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OBJECT RECOGNITION SYSTEM USING IMAGE PROCESSING

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ABSTRACT

An object recognition system using image processing is a computer vision technology that automatically identifies and classifies objects within digital images or video streams. This system involves several stages, including image acquisition, preprocessing, feature extraction, object detection, and classification. In the image acquisition stage, digital images or ẏideo frames are captured using a camera or other imaging devices. In the preprocessing stage, the acquired images are enhanced and normalized to ensure optimal quality. In the feature extraction stage, relevant features of the objects are extracted from the preprocessed images. In the object detection stage, the locations of the objects within the images are identified using techniques such as edge detection or template matching. Finally, in the classification stage, the recognized objects are classified into predefined categories based on their features. This system has numerous practical applications, including robotics, surveillance, and autonomous vehicles.

Aim

➢The main objective of an object recognition system is to extract relevant features from an image or video and match them with pre-defined object categories.

Literature review:

- We will bootstrap simple images and apply increasingly complex neural networks to them. In the end, the algorithm will be able to detect multiple objects of varying shapes and colors. You should have a basic understanding of neural networks. But the accuracy is low to detect the more multiple objects.

METHDOLOGY

- Detecting and recognizing objects in unstructured as well as structured environments is one of the most challenging tasks in computer vision and artificial intelligence research. This paper introduces a new computer vision-based obstacle detection method for mobile technology and its applications. Each individual image pixel is classified as belonging either to an obstacle based on its appearance. The method uses a single lens webcam camera that performs in real-time, and also provides a binary obstacle image at high resolution. In the adaptive mode, the system keeps learning the appearance of the obstacle during operation. The system has been tested successfully in a variety of environments, indoors as well as outdoors, making it suitable for all kinds of hurdles. It also tells us the type of obstacle which has been detected by the system.

