Object Detection In An Image Using Machine Learning

Soham N. Gade[1], Shubham S. Gonyal[2], Ganesh S. Ghodake[3], Abhay V. Chidrawar4, Prof. V.V.Kimbahune[5]
[1, 2, 3, 4, 5]Dept of Computer Engineering
[1, 2, 3, 4, 5]Smt. Kashibai Navale College of Engineering, Pune

Abstract- *In this nimble and fast growing era, it is very necessary to complete the work in an expeditious manner. Machine's plays a vital role for giving accurate output every time. But however, training of Machine is very important in order to get precise and unambiguous output. The aim of this project is to detect the various object in an image or the frame. Using Machine learning technology and Tesnorflow, first the data will be trained. Further using the trained data, various objects in an image or frame which will be given as input to the program can be detected*

Keywords- Feature Selection, Data preprocessing, Object Detection, Classification.

I. INTRODUCTION

The ability to recognize and prioritize the most significant input variables to a neural network has been a focus of research for many years. The performance benefits available from effective feature selection techniques are well established, since when applied before training of and classification of a neural network, these techniques have been found to improve the learning speed, make the learner more generalizable, and simplify the representation of the data [1]. However, these techniques have yetto be realized to the fullest potential in emerging deep learning techniques.

Feature Selection attempts to identify the best subset of variables (or features) out of the available variables (or features) to be used as input to a classification or prediction method. The main goals of Feature Selection are: to clean the data, to eliminate redundancies, and to identify the most relevant and useful information hidden within the data, thereby reducing the scale or dimensionality of the data. Feature Selection results in an enhanced ability to explore the data, visualize the data, and to make some previous infeasible analytic models feasible. In order to use machine learning methods effectively, pre-processing of the data is essential. Feature selection is one of the most frequent and important techniques in data pre-processing, and has become an indispensable component of the machine learning process. It is also known as variable selection, attribute selection, or variable subset selection in machine learning and statistics. It is the process of detecting relevant features and removing irrelevant, redundant, or noisy data. This process speeds up data picture, and Table captions should be centered above the table body. The smaller size of the subset that satisfies a certain restriction on evaluation measures In general, the subset with the best commitment among size and evaluation measure.

Feature selection occurs naturally and without an extra filtering step as part of the training process for certain learning algorithms, such as decision trees and neural networks [8].

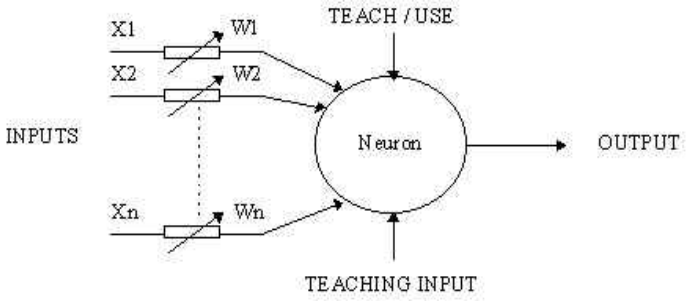

Fig. 1. Neural network weights used for importance calculation

II. REVIEW OF RELATED LITERATURES

In the fast growing era where the work is expected to be completed in a given amount of time, in order to fulfill this requirement with high efficacy machines acts like a savior. In this topic we are dealing with the detection of the objects in a particular image or a frame. [1] V. Shehu presents the results gathered from researching various object detection and recognition techniques. They also presents a multilayered framework of flexibly detecting objects of various classes. The system must constrain to support only limited number of classes, among which are: text, faces, people, gestures etc., but also to be extendable to support objects of other types as well. In order for a system to be capable of recognizing objects, the system must be able to extract identifying features of that object and be able to recognize those features on a database of previously stored objects. An object detected in one scene can differ a lot from the same object detected on another scene.

Among factors that affect this difference are: lightning condition, transformation (such as scale and rotation) and differences in viewing position. Also it is not feasible to build a system that will be capable to recognize any objects, mainly due to the extremely large number of object classes. Due to the different nature of detected objects, one has to combine various computer vision algorithms.

So in [1]V. Shehu propose a layered modular approach, where each module will solve a particular problem. The layers proposed are Image preprocessing, Object detection / Type classification, Object recognition. During the preprocessing phase, images will go through simple processing and filtering algorithms. The detection layer deals with the extraction of sub images from the main image, and these images are further feed to the object recognition layer. Finally, the object recognition layer implements machine learning and statistical algorithms to determine the class of the objects.

