KINDERGARTEN LEARNING SYSTEM

Using Deep Learning

PROJECT REPORT

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CERTIFICATE

This is to certify this project report entitled **"KinderGarten Learning System"** submitted to **Dayalbagh Educational Institute, Agra**, is a bonafide record of work done by **"Adil Ansari", "Atisha Sharma",** and **"Aarat P. Chopra"** under my supervision from **"01-Jan-2022"** to **"14-May-2022"**

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DECLARATION

This is to declare that this report has been written by us. No part of the report is plagiarized from other sources. All information included from other sources have been duly acknowledged. We aver that if any part of the report is found to be plagiarized, we shall take full responsibility for it.

Date - 14-05-2022

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ABSTRACT

The Kindergarten Learning System is a way to teach students about different kinds of things. It aims for creating a platform which helps students to be directly involved in the technological term and learn and grow motive. It also aims to have a fully automated section of the classroom without any human effort of making things ready for students to learn , it automatically describes and answers the student for their better learning. For example - animals, shapes, fruits, etc. In our Kid's learning system, the student will show the object/picture to the camera and it will recognize which object/animal it is. Students in kindergarten, or visually impaired students are our main target users for this system.

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CHAPTER 1

INTRODUCTION

The Kindergarten Learning System is a way to teach students about different kinds of things. For example - animals, shapes, fruits, etc. In our Kid's learning system, the student will show the object/picture to the camera and it will recognize which object/animal it is. By this system, students in kindergarten, or visually impaired students are our main target users for this system. In this system there are three sections of performance; the very first is based on real time object detection. In the second section it is able to perform and recognize according to the image or data provided to it and in the last section it is able to perform on iOS devices as well.

CHAPTER 2

LITERATURE REVIEW

Education is the key step to success and for effective teaching and learning experience or helping kids progress in learning and to get the right approach to get the kids to be independent learners.

According to Kleopatra Niklopoulou he focuses on interactive multimedia environments , Games , paintings in a form of play designed to attract and sustain children's attention. Although there are many other software programs that are used by teachers and parents for making their kids a better learning experience.

According to The National Association for education of young children and Fred Rogers center for early stage learning and children's media , their statement regarding to the role of technology in preschool classrooms , states that technology and interaction media tools must be used in a proper way with integration to the environment , in supporting and extending children's experience has been emphasized by Stephen and Plowan 2003.

Web Based e-learning system for pre school kids by Olish Kingsley S Mohamed Ismail , they provide public education for kids as early as from their tender age in terms of getting better results.

CHAPTER 3

METHODOLOGY

Data Collection is the first thing that we need to do. One of the most famous dataset available on the internet is Imagenet dataset. (https://www.image-net.org/)

After collecting the data we need to create a convolution neural network architecture. For this we have used a pre-created network that is VGG-16.

VGG stands for Visual Geometry Group. VGG-16 is 16 layered neural network architecture, it was originally designed to recognize any object that is available in imagenet dataset. This network has around 138 million parameters.

Its architecture is shown below in the below figures :

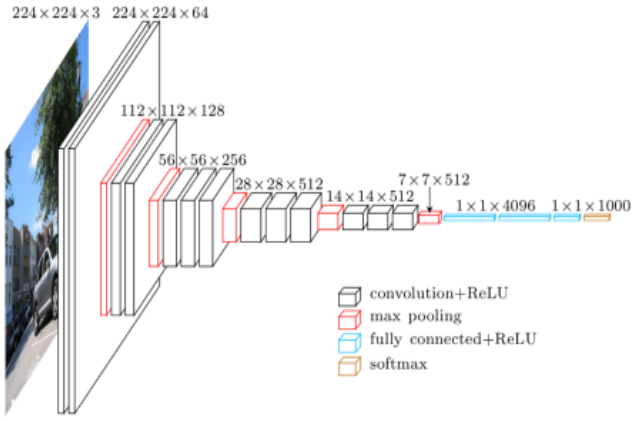


Fig - 1.1

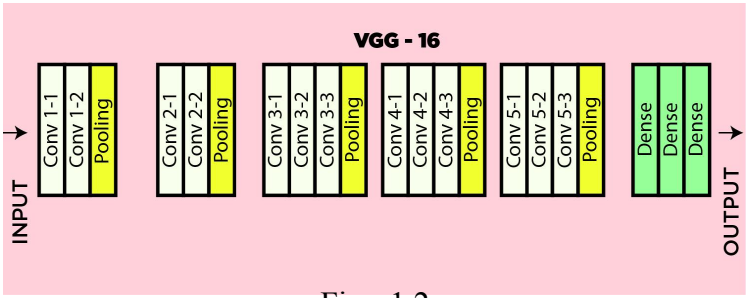


Fig - 1.2

For live object detection we have used the YOLO v3 (You Only Look Once) model. This is an object detection model that can be used to detect objects in live videos or in an image. Currently it detects 80 objects listed in coco (common objects in context).