TOOLS REQUIRED

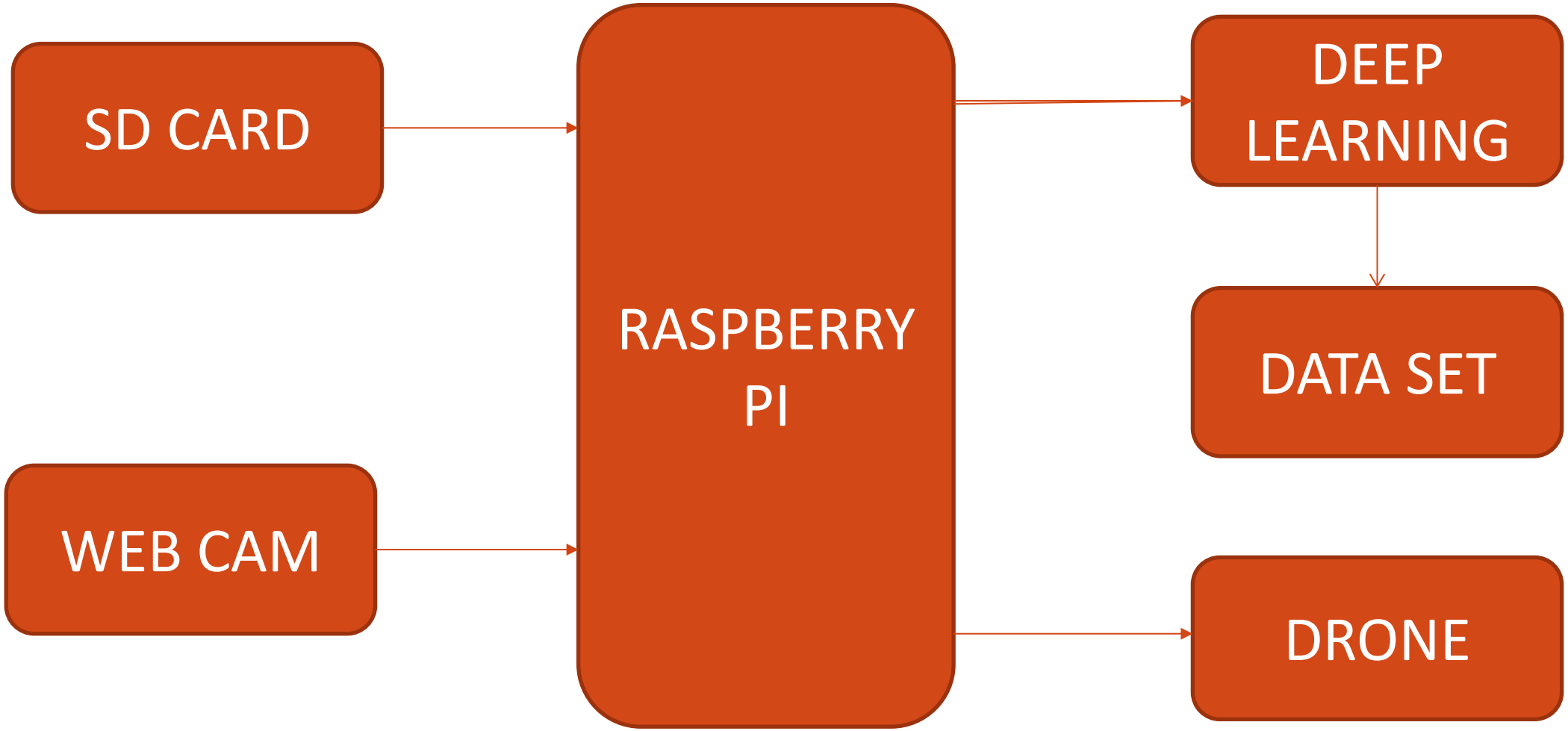
❑HARDWARE REQUIRED

- ❑ RASPBERRY PI
- ❑ SD CARD
- ❑ DRONE
- ❑ 12V BATTERY
- ❑ MINIMUM 4GB RAM
- ❑ WINDOWS OS PC 64 BIT