Earlier works of color object recognition focused on RGB images. In [2]Huangetal Proposed an object recognition approach for recognizing RGB images in a target domain by performing across-domain dictionary learning over both RGB and depth images in source domain, in which both dictionary learning and classification task are unified into a single learning process. Mohammad[3] presented a novel multimodal deep convolutional neural networks architecture for RGB-D object recognition which composed of three streams with two different types of deep CNNs. Compared to RGB data, RGB-D images provide additional depth information that can be represented as depth colorization methods or surface normal. . They divide the depth channel into two streams (named surface normal and color jet), and then combine the both depths with RGB channel to make a three-stream convolutional neural networks. To train RGB channel, they use the GoogLeNet, which have recently shown remarkably performance in ImageNet challenges; and to train the both surface normal and colorjet streams, they use the CaffeNet, which has a noncomplex network architecture.

Shape features are difficult to describe with traditional RGB information. Therefore, constructing a robust and efficient method by combining RGB and depth information has become an important issue in RGB-D object recognition.

To achieve this we are combining two different techniques i.e. Machine Learning and TensorFlow. Though object detection is a very tedious job to do, Google's famous API called Tensorflow alleviates the job of detection. TensorFlow or TF is an adroit API, which is made up of using various techniques such as deep learning, neural networks, image processing etc. In [4] it is stated that the system of tensor flow is flexible and can be used to express a wide variety of algorithms, including training and inference algorithms for deep neural network models, and it has been used for conducting research and for deploying machine learning systems into production across more than a dozen areas of computer science and other fields, including speech recognition, computer vision, robotics, information retrieval, natural language processing, geographic information extraction, and computational drug discovery. [6] States the basic framework of object detection which is used for detecting object in a static image. In [7] they have proposed a new and novel multilayer perceptron training scheme which is basically an advancement of extreme learning machine. We are referring [7] to understand the basics of the extreme learning machine techniques which can be used for training of data that is objects.

TensorFlow[5] is an interface for expressing machine learning algorithms, and an implementation for executing such algorithms. A computation expressed using TensorFlow can be executed with little or no change on a wide variety of heterogeneous systems.

III. SYSTEM DESIGN

The System Architecture is the conceptual model that defines the structure, behavior, and more views of a system. An architecture description is a formal description and representation of a system, organized in a way that supports reasoning about the structures and behaviors of the system. System architecture of the system consists of following blocks –

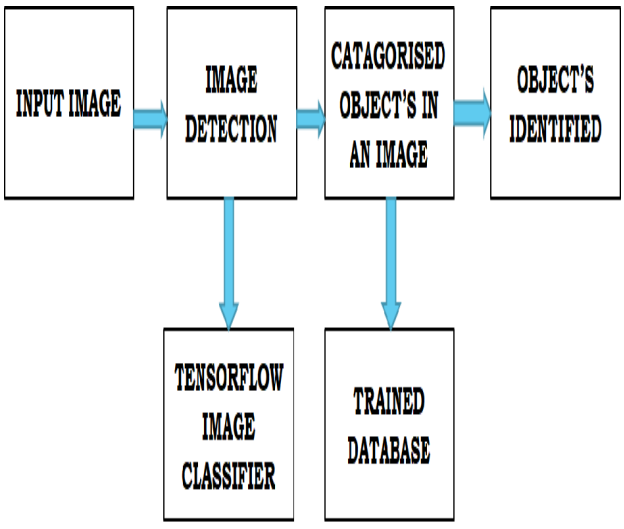

Fig 1. System Design

Goal of this system is detection and recognition of objects in an image. So system accept image from user. System checks attributes of image like format, size and if necessary, it converts to required attribute. For image detection, we use trained modules of large dataset. For we have to import dataset and train modules on it. New entries stored in dataset. TensorFlow image classifier is used to detect and recognize the objects in an image. Output of system is recognized objects in an image. In this, we can provide alert message or error message for various reasons like format is not appropriate or related to size issue or any error while detecting object in an image.

We using two different techniques i.e. Machine Learning and TensorFlow. Though object detection is a very tedious job to do, Google's famous API called TensorFlow alleviates the job of detection. TensorFlow or TF is an adroit API, which is made up of using various techniques such as deep learning, neural networks, image processing.

The System uses Feature Selecting on the various objects, which needs to be trained so that those objects can be detected in a frame. Once the objects are selected further it needs to be trained. Using trained data and TensorFlow machine can detect various objects. The proposed system takes image as input from which we need to detect various objects in it. The system takes the input from user. It uses then the TensorFlow for detecting the various edges of the objects. Using TensorFlow the objects will be trained and using that trained data machine will give the final output.

