

# Colored Object Detection For Blind People Using CNN

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**Abstract**—Nowadays, computer vision plays the major role for identifying the objects in the real world scenarios such as face detection, video object co-segmentation. It is also used in tracking objects. This project deals with the colored object detection in an image. The system detects the people, vehicle and some other objects. It uses CNN algorithm to achieve this. This system also displays the color name of the selected pixel in an image. This is done by OpenCV python library. Since the system uses the training set containing different instances of people and vehicles, it is used in many use cases such as aid for blind people, autonomous vehicles, detecting person's face and monitoring traffic and thefts in roads accurately.

**Keywords**— Color detection, Object detection, Image processing, CNN, Machine learning

## I. INTRODUCTION

As computer cannot see the things its interaction with world is limited. Cameras and videos are able to capture and store the visual scene but fail to understand the information the information they capture. Colored Object Recognition is a challenging task in computer vision as machines see images, as numbers that represent individual pixels, where as humans perceive photos as objects which make sit difficult for machines to process all that data.. Recognition of colored objects is evolved as big challenge in computer vision. Appearance of a object color is dependent on the surface reflectance and a change according to visible spectrum. Objects can be differentiated from each other on the basis of their visual and geometric properties. These object properties are important for object recognition. In case of geometric features, shape based features and their role in classifying the objects is one of the major challenge because of the wide range of invariance in illumination, scale, pose, shape and viewpoint in the scene. Object detection is related to the computer vision and image processing that which performs detecting instances semantic objects. People suffering from blindness experience a lot of problems in their day to day activities like identifying traffics lights, reading metro maps, usage of electronic devices. In terms of careers, it can range from mixing paint to those that require a person to operate machinery. So vision deficiency has a profound influence on determining person's career. Blindness and color blindness makes people ineligible for certain jobs such as aircraft pilots, train drivers, crane operators, and people in the armedforces, medicine, industrial engineering, firefighting, doctor,

navy, military, electrician, designer, florist etc. defective vision is a safety problem in many industries. Distinguishing traffic lights is one of the biggest problems for color blind people as they may interpret the signals incorrectly leading to accidents. This system develops an aid to such people to overcome above problems using ML techniques.

### A. Motivation

This System focusses on social relevance for helping blind and color blind people for a friendly visualization by developing a system which helps that person to identify object as well as distinguish color. This system identifies and locates one or more effective targets from still image or video data which can further be used in applications to develop secure or autonomous system.

### B. Objectives

This paper aims to develop an aid for visually impaired people such that they can live an independent life. This paper aim to retrieve R,G B values from an image to determine the color of the pixel and thereby develop an aid for blind people for recognizing color in the images.

## II. LITERATURE SURVEY

In this paper [1] Underwater image processing has been shown to exhibit significant potential for exploring underwater environments. It has been applied to a wide variety of fields, such as underwater terrain scanning and autonomous underwater vehicles (AUVs)-driven applications, such as image-based underwater object detection.

This paper [2] describes a combination of color determination and object detection. It describes the creation of a hybrid system that would increase production and streamline the process of crop harvesting. The system aims to delineate all potential crops by determining color. If the potential crops are of the sufficient size then object detection is performed using YOLO technology which determines the confidence of strawberry prediction.

In this paper [3], a new method for detecting objects with an extreme color is introduced and compared with other approaches found in the literature.

The methods are analyzed and compared using a color palette in which a transition between R, G, B, C, M and Y colors is generated. In this paper [4], a new robotic system to detect objects in unknown indoor and outdoor environment is realized. The developed robotic system is equipped with ultrasonic sensor and camera, gives visually information about the environment around detected object.

In this paper [5], These people encounter difficulties in navigating independently and safely, facing issues in accessing information and communication. The objective of the proposed work is to change the visual world into an audio world by notifying the blind people about the objects in their path. This will help visually impaired people to navigate independently without any external assistance just by using the real-time object detection system.

In this paper [6] there is Attempt to make an online shopping portal for color blind persons to help them in discerning colors, and to provide assistance for an interactive shopping experience. The incentive behind this effort is to significantly reduce the difficulties faced by a color-blind person while shopping online. To reduce said difficulties, they designed a color detection algorithm for an online shopping portal which is developed with help of PHP. This paper [7] proposed an object detection technique for blind people in real time to detect objects on any device running this model. They use convolution neural network along with single shot multi-box detector algorithm to develop the proposed model. This model is composed of multiple layers to classify the given objects into any of the defined classes. Due to recent advancement in deep learning with image processing, enable us to develop this model.

In this research [8], a tool that can provide information about object around is made. This tool can also estimate distance of detected object through camera which is combined with glasses, to ease blind people who use it. This tool is certainly can help them to identify object around and improve their skill and ability. This tool use camera as main sensor, which works like human eyes, to provide real time video as visual data. The RGB visual data is processed using Convolution Neural Network which has 176x132 pixels by convoluting 2 times.

In this paper [9] there is Attempt to make an online shopping portal for color blind persons to help them in discerning colors, and to provide assistance for an interactive shopping experience.