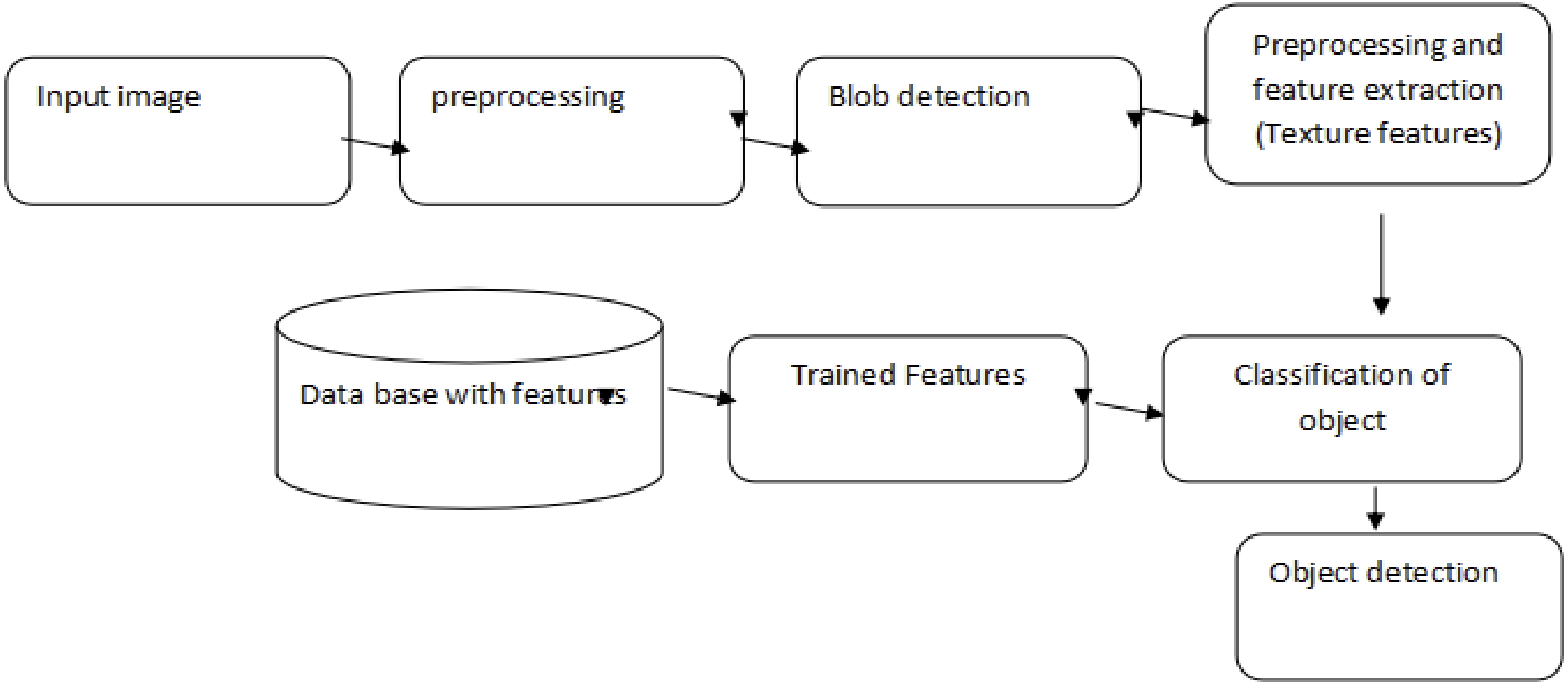
❑SOFTWARE REQUIRED

- ❑ PYTHON IDLE
- ❑ OPENCV
- ❑ NUMPY
- ❑ Deep learning using CNN (convolutional neural network) algorithm