CHAPTER 4

IMPLEMENTATION

For VGG-16 :

Firstly we loaded the VGG-16 model with imagenet dataset weights in our python program.

Then we created a function to process the image as per the input requirements of the model.

Then we loaded the image and preprocessed it and then sent it to the prediction function to recognize the object/animal/fruit etc. in the picture.

In [1]:
```
from keras.applications import vgg16
from keras.preprocessing import image
from keras.applications.vgg16 import decode_predictions
from keras.applications.vgg16 import preprocess_input
import numpy as np
```

In [2]:
```
# pre trained weights : create my model
model = vgg16.VGG16(weights='imagenet')
```

In [3]:
```
def process_img(img) :
    img_np = image.img_to_array(img)
    ae = np.expand_dims(img_np, axis=0)
    finalimg = preprocess_input(ae)
    return finalimg
```

In [4]:
```
def prediction(finalimg) :
    pred = model.predict(finalimg)
    return decode_predictions(pred, top=5)[0][0][1]
```

Fig 2.1

For YOLO v3:

First we loaded the yolo v3 weights and configuration file in our python program.

Then we read the coco text file to get all the classes available in the yolo.

After that we captured the image from the camera and processed the image and put all this in a loop so that it would act like a live video.

And by this way we have achieved our task of live object detection.

```
In [8]:
import cv2
import numpy as np
import matplotlib.pyplot as plt

In [9]:
yolo = cv2.dnn.readNet("yolov3.weights", "yolov3.cfg")

In [10]:
with open("coco.names", "r") as f :
    classes = f.read().splitlines()
```

Fig 3.1

```
In [11]:
num = 0
cap = cv2.VideoCapture(0)
while True :
    ret, img = cap.read()
    height, width, _ = img.shape
    blob = cv2.dnn.blobFromImage(img, 1/255, (320,320), (0,0,0), swapRB=True, crop=False)
    yolo.setInput(blob)
    out_layer_name = yolo.getUnconnectedOutLayersNames()
    output_layer = yolo.forward(out_layer_name)
    boxes = []
    confidences = []
    class_ids = []
    for output in output_layer :
        for detection in output :
            score = detection[5:]
            class_id = np.argmax(score)
            confidence = score[class_id]
            if confidence > 0.7 :
                center_x = int(detection[0]*width)
                center_y = int(detection[1]*height)
                w = int(detection[2]*width)
                h = int(detection[3]*height)
                x = int(center_x - w/2)
                y = int(center_y - h/2)

```

Fig 3.2

```
                boxes.append([x,y,w,h])
                confidences.append(float(confidence))
                class_ids.append(class_id)


    indexes = cv2.dnn.NMSBoxes(boxes, confidences, 0.5, 0.4)
    font = cv2.FONT_HERSHEY_PLAIN
    colors = np.random.uniform(0,255,size=(len(boxes),3))
    for i in indexes :
        x,y,w,h = boxes[i]
        label = str(classes[class_ids[i]])
        confi = str(round(confidences[i],2))
        color = colors[i]
        cv2.rectangle(img, (x,y), (x+w, y+h), color, 2)
        cv2.putText(img, label +" "+ confi, (x,y+20), font, 2, (0,255,0), 2)


    cv2.imshow('yolo test', img)
    if cv2.waitKey(500) == 13 :
        break
cv2.destroyAllWindows()
cap.release()
```

Fig 3.3

Training Yolo v3 for iOS :