This paper [10] proposed an object detection technique for blind people in real time to detect objects on any device running this model. They use convolution neural network along with single shot multi-box detector algorithm to develop the proposed model.

This paper [11] explain how convolution neural network are trained on Image Net dataset that can detect objects and narrate detected objects information to the visually impairs person. This implementation can be used with any device using a camera that includes computers, tablets and mobile phones.

In this research [12], a tool that can provide information about object around is made. This tool can also estimate distance of detected object through camera which is combined with glasses, to ease blind people who use it.

This paper [13] presents a recognition system, which can be

helpful for a blind person. Hand gesture recognition system and face recognition system has been implemented in this paper using which various tasks can be performed.

In this paper [14] various Object Detection Algorithms such as face detection, skin detection, color detection, shape detection, target detection are simulated and implemented using MATLAB 2017b to detect various types of objects for video surveillance applications with improved accuracy.

In this paper [15] the procedure is challenging, because face color is unique, and some objects may have similar color.

#### A. Challenges

Viewpoint variation: One of the biggest difficulties of colored object detection is that a colored object viewed from different angles may look completely different. Occlusion: Sometimes colored objects can be obscured by other things, which make it difficult to read the signs and identify these color and objects. Illumination conditions: Lighting has a very large influence on the definition of colored objects. The same color and objects will look different depending on the lighting conditions. Cluttered or textured background: Colored objects that need to be identified may blend into the background, making it difficult to identify them. Variety: The same-colored object can have completely different shapes and sizes. Computer vision needs to do a lot of research to read a colored object and understand what it means. Speed: When it involves video, detectors must be trained to perform the analysis in an ever-changing environment. It means that colored object detection algorithms must not only accurately classify important colored objects but also be incredibly fast during prediction

#### B. Proposed system

The proposed system is designed for multiple moving tracking in real time. We use the bounding rectangular box for labeling the objects. The initial stage of the system starts with the collection of images and generation of the train and test dataset. The CNN model comprises of the convolutional layer and pooling layer with regional propositional network or region generation. The feature maps are generated from the input image and fed into RoI layer with the regions generated. The system consists of camera, a portable computer. The system has the features of obstacles detection, traffic light recognition and color detection. Color Object detection system we proposed is based on self-adaptive threshold image segmentation. The input image is preprocessed. The image is intersected with region of interest (ROI) firstly. ROI is set before detection. The output of the system provides labeling of the objects in the test image with the representation of the rectangular anchor boxes.

### C. Applications

Color detection is applied within in the color image segmentation and real-time color sensor, which affects the results of video image segmentation and proper real-time temperature value. It is used for true color recognition and color mark detection. Textile industries, automotive industries, the food industry, printing industries, the pharmaceutical industry utilize color detection for visual inspection tools. For tracking colored objects which is employed within the field of security and surveillance colored object detection plays a vital role. With object tracking it would be easier to trace someone in a video. Colored Object tracking can be used in tracking the motion of a ball during a match. In the field of traffic monitoring too colored object tracking plays a crucial role. Counting the crowd or people counting is another significant application of colored object detection. During festivals or in malls it helps in dissecting the crowd and measure different groups. Self-driving cars is application of colored object detection technique is self-driving cars. A self-driving car ensures street safely when it detects all the colored objects like people, other cars, road signs on the road, to decide what action to take. The system also provides labeling of overlapping of objects based on the region mapped with the image. This system also performs color detection task that detects the name of any color along with RGB values. It automatically gets the name of the color by clicking on them. Then distance from each color is calculated and shortest one is found. We have used vision library of Python that is OpenCV and Pandas. OpenCV, Pandas, and NumPy are the Python packages that converts normal language text into speech other systems render symbolic linguistic representations: phonetic transcriptions into speech. Synthesized speech is created by combining pieces of recorded speech which are stored. Systems vary in the size of the stored speech units. It can incorporate a model of the vocal tract and other human voice characteristics to create a completely synthetic voice output. Detecting a vehicle on a road full of speeding vehicles colored object detection can help by tracking a particular vehicle and even its number plate. So, if a car faces accident or, breaks traffic rules then it will detect that car using colored object detection model and thereby decreasing the crime rate while enhancing security. AI-based customer analysis to detect and track customers with cameras helps to understand customer interaction and customer experience. In Medical feature detection in Healthcare, Object detection helps in study of images, scans, and photos.

### III METHODOLOGY

This system contains color detection and object detection module. image classification algorithm(CNN) on each cell. Based on the probability of the object belonging to a certain class, the class is determined The most probable class name is retrieved as the object name along with confidence value. On the other hand, for color detection the RGB values are extracted and each of there distance are calculated from the coordinates the distance which is least is taken into consideration and that corresponding color name is retrieved along with the RGB values the obtained output is in textual format with undergoes Natural Language Processing and Digital Signal Processing to synthesis speech.