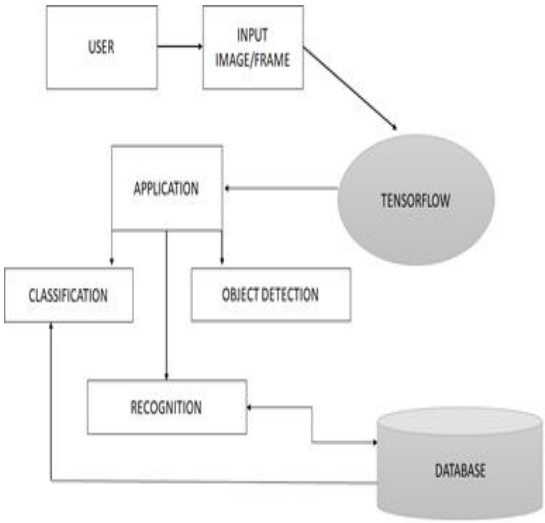

Fig 4. Data Flow Diagram

Image is taken as input from user. First system performs detection of objects in an image. The System uses Feature Selection on image data and applies filtering for final results. There is a set of objects. System does classification that utilizes machine learning. Machine learning based image classification techniques for image and related entities have been used.

Table no. 1

USER	CHARACTERISTICS
ADMIN	Data Analysis Data Processing Data Training Object Detection
USER	Image Providing Detected Object

The System should function without generating any fault and should have a stable bandwidth. The main factor responsible for the reliability of the proposed system is the computing power and its processing ability.

Image is provided by user as input. Our System has trained model on train dataset. System has functions like Data training,

Data Processing, Data Analysis, Object Detection in Admin part.

In data processing, validation of image is performed. If there is any error then appropriate error message is displayed on screen.

After validation of image attributes like format, size and quality

Object Detection process is carried out. Objects are detected in an image using various techniques like edge detection. Detected objects are recognized using classification and Machine Learning concepts.

IV. RESULT OF WORK

While discussion found that system implementation is useful, easy and could have advantages like we able to use multiple modules and evaluate most efficient module on datasets.

V. FUTURE SCOPE

As Video is nothing but a contiguous set of frames or an image. Using the same logic of detecting the object in an image, the same can be used for for video by just considering a running frame. The Only constraint to this application will be detecting the object in microsecond of time.

To detect what type of vehicle is passing on road. In many parts of the city, Heavy Load Vehicles are not allowed. This can also be achieved using this application with certain necessary modifications.

Object detection can be also used for people counting; it is used for analyzing store performance or crowd statistics during festivals. These tend to be more difficult as people move out of the frame quickly (also because people are non-rigid objects).

In the future, we might be able to use object detection to identify anomalies in a scene such as bombs or explosives (by making use of a quadcopter).

VI.CONCLUSION

The proposed system takes image from user and applies machine learning based Tensorflow classification system. It leverages a varied collection of classification and techniques to tackle the challenges of designing a scalable classification system for a large taxonomy of job categories.

REFERENCES

[1] Shehu, V., & Dika, A. (2011, May). Object class recognition using range of multiple computer vision algorithms. In *MIPRO, 2011 Proceedings of the 34th International Convention* (pp. 909-912). IEEE.

[2] Huang, Y., Zhu, F., Shao, L., & Frangi, A. F. (2016, May). Color object recognition via cross-domain learning on RGB-D images. In *Robotics and Automation (ICRA), 2016 IEEE International Conference on* (pp. 1672-1677). IEEE

[3] Rahman, M. M., Tan, Y., Xue, J., & Lu, K. (2017, July). RGB-D object recognition with multimodal deep convolutional neural networks. In *Multimedia and Expo (ICME), 2017 IEEE International Conference on* (pp. 991-996). IEEE.

[4] Heaton, J., McElwee, S., Fraley, J., & Cannady, J. (2017, May). Early stabilizing feature importance for TensorFlow deep neural networks. In *Neural Networks (IJCNN), 2017 International Joint Conference on* (pp. 4618-4624). IEEE.

[5] Abadi, M., Agarwal, A., Barham, P., Brevdo, E., Chen, Z., Citro, C., ... & Ghemawat, S. (2016). Tensorflow: Large-scale machine learning on heterogeneous distributed systems. *arXiv preprint arXiv:1603.04467*.

[6] Papageorgiou, C. P., Oren, M., & Poggio, T. (1998, January). A general framework for object detection. In *Computer vision, 1998. sixth international conference on* (pp. 555-562). IEEE.

[7] Tang, J., Deng, C., & Huang, G. B. (2016). Extreme learning machine for multilayer perceptron. *IEEE transactions on neural networks and learning systems*, *27*(4), 809-821.w Phytologist, vol. 101, no. 3, pp. 441–450, Nov. 1985.