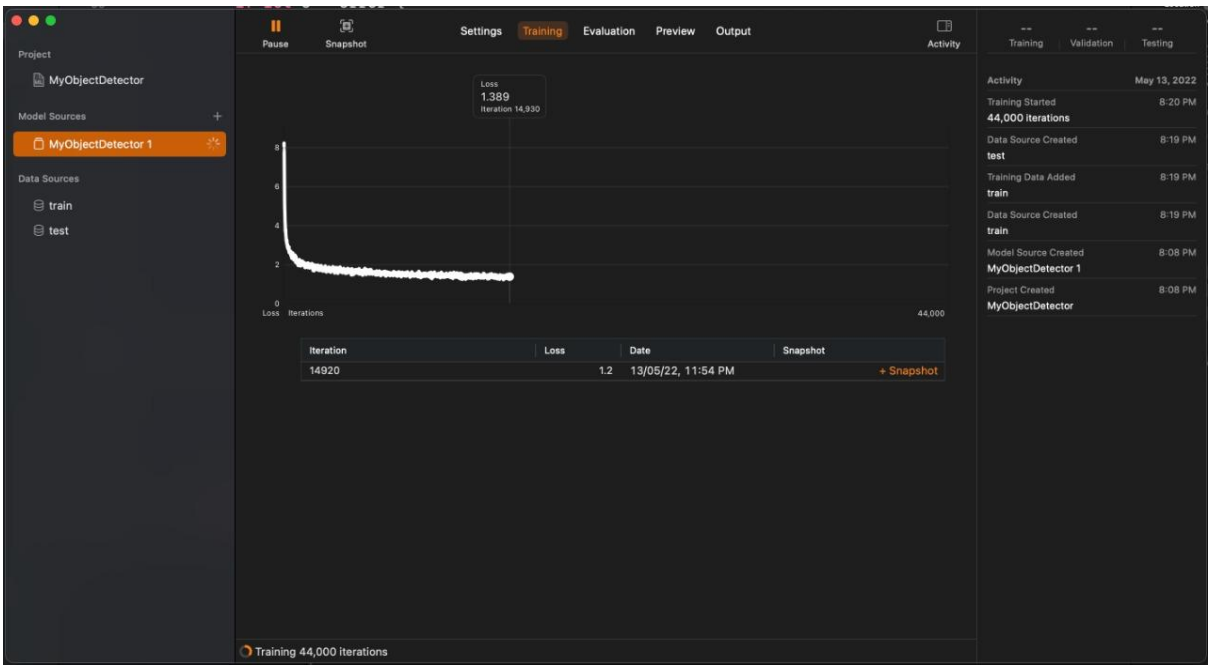


Fig 3.4

CHAPTER 5

RESULTS

Below are the results of our both models / python programs.

VGG-16 Results :

```
In [14]: 1 img
```

Out[14]:

```
In [11]: 1 finalimg = process_img(img)

In [12]: 1 pred = prediction(finalimg)

In [13]: 1 pred
Out[13]: 'giant_panda'
```

Fig 4.1

```
In [15]: 1 img = image.load_img('cat.jfif',target_size=(224,224))

In [16]: 1 img
```

Out[16]:

```
In [17]: 1 finalimg = process_img(img)

In [18]: 1 pred = prediction(finalimg)

In [19]: 1 pred

Out[19]: 'tiger_cat'
```

Fig 4.2

YOLO v3 Results :

