Ex No: 8

OBJECT DETECTION WITH YOLO3

AIM:

To build an object detection model with YOLO3 using Keras/TensorFlow.

PROCEDURE:

1. Download and load the dataset.
2. Perform analysis and preprocessing of the dataset.
3. Build an object detection model with YOLO3 using Keras/TensorFlow.
4. Compile and fit the model.
5. Perform prediction with the test dataset.
6. Calculate performance metrics.

PROGRAM:

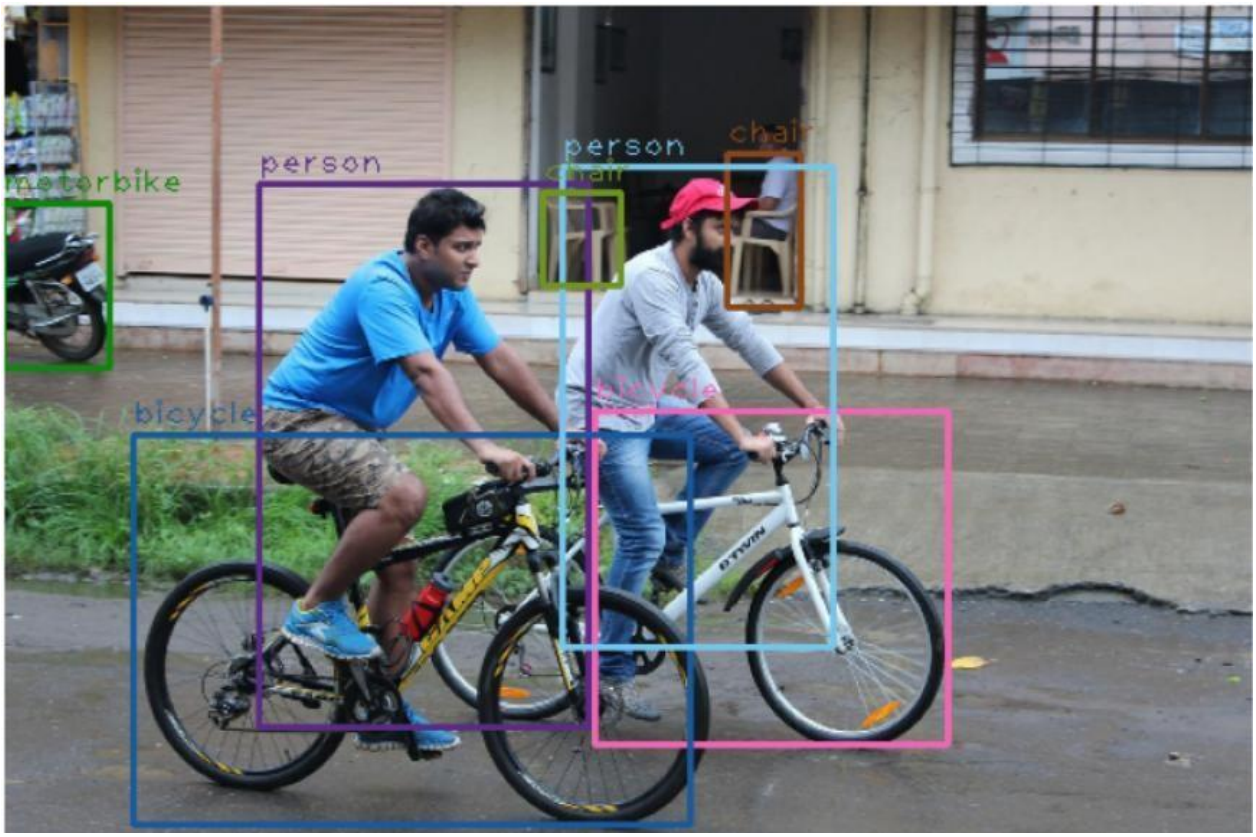
```
import cv2
import numpy as np
import matplotlib.pyplot as plt


# Function to display images in Jupyter Notebook
def display_image(image):
    image_rgb = cv2.cvtColor(image, cv2.COLOR_BGR2RGB)
    plt.figure(figsize=(10, 6))
    plt.imshow(image_rgb)
    plt.axis('off')
    plt.show()


# Load YOLO model
```

```
def load_yolo():
    net = cv2.dnn.readNet("yolov3.weights", "yolov3.cfg")  # Ensure you have these files in the correct path
    classes = []
    with open("coco.names", "r") as f:  # Ensure 'coco.names' is in the correct path
        classes = [line.strip() for line in f.readlines()]
    output_layers = [layer_name for layer_name in net.getUnconnectedOutLayersNames()]
    colors = np.random.uniform(0, 255, size=(len(classes), 3))
    return net, classes, colors, output_layers


# Load and preprocess image
def load_image(img_path):
    img = cv2.imread(img_path)
    img = cv2.resize(img, None, fx=0.4, fy=0.4)
    height, width, channels = img.shape
    return img, height, width, channels


# Detect objects in an image
def detect_objects(img, net, outputLayers):
    blob = cv2.dnn.blobFromImage(img, scalefactor=0.00392, size=(320, 320), mean=(0, 0, 0), swapRB=True, crop=False)
    net.setInput(blob)
    outputs = net.forward(outputLayers)
    return blob, outputs


# Get bounding box dimensions for detected objects
```

```
def get_box_dimensions(outputs, height, width):
    boxes = []
    confs = []
    class_ids = []
    for output in outputs:
        for detect in output:
            scores = detect[5:]
            class_id = np.argmax(scores)
            conf = scores[class_id]
            if conf > 0.3:  # Confidence threshold
                center_x = int(detect[0] * width)
                center_y = int(detect[1] * height)
                w = int(detect[2] * width)
                h = int(detect[3] * height)
                x = int(center_x - w / 2)
                y = int(center_y - h / 2)
                boxes.append([x, y, w, h])
                confs.append(float(conf))
                class_ids.append(class_id)
    return boxes, confs, class_ids


# Draw labels on detected objects
def draw_labels(boxes, confs, colors, class_ids, classes, img):
    indexes = cv2.dnn.NMSBoxes(boxes, confs, 0.5, 0.4)
    font = cv2.FONT_HERSHEY_PLAIN
```

```
    for i in range(len(boxes)):
        if i in indexes:
            x, y, w, h = boxes[i]
            label = str(classes[class_ids[i]])
            color = colors[i]
            cv2.rectangle(img, (x, y), (x + w, y + h), color, 2)
            cv2.putText(img, label, (x, y - 5), font, 1, color, 1)
    display_image(img)  # Display the image in Jupyter Notebook

# Main function to detect objects in an image
def image_detect(img_path):
    model, classes, colors, output_layers = load_yolo()
    image, height, width, channels = load_image(img_path)
    blob, outputs = detect_objects(image, model, output_layers)
    boxes, confs, class_ids = get_box_dimensions(outputs, height, width)
    draw_labels(boxes, confs, colors, class_ids, classes, image)

# Manually set the image path and call the detection function
image_path = "Images/bicycle.jpg"  # Update this path to your test image location
image_detect(image_path)
```

OUTPUT:



RESULT:

Thus, an object detection model with YOLO3 using Keras/TensorFlow was successfully implemented.