Efficient Detection of Garbage and Overflowing Street bins in CCTV Surveillance

Akhil Dua, Ayush Dwivedi, Dave Shivangi Devendra, Azra Nasreen, Shankar T
RV College of Engineering, Center For CCTV Research

Introduction and Motivation

- Many cases have been recorded where garbage has been observed lying just like that in public places resulting in enormous inconvenience and breeding grounds for many problems.
- In order to address this issue, a significant amount of work has been done, the prominent one being implementation of IOT, connected devices that are capable of sending data across connections but the major limitation encountered in these is that of maintenance and the complexity in setting up the whole system.
- The conventional approach of monitoring the overflowing of bins can be inefficient. So an automated overflowing of garbage detection system is required to avoid these circumstances.

Objectives

- Monitor the overflowing of bins through surveillance video.
- Detect the static overflowing bins in video sequences with the help of bounding boxes.
- Processing CCTV video streams and implementing background subtraction to identify potential input areas for the network followed by classification of garbage as Overflowing.
- To achieve suitable accuracy depending on the status of the bins.

Solution Methodology

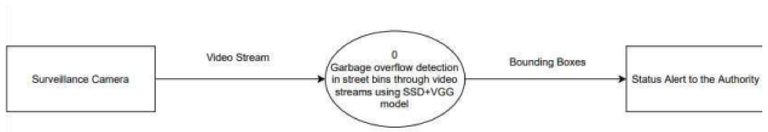


FIG. 1: DFD LEVEL 0

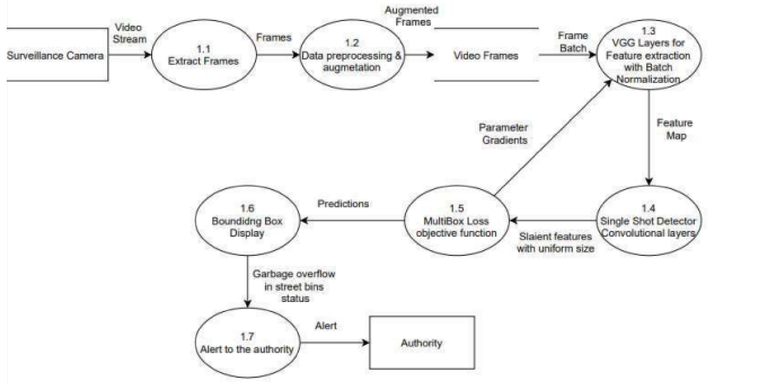
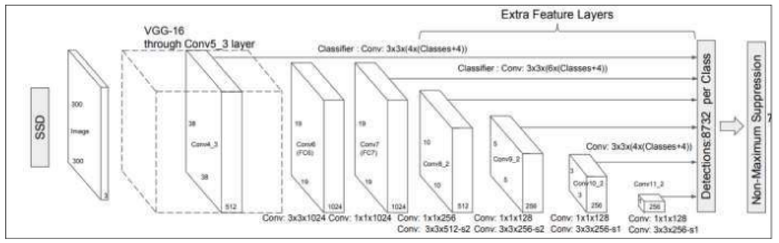


FIG. 2: DFD LEVEL 1

SSD+VGG16 Architecture



- The base network block is used to extract features of original images, and it generally takes the form of a deep convolutional neural network. The approach used for SSDs chooses to place a truncated VGG before the classification layer.
- As the SSD generates different numbers of anchor boxes of different sizes based on the base network block and each multiscale feature block and then predicts the categories and offsets of the anchor boxes in order to detect objects of different sizes, SSD is a multiscale object detection model.
- The SSD model used adds several feature layers to the end of a base network, which predict the offsets to default boxes of different scales and aspect ratios and their associated confidences.

Video Surveillance Test Results

Results

- The proposed method utilizes the ability of capturing the overflowing trash level from the bins by the surveillance cameras.
- The details of, as to which bin is full, can be retrieved and suitable action can be triggered in order to inform the concerned authorities.
- Dataset requirement for such kind of application where expected accuracy is very high, plays a crucial role.

More Information

https://drive.google.com/file/d/1_PgUL3IkmvrqFGzggtzYPmqj3fTjgbMw/view?usp=sharing