A SURVEY ON HUMAN DETECTION WHILE DUMPING WASTE

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Abstract— *Dumping of wastes through illegal ways has been an unpleasant issue in many countries of the world. The effect of wastes being lying around not only cause unpleasant aroma and spoil the city view but also affect people and animal around the place with different types of health issues. Even though many efforts have been put into use to prevent these, most of them are not of much use and are either less efficient or of high cost. In this survey, we propose to use machine learning and image processing approaches to implement a system which would recognize various types of dumped wastes along with humans dumping it using machine learning and image processing, for better present and future.*

I. INTRODUCTION

Illegal dumping is a major issue faced by many countries across the world. These kinds of dumping include variety of wastes ranging from electronic goods, furniture and many other household items that are dumped illegally in the public places which in turn cause threat to human health and environment. To minimize the illegal waste dumping, many countries have imparted different facilities such as installation of surveillance camera, creating awareness among people through social media and other platforms and sometimes also by taking serious measures of issuing fine to the ones who

violate the rules. Manual detection is not cost effective and quite a bit expensive, therefore we should install a system that identifies automatically and reports without any major efforts. In this survey paper we have proposed to identify all types of the waste and as well as detects humans who dump waste by using Machine Learning and Image processing techniques.

II. LITERATURE SURVEY

In this section, we will study different approaches based on Machine Learning and Image Processing. Techniques to identify human activity while dumping waste.

A. Unstructured feature points:

Unstructured feature points is a method for human activity recognition which does not require articulated pose during testing and which models activities two attentional processes, the first process is extracting a set of hints per frame and the other process is reasoning the entities with respect to time. This unstructured cloud of hints that is produced by attention process is tracked by using a set of recognizers or trackers. The articulated pose is used during training time as an additional target, which encourages the attention process which in turn helps to focus on human structures. In feature space different attentional mechanisms are executed which is calculated together with a global model that processes full input image.

B. Support Vector Machine*:*

Support Vector Machines uses the hyper dimensional planes to separate examples. Although Support Vector Machines can be used with/without supervision, it is usually faster and more effective to use supervised Support Vector Machines. When supervising a Support Vector Machine with a cubic polynomial kernel used to identify tuples in the dataset, a high success rate around 99 per cent was achieved.

C. Recurrent neural network (RNN):

A recurrent neural network (RNN) is a subset of artificial neural networks in which node-to-node links shape a directed graph along a timing chain. His enables it to display temporary dynamic behavior. Like feed forward neural networks, RNNs can use its internal state (memory) to process input sequences of variable lengths.

D. PoseNet:

PoseNet is an effective machine learning model which allows in estimation of Human pose in Real-Time. It can estimate both a single pose or multiple poses, in the sense, there are two versions of algorithm.one version can detect only one person at a time in a given image or video and another version can detect more than one person in an image or a video.

Parameters:

video -any type of HTML video/p5 video.
type - String to perform single/multiple estimation.
callback - function used to execute the model once it has been loaded. Options - Object describing a model accuracy and performance.

Sl No	Authors	Title	Technology used	Outcomes
1	Kimin Yun , Yongjin Kwon, Sungchan Oh, Jinyoung Moon, Jongyoul Park	Vision-based garbage dumping action detection for real-world surveillance platform	Deep learning	Detection of human actions when dumping waste.
2	James W. Davis, Vinay Sharma, Ambrish Tyagi, Mark Keck	Human Detection and Tracking	Machine learning	Tracking humans
3	M. Hussein,W .Abd Almageed, Yang Ran, L. Davis	Real-Time Human Detection, Tracking, and Verification in Uncontrolled Camera Motion Environments	Robot vision systems, Object detection	Human detection, tracking, and verification in such challenging environments.
4	Akshay Dabholkar , Bhushan Muthiyan, Shilpa Srinivasan , Swetha Ravi, Hyeran Jeon, Jerry Gao	Smart Illegal Dumping Detection	Machine Learning	Detection of wastes in prohibited public areas
5	Hema Begur, Mithila Dhawade, Navit Gaur, Pulkit Dureja, Jerry Gao, Medhat Mahmoud,	An edge-based smart mobile service system for illegal dumping detection and monitoring in San Jose	Big Data, cloud computing, IOT, mobile computing	Proposing an innovative smart mobile based service system that supports real time

Table -1: Literature Survey Table.

E. Classification Using Skeleton Information:

Joint locations which are in 3D format of the human body are used as input to SVM classifier toextract posture information. The posture information is later used for the recognition of different activities with a sequence of postures.

F. Neural Networks

Artificial Neuron is the basic element of both Deep Learning and Machine Learning. Learning calculations are performed sing these neurons. Different neurons work together with a common goal of implementing a complex mathematical computation. The network formed by these neurons is called as the artificial neural network. The whole concept of artificial neurons is taken from the biological neurons that are present in the human nervous system.

In an artificial neuron, dendrites are considered as the input terminals of the neurons. The processing job is done by the axons and the output is passed on to other neurons connected via synapses and dendrites of another neuron. The input signals are multiplied by the weight of the line (input signals travel along the input line). The weighted input signal is processed by the mathematical function. This function is called as activation function. The processed signal is then passed on to the next layer of neurons for the processing. The weight of the connection between neurons is considered as the learning element. During the time of training of model, value is adjusted such that the error is converged to 0. In the human body, the signals that are carried by the dendrites are added up and if the sum is more than the threshold value then signals are fired by the axon. A similar approach is used in mathematical models. The activation function determines the threshold value. The standard choice of the activation function is referred as sigmoid function. The sigmoid function takes summed up value as input and converts it between 0 and 1 range.

