A

REPORT

ON

Moving Object Detection and Tracking

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In

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<u>CERTIFICATE</u>

This is to certify that **Mr. Prajwal Sute** of B.E. Computer Engineering,Roll No.14160 has successfully completed his report on "Moving Object Detection and Tracking".

To my satisfaction and is submitted the same during the academic year 2022-23semester

towards the partial fulfillment of degree of Bachelor of Engineering under the Savitribai

Phule Pune University, Pune.

Date: /   / 2023

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INTRODUCTION

Visual surveillance is an important field of computer vision that has gained significant attention in recent years due to the growing need for surveillance and security in various domains. The aim of visual surveillance is to detect and track objects of interest in a video stream, which can be used for a wide range of applications such as security, traffic monitoring, and object tracking.

Object detection and tracking algorithms are the key components of visual surveillance systems. Object detection algorithms are used to identify objects of interest in a video stream, while object tracking algorithms are used to track the movement of these objects over time. These algorithms can be implemented using various techniques such as deep learning, computer vision, and machine learning.

In this report, we will discuss the implementation of visual surveillance applications using object detection and tracking algorithms. We will begin by providing an overview of the different techniques and algorithms used in visual surveillance. Then, we will discuss the different components of a visual surveillance system, including video acquisition, object detection, and object tracking.

Objectives

The objective of this report is to describe the implementation of a visual surveillance application that uses object detection and tracking algorithms to detect and track moving objects in a video stream. The report will discuss the various steps involved in the implementation, including selecting and preprocessing the video data, choosing an appropriate object detection algorithm, and implementing object tracking. Additionally, the report will evaluate the performance of the application, discussing its accuracy and efficiency in detecting and tracking moving objects.

Tool Used

Software Requirements -

- Software's used   :- Anaconda, Jupiter Notebook
- Operating system :- We have chosen Windows 10 operating system
- Data   :- Video Data

Hardware Requirements -

- Processor :- Pentium or Higher
- RAM   :- 8 GB
- Hard Disk :- 500 GB
- Input Device :- Keyboard, Mouse

Implementation Details:

Steps:

The code is an implementation of background subtraction for detecting moving objects in a video. It uses the OpenCV library in Python to perform the following steps:

1. Load a video file using `cv2.VideoCapture`.

2. Randomly select 30 frames from the video.

3. Calculate the median and average of the selected frames using numpy functions.

4. Convert the median frame to grayscale using `cv2.cvtColor`.

5. Loop through each frame of the video and perform the following steps:

    a. Convert the current frame to grayscale.

    b. Calculate the absolute difference between the current frame and the median frame using `cv2.absdiff`.

    c. Apply Gaussian blur to reduce noise using `cv2.GaussianBlur`.

    d. Binarize the frame using thresholding with Otsu's method using `cv2.threshold`.

    e. Find contours in the binary image using `cv2.findContours`.

    f. Draw bounding boxes around the contours using `cv2.rectangle`.

    g. Display the resulting image with the bounding boxes using `cv2.imshow`.

    h. Write the processed frame to an output video file using `cv2.VideoWriter`.

6. Release the video capture device and output video writer, and destroy the display window using `cv2.destroyAllWindows`.

Result:

Screenshot:

Conclusion

Visual surveillance applications are becoming increasingly important for security and safety purposes. One of the primary tasks in visual surveillance is detecting and tracking moving objects in a video stream. Object detection and tracking algorithms can be used to accomplish this task.

Object detection algorithms use computer vision techniques to identify objects of interest in an image or video stream. These algorithms typically involve analyzing the image or video stream at multiple scales and using machine learning algorithms to classify objects in the image or video.

Object tracking algorithms, on the other hand, aim to track the movement of objects of interest over time. These algorithms use information from previous frames to estimate the location and movement of objects in the current frame.

By combining object detection and tracking algorithms, it is possible to build effective visual surveillance applications for detecting and tracking moving objects in a video stream. These applications can be used for a variety of purposes, including monitoring traffic, detecting intruders, and tracking individuals in crowded public spaces.

In conclusion, visual surveillance applications based on object detection and tracking algorithms are a valuable tool for enhancing security and safety in a variety of settings. With the continued development of computer vision and machine learning techniques, these applications are likely to become even more effective and versatile in the future.

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