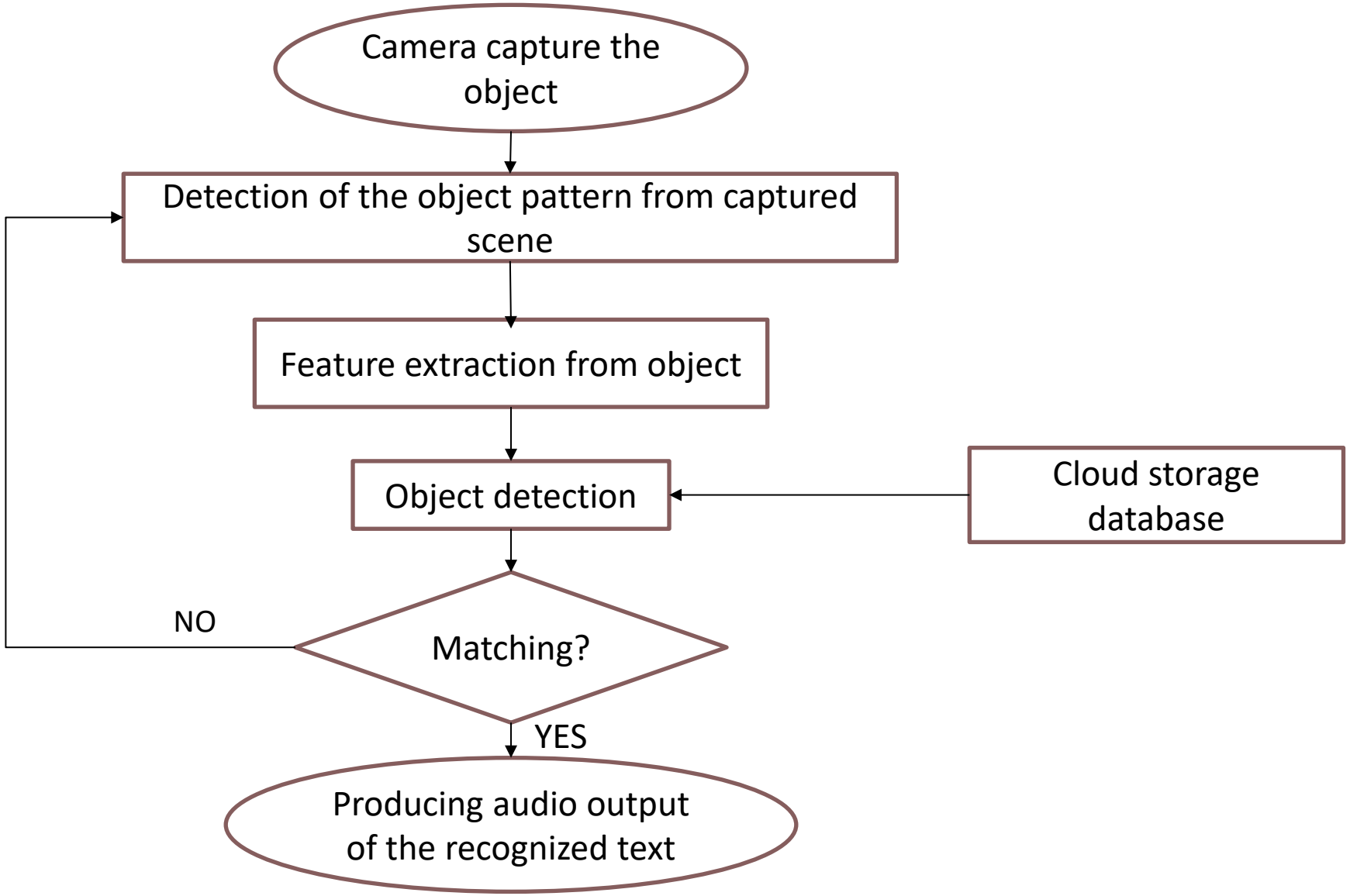
HARDWARE BLOCK DIAGRAM

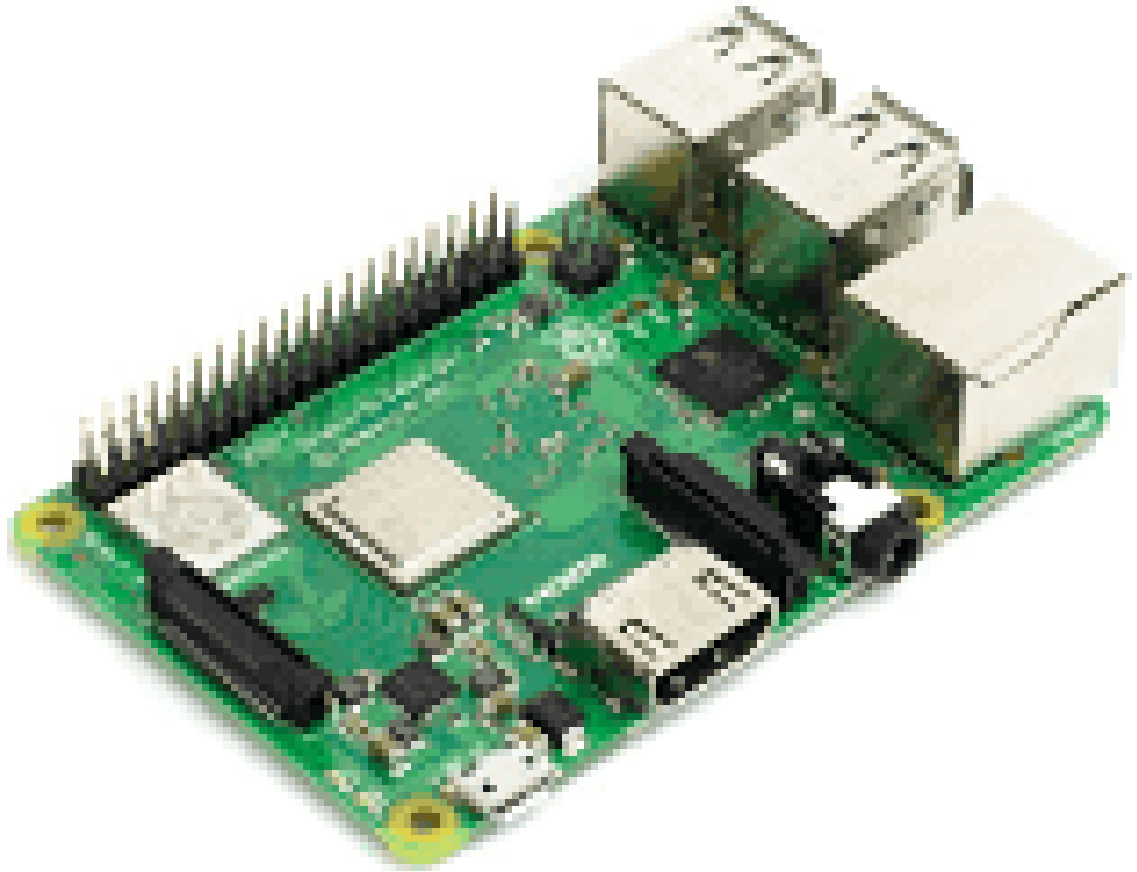


SOFTWARE BLOCK DIAGRAM



FLOWCHART


Camera capture the object
Detection of the object pattern from captured scene
Feature extraction from object
Object detection
Cloud storage database
Matching?
NO
YES
Producing audio output of the recognized text



RASPBERRY PI 3B+

RASPBERRY PI specifications

- Broadcom BCM2837B0 chipset
- 1.4GHz Quad-Core ARM Cortex-A53, 4 cores
- 64 bit CPU
- 1GB RAM
- 4 USB 2.0 ports (via LAN7515)
- Gigabit Ethernet (via LAN7515, max speed 300Mbps)
- PoE (power over Ethernet)
- Micro USB power connector
- HDMI
- CSI camera interface
- DSI connector for official screen
- 3.5mm jack connector supporting stereo audio and composite video
- 2-pin reset header
- Micro SD socket

Algorithm and modules:

➢ Pre-processing:

The aim of pre-processing is an improvement of the image data that suppresses unwilling distortions or enhances some image features important for further processing, although geometric transformations of images (e.g. rotation, scaling, translation)

➢ preprocessing and feature extraction:

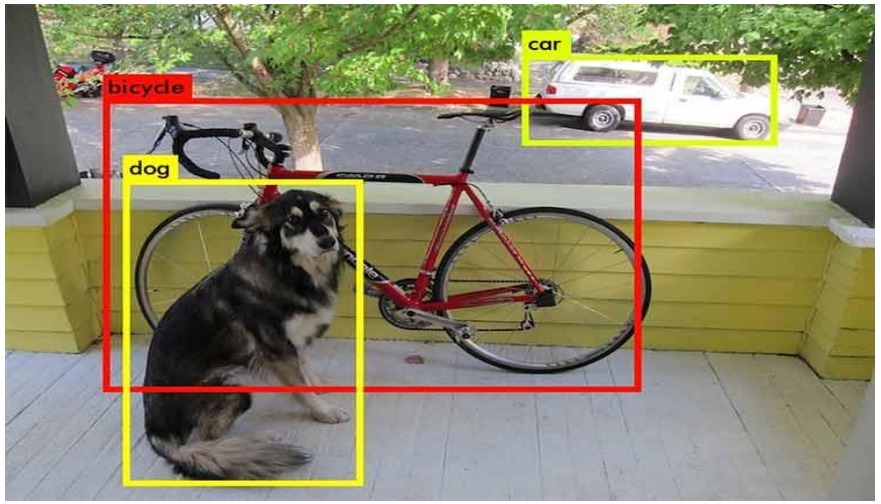
Before getting features, various image preprocessing techniques like binarization, thresholding, resizing, normalization etc. are applied on the sampled image. After that, feature extraction techniques are applied to get features that will be useful in classifying and recognition of images

➢ CNN:

A CNN is a kind of network architecture for deep learning algorithms and is specifically used for image recognition and tasks that involve the processing of pixel data

➢Blob detection:

In computer vision, blob detection methods are aimed at detecting regions in a digital image that differ in properties, such as brightness or color, compared to surrounding regions.



Advantages :

- More objects detection
- More accuracy
- Using yolo object detection is very fast.
- Less time taken

RESULT

- Here we are using algorithms like YOLO and RCNN for object detection using raspberry pi. Though the algorithms show accurate results and speed of detection is too fast. Due to the limited computing power of raspberry pi can result in slower inference times and lower accuracy of detection system.

REFERENCE

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ANY QUERIES...?


thank
you