III. IMPLEMENTATION

There are many challenges to be faced in the process of illegal dumping detection. Firstly, the detection of waste. Since wastes can be anything and they also vary in their sizes. In this paper, we use Machine Learning approach which identifies different types of wastes and also detects humans who dump waste in prohibited places.

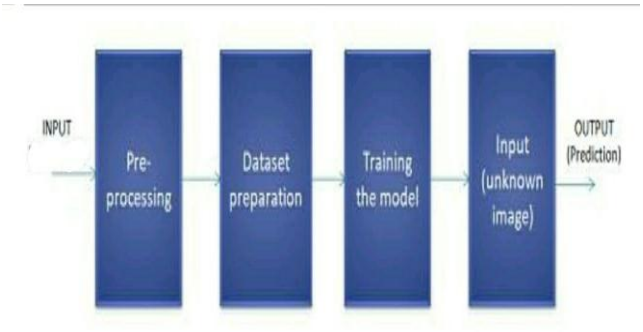

Fig -1: System design of a Training Model.

SYSTEM DESIGN

The dataset images are input to be trained using Machine Learningin this design. In the beginning we develop a model that extracts features of the given input elements (training phase). The trained model checks if the given image contains any kind of object that model is trained with. Hundreds of dumping images are used to make sure that the model identifies Human actions. Machine Learning model detects images of identified human actions.Human Activity Recognition is used to recognize a set of human activities by training supervisied learning model and the result is displayed as received from input (camera). The system recognizes actions based on feature points .Based on theinput from the camera,we perform feature enhancement and background reduction .

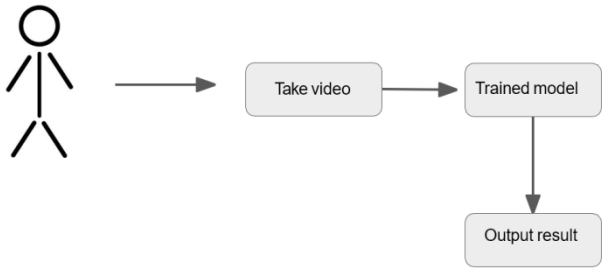

Fig -2: Process of Training a ML model.

Training Data: The training dataset is a set of examples used to train the model in order to fit the parameters. Most of the approaches used for training the samples tend to overfit if the dataset is not increased and used in variety.

Validation Dataset: A validation dataset is also called as the development dataset or dev set. A dev set is used to fit the hyper parameters of the classifier. It is essential to have a validation dataset along with training dataset and test dataset as it helps to solve the problem of over fitting. The main goal here is to choose a network performing which is best on unseen data. Hence, we use validation dataset which is not dependent on the training dataset.

Test Dataset: The test dataset is not dependent on neither training nor validation dataset. If a model is found to be fitting both the training dataset and test dataset then it is said that minimum over fitting has occurred. The test dataset, as the name goes is the dataset which is used only to test the performance of the classifier/model. The test dataset is used to check the performance characteristics of the model like the accuracy, loss and sensitivity.

IMPLEMENTATION

Data collection is the first process under implementation. Data sets play an important role in machine learning as it is used to train thesystem in order to get the desired output.

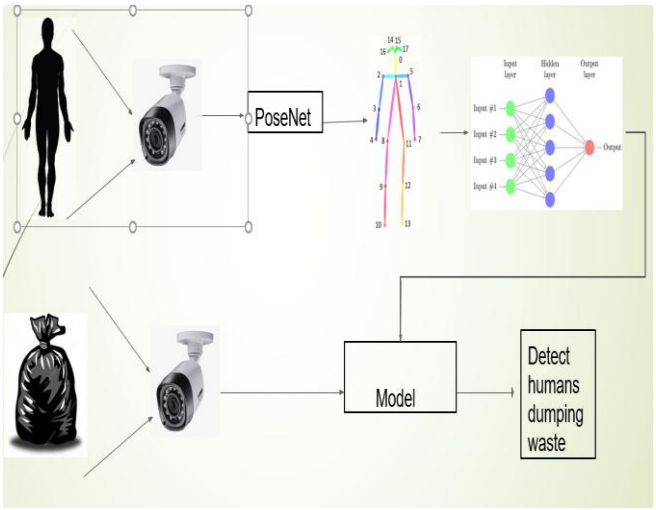

Fig -3: Implementation.

Data set mainly consits of different types of human actions and types of garbage. Some data sets are available publicly while some are not. The trained model from the machine learning technique differntiates human action of whether the garbage is thrown or not from the video surveillance. From the output of the camera we identify the human face and crop it from the outtput video.

IV. ADVANTAGES

- Cost of the sensors is eliminated
- Dependability on sensors is eliminated
- Fewer resources are required as compared othermodels
- Easy to enhance and add accuracy to current model without any additional hardware requirements
- Keeps the environment clean.
- Health related issues of citizens will be minimized.

CONCLUSION

A Survey on how a Machine Learning trainedmodel automatically detects humans when dumping lump waste in prohibited areas with lesser memory and high accuracy. In this paper we try to demonstrate and explain that the process illegal dumping can be detected using machine learning methodology.

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