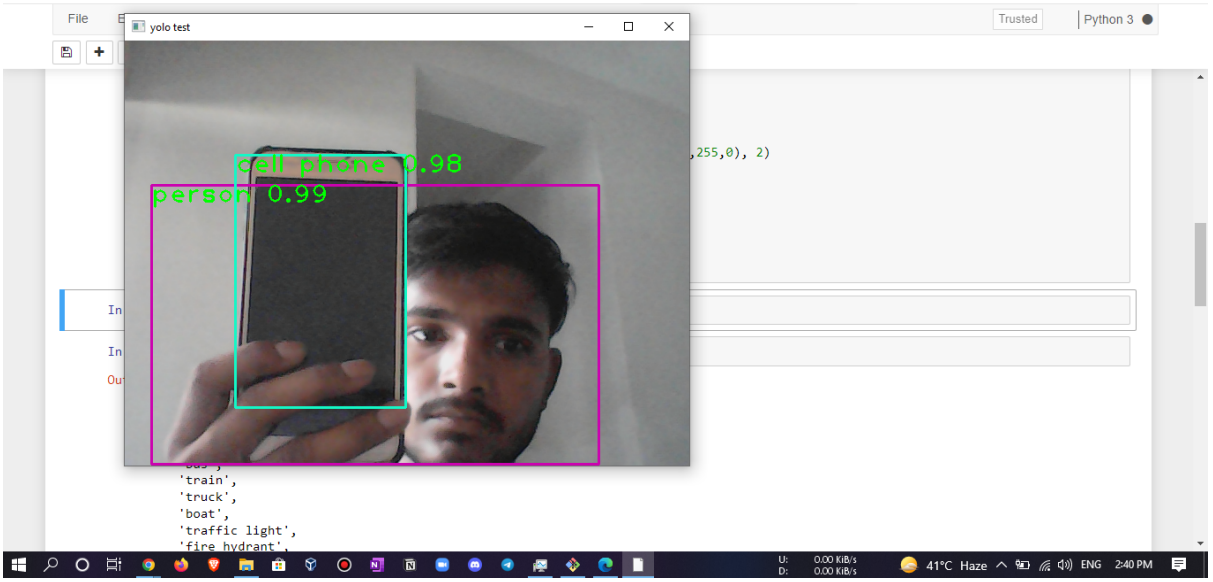


Fig 5.1

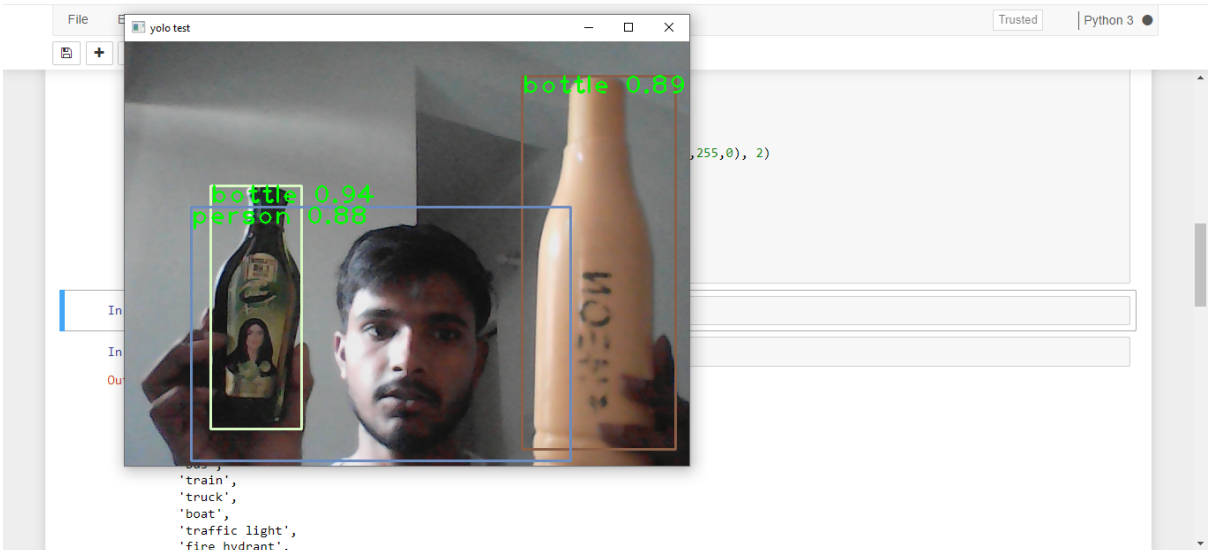
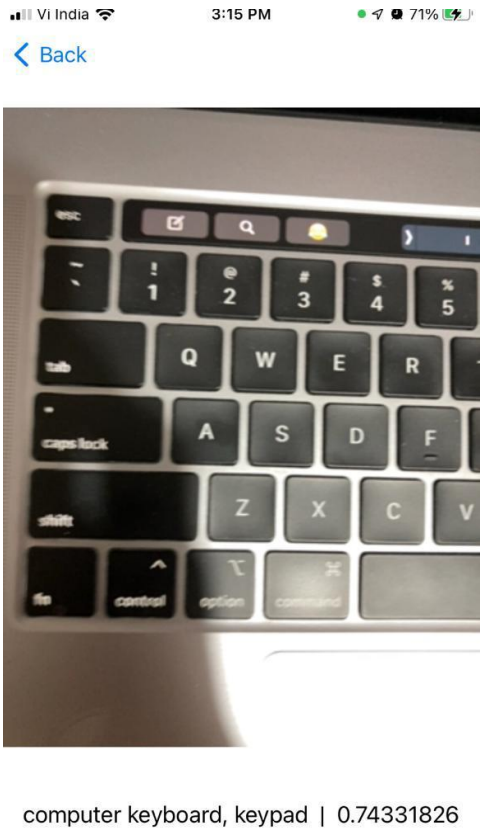


Fig 5.2

iOS Device Result :



CONCLUSION

Deep learning is much better than our traditional machine learning. It is fast in many scenarios and also gives better accuracy because of neural networks.

Both of our models built and run successfully and recognized objects/animal/fruits etc. based on their datasets.

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