo is google's collection of pre-trained object detection models that have various levels of speed and accuracy and this model is trained on coco 2017 dataset. This model is trained on the ssd algorithm. The raspberry pi3B+ has a weak processor, so we need to use a model that takes less processing power. This model runs fast with high accuracy as per our observation. The object_detection script detects objects in live feeds from a picamera or usb webcam. The script initializes the camera, and then begins performing object detection on each video frame. You can get different colour box frames on the human and vehicle and also count them in the frame with few changes in the code script. Raspberrypi 3B+ performs fairly well, achieving a frame rate nearly 1fps. This can be increased on the basis of the camera and the raspberry processor advancement.

3.2: ROVER MOVEMENT

For the movement of rover we need to define input and output pins for Raspberry-Pi. Next we need to initialise GPIO pins for Raspberry-Pi. Next, we also have to define user functions for forward, backward, left and right movement of the rover. Another function needs to be allotted which takes input from the user. Various Keys have been assigned to perform specific tasks. Key W will be for forward movement, key S for backward, key D for right movement, key A for left and finally key X to stop. Each key when pressed followed by pressing enter will perform the task associated with it and move in it's desired direction.

4. CONCLUSION

After reading a couple of research papers, we have decided to use OpenCV as our library and zoo model for Human and vehicle detection. We look forward to tracking the human and car when they go beyond the camera boundary. The rover movement is controlled with a remote controller and powered by a battery .The data is then sent to the centre for the detection and alarming of the guards.

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