- For Object Detection
  - This system uses COCO dataset in large scale object detection and fragmentation and capturing dataset. It has 80 object categories with 330K images.
  - 1. The input image is either fetched from the camera or taken from the file and passed into the YOLO algorithm. YOLO divides the input image into SXS grid and applies classification algorithm i.e. CNN on each cells, the bounding box is displayed across.
  - 2. Bounding boxes are obtained, among which the best bounding box for each object is obtained through non maxima suppression and intersection over union.
  - 3. The bounding box co-ordinates along with image is passed into the CNN.
  - 4. The output of CNN is a vector containing variables indicating the presence of object, bounding co-ordinates and class probability.
  - 5. Based on highest probability the class is chosen.
  - 6. The corresponding class name and confidence value is displayed above the bounding thereby detecting objects.
  - 7. The obtained textual output is converted into speech using MP3 module.
- For Color Detection
  - 1. Input is a captured image and pixel whose color needs to be determined is selected.
  - 2. The pixel's co-ordinates is compared with RGB co-ordinates in the dataset.
  - 3. The color for which distance is found to be the least is chosen.
  - 4. It is displayed with corresponding RGB values.
  - 5. The obtained color name and RGB value is read out loud using MP3 module.

- For Text to Speech

Many APIs are available to convert text to speech in Python. Google Text to Speech API i.e. gTTS API is used for this.



It converts the text to audio and saved as a mp3 file. The gTTS API supports many languages including English, Hindi, Tamil, French, German etc.

#### IV SYSTEM DESIGN

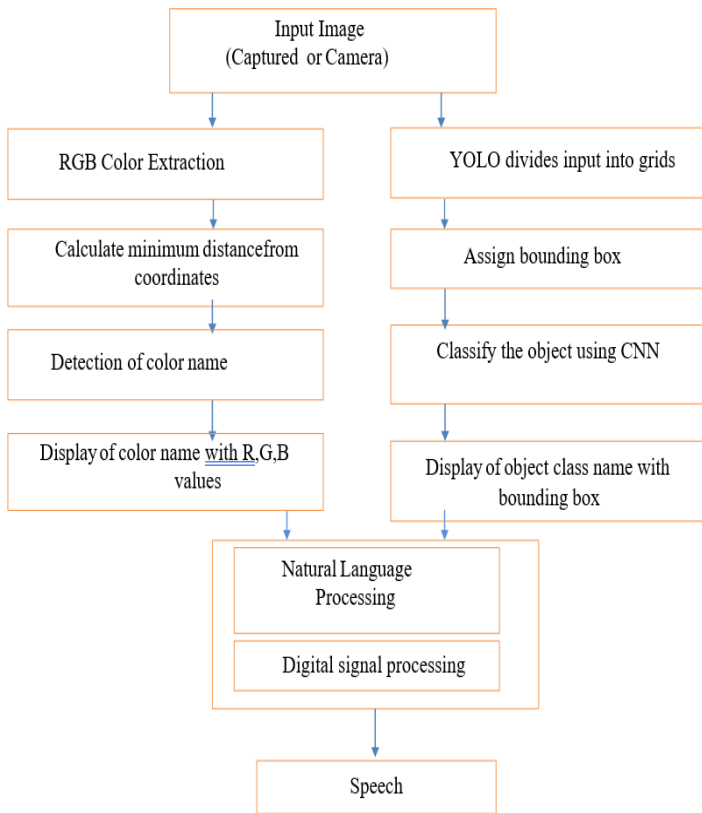


Fig 1: Architecture of Colored object detection system

For Object Detection Input image is fetch from the camera or the captured file and is passed into the yolo algorithm. Then the image is divided into S X S grids and applies.

#### V RESULTS AND DISCUSSION

In object detection, the objects shown in front of the camera or the image that is given as an input, the objects contained in them are detected by displaying bounding box value across the objects along with the detected class label and confidence value. It is also read out loud so that blind people can know the result of the detection.



Fig 2: Bottle detected



Fig 3: Remote detected

On the other hand for color detection. The input image where the color needs to be detected. It must be double clicked and the selected pixel's color is displayed along with RGB values. It is in turn converted to sound as well.

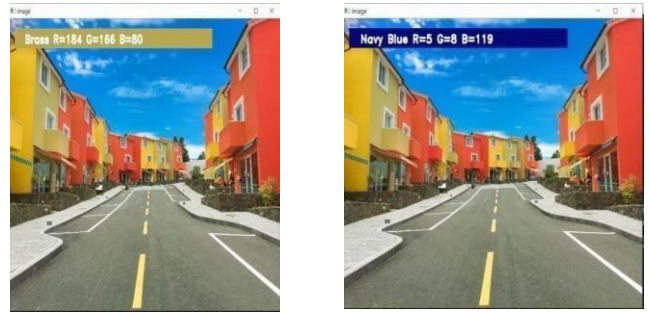


Fig 4: Color detection of input images

#### VI CONCLUSION

This system developed an efficient aid for visually impaired people to detect object as well as color such that they can lead an independent life. The object is recognized with fairly high confidence value leading to accurate detection. The wide variety of colors are efficiently recognized by our system. All these detections are converted to speech as well enabling blind people to understand the results of detection.

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