# A STUDY OF DETECTION AND CLASSIFICATION OF COLOR FEATURES FOR VEGETABLES

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***Abstract— In today's world, the important part of research in video processing and in real time applications are the idea of detecting and classifying the objects with a particular feature in the moving video. Technically, image processing is defined as the form of signal processing. There are many existing approaches which are used for tracking objects. Edge matching, Divide-and-Conquer search, Gradient matching, Histograms of receptive field responses, Pose clustering, SIFT, SURF, etc are some of the approaches applied. All these methods are either Appearance based methods or Feature based methods. They lag in one or the other way when it comes to real time applications. So there has been a need for creating a new system that could combine positive aspects of both the methods and increase the efficiency in tracking objects, when it comes to real life scenario. The proposed work is a study to detect and classify the green vegetables in the video by combining the features of SVM and Neural networking algorithms. It consists of three modules, first modules does feature and key point extraction, second module does dimensionality reduction using PCA. The output of the second module is passed into the SVM classifier to classify the vegetables based on its color.***

***Keywords— Detection; Classification; Surveillance; Tracking; Extraction; Reduction; Video Processing***

## I. INTRODUCTION

Object detection and classification in videos is quite complex and bringing tracking on top of it makes the already difficult task more difficult. The demands of detection and classification of objects in multiple fields such as ADAS, Robotic based industrial automation, object counting, military makes the active inclusions of research. **Object detection** is the **process** of finding instances of real-world **objects** such as faces, bicycles, and buildings in **images** or videos. **Object detection** algorithms typically use extracted features and learning algorithms to recognize instances of an **object** category.

In general, any image recognition algorithm takes an image as input and outputs what the image contains. The output is a class label. The anatomy of the image classifier is given in Fig. 1.1

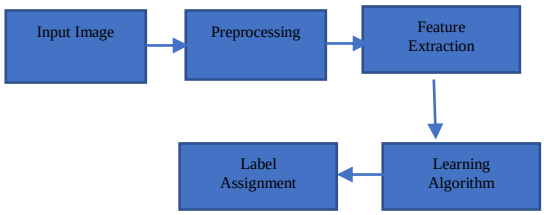


Fig.1.1 Anatomy of Image Classifier

**Step1:** The input image is pre-processed to normalize the effects of contrast and brightness.

**Step 2**: The input image may have additional information that is not needed for the classification, so, to simply the image, we extract the important information in the image. In today's scenario, more feature extraction algorithms like Histogram of oriented Gradients(HOG), Scale-Invariant Feature Transform(SIFT), Speeded Up Robust Feature(SURF), etc are available.

**Step 3:** Learning algorithm for Classification takes feature vector from step2 as input and gives class label as output. Different learning exist but every learning algorithms considers feature vectors as points in high dimension space.

## II. APROACHES FOR FEATURE EXTRACTION

The process of object detection is categorized into two as machine learning approaches and deep learning approaches. In Machine Learning approaches, it is necessary to define the features using any one of the listed methods.

- Haar Features
- Scale-Invariant Feature Transform(SIFT)
- Histogram of Oriented gradients(HOG)

and does classification using any classification techniques like Support Vector Machine(SVM). In deep learning approaches, end-to-end detection is possible without defining features, and so they are called as Convolutional Neural Networks.

**GLOH:** GLOH (**Gradient Location and Orientation Histogram**) is a robust image descriptor that can be used in computer vision tasks. It is a SIFT-like descriptor that considers more spatial regions for the **histogram**

Classification is the process of identifying the set of categories, a new observation belongs by considering the training set of data containing observations for known category membership. The algorithm gives the classification in a concrete implementation is called as a classifier. Sometimes, "classifier" refers to mathematical functions given by classification algorithms, which is mapping input data for this category. Some of the commonly used classification techniques are SVM (State Vector Machines), Neural networks and PCA (Principal Component Analysis). Some of these techniques are discussed below.

SVM: Support Vector Machine(SVM) is a discriminative classifier formally defined by a separating hyperplane. It is a supervised learning model which analyze data and recognize patterns that can be used for regression analysis.

Neural Networks: A neural network consists of an closely connected group of artificial neurons, and process the information in a connectionist approach for computation.

Principal Component Analysis: Principal component analysis is an algorithm which achieves dimensionality reduction. In our proposed system PCA is used for classification on cars in a frame of video based on its brand. PCA classification aims to maximize between-class separation and aims at accurate classification.

## III. PROPOSED SYSTEM

It is proposed to detect and classify vegetables in a given video. To extract and reduce the features from the video , GLOH (Gradient Location Orientation Histogram) algorithm is used. To further classify the vegetable from the input video frame, Principal Component Analysis (PCA) is used. To simulate this system, basically three modules are used.

- Feature extraction and Key point extraction of the input video are performed using GLOH algorithm.
- The extracted features are qualitatively enhanced using dimensionality reduction by PCA.
- The third module further classifies the output features of module 2 using SVM classifier.
- To get the final result, all the above modules are integrated to get the final result.

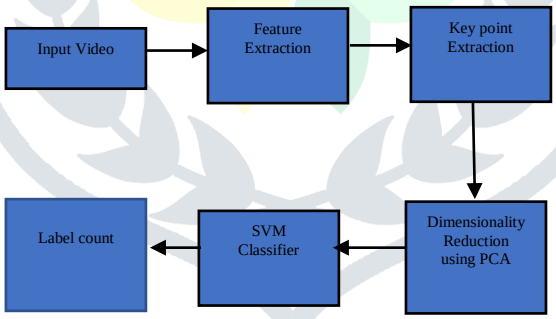


Fig.2 Proposed System

## CONCLUSION

The same algorithm is used with SVM classifier without using PCA, but it is accounting for best results. Since, Neural Networks do not like the "curse of dimensionality" and so using PCA to reduce the dimension of the data can improve speed of convergence and quality of results. The transformation of the data, by centering, rotating and scaling informed by PCA can improve the convergence time and the quality of results. The possible limitations of the simulated results are factors like height and width of the input image needs to be identical and has to be of single channel, the factors like height and width of the average image should be same as that of input image.

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