Real Time Suspicious Object detection

Engineering & Technology
Level :
Under-graduate Student

ABSTRACT

Understanding objects in video data is of particular interest due to its enhanced automation in public security surveillance as well as in traffic control and pedestrian flow analysis. Here, a system is presented which is able to track a classified objects in different conditions using a static camera. The system is capable of correctly tracking moving objects despite occlusions and object interactions. Results are presented on real world sequence.

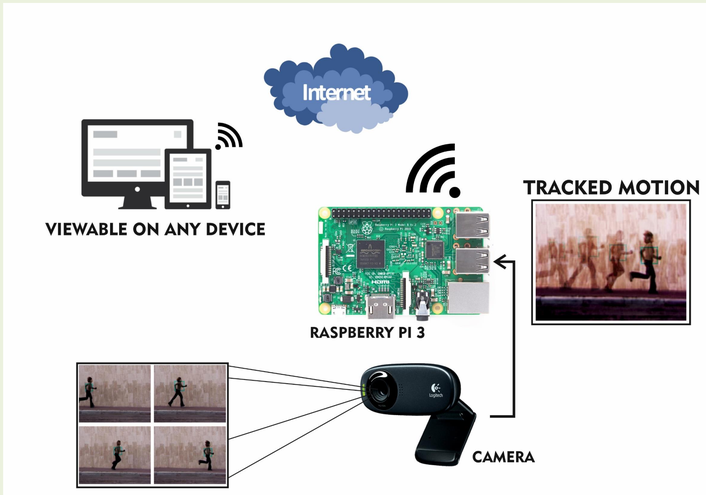
INTRODUCTION

The main objective of the project is to design a system that tracks and identify particular object from the video sample. The goal is to track objects in view of the camera and to determine their type and position. The project is based on object tracking. There are several ways to track an object in live video stream. The most simple and fastest ways are colour and size detection. In this project we have to give the input as video frame and we get tracked object (outlined object) as an output. This work is done by analyzing the frames of input video sample. This is done by using convolutional neural networks algorithm.

TRADITIONAL METHODS

Traditionally the object detection was done using complex algorithm such as blob analysis, k-means clustering, camshift and involved various steps like thresholding and edge detection etc. But developing these algorithms for identification of different object was very difficult because algorithms were mathematically very complex and did not give satisfactory result. There after image processing was performed by machine learning algorithms like HOG,SVM Voila Jones algorithms etc but eventually it was observed that better results can be obtained using Convolution Neural Networks and only one type of object was able to be detected per classifier so to identify n number of objects we would need n number of classifier.

ARCHITECTURE



ALGORITHM FOR TRACKING AND DETECTION

Convolutional Neural Networks are a form of Feed forward Neural Network. Given below is a schema of a typical CNN. The first part consists of Convolutional and max-pooling layers which act as the feature extractor. The second part consists of the fully connected layer which performs non-linear transformations of the extracted features and acts as the classifier.
The input frame is fed to the network of stacked Conv, Pool and Dense layers. The output can be a softmax layer indicating whether there is a particular trained object or something else. You can also have a sigmoid layer to give you a probability of the image being a particular object from a given set of objects on which the neural network was trained..

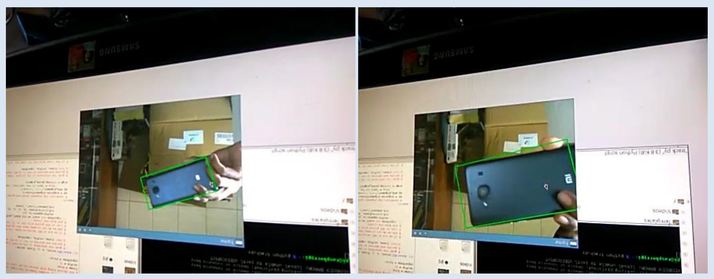
PYTHON

- Uses an elegant syntax, making the programs you write easier to read.
- Is an easy-to-use language that makes it simple to get your program working. This makes Python ideal for prototype development and other ad-hoc programming tasks, without compromising maintainability.
- Comes with a large standard library that supports many common programming tasks such as connecting to web servers, searching text with regular expressions, reading and modifying files.

WORKING

- It uses Tensorflow, it is a tool for machine learning. While it contains a wide range of functionality, TensorFlow is mainly designed for deep neural network models. And OpenCV, a computer vision library for video capturing and converting the video frames and Raspberry pi, a micro-controller kit build with ARM11 board is used run the algorithm and display output.
- Feed from camera is given as input to the raspberry pi.. The code is compiled on the Pi using Python 3. It is continuously run once the Pi boots. When a frame is captured by the cam, it is fed to the Pi and the Pi then processes this frame by using Convolutional Neural Network. The output of this processing is a video with a tracked object can be seen on the Display monitor.

RESULTS



CONCLUSIONS

- We have demonstrated a vision based system for tracking and classifying dynamic objects in different conditions. The system is based on convolutional networks and shows improvements in the tracking and classification of objects. The system can handle occlusions under certain level and has demonstrated good results over multiple objects in varying conditions.

REFERENCES

- https://www.tensorflow.org/
- https://www.raspberrypi.org/
- "Speed/accuracy trade-offs for modern convolutional object detectors.“ Huang J, Rathod V, Sun C, Zhu M, Korattikara A, Fathi A, Fischer I, Wojna Z, Song Y, Guadarrama S, Murphy K, CVPR 2017