Rajiv Gandhi University of Knowledge Technologies

R.K Valley, Y.S.R Kadapa (Dist) - 516330

A
project report
on

Self Driving Car
Using
Object Detection

Submitted by

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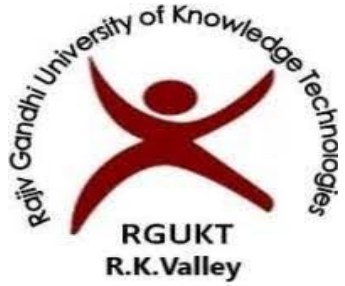

Under the guidance of

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This project report has been submitted in fulfillment of the requirements for the Degree of Bachelor of Technology in software Engineering.

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CERTIFICATE

This is to certify that report entitled "**Self Driving Car Using Object Detection**" Submitted by P.Shashi (R170042), T.Sujay (R170044), G.N.Tharun (R170045) in partial fulfillment of the requirements of the award of bachelor of technology in Computer Science Engineering is a bonafide work carried by the them under the supervision and guidance. The report has been not submitted previously in part or full to this or any other university or institue for the award of any degree or diploma.

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ACKNOWLEDGEMENT

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DECLARATION

We hereby declare that this report entitled "**Self Driving Car Using Object Detection**" Submitted by us under the guidance and Supervision of **Mrs.Challa Ratnakumari**, is a bonafide work. We also declare that it has not been of Submitted previously in part or in full to this University or other institution for the award of any degree or diploma.

Date:- 21-09-2022

Place:-RK VALLEY

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ABSTRACT

Object detection is a computer vision technique for locating instances of objects in images and videos.It has wide range of applications in autonomous driving, face detection, industrial applications, medical applications.

Using this object detection we are proposed to develop an demonstrative application for self driving car which detects the objects in the given image and suggest to take correct decision according to the obstacle position on the road and also able to tell how much deviation can be taken inorder to avoid accidents.

INTRODUCTION

Object detection is used to locate the presence of objects with bounding box and classes of the located objects in an image or video. Object detection can able to detect muiltiple objects in an image or video. The performance of a model for object detection is evaluated using precision and recall across each of best matching bounding boxes for known objects in the image.

Object detection is breaking into wide scope of enterprises, with use cases extending from individual security to efficiency in the working environment. Object detection is applied in numerous territories of image processing including picture retrieval, security, and observation. Tracking a ball during a football match, automated cctv surveillance.

By using YOLO object detection tool we identified the classes of objects in the given input image, it gives bounding box coordinates of the objects in the given input image. Using this coordinates we made decision making for self driving car. This Self driving car can able to decide the direction and deviation based on position of obstacle in front of car.

PRELIMINARIES

CONVOLUTIONAL NEURAL NETWORKS(CNN)

CNN is the primary algorithm that these systems used to recognise and classify different parts of the road and to make appropriate decisions. This algorithm uses a single neural network to process the entire picture, then separates it into parts and predicts bounding boxes and probability for each class. The method “just looks once” at the image in the sense that it makes predictions after only one forward propagation run through the neural network. It then delivers detected items after non-max suppression which ensures that the object detection algorithm only identifies each object once.

Applications Of CNN

- Image recognition and OCR
- Object detection for self-driving cars
- Face recognition on social media
- Image analysis in healthcare

PyTorch

PyTorch is an open source machine learning framework based on the Torch library, used for applications such as computer vision and natural language processing, originally developed by Meta AI and now part of the Linux Foundation umbrella. It is free and open-source software released under the Modified BSD license.

Applications of PyTorch

- Computer Vision
- Natural Language Processing
- Reinforcement Learning

PROPOSED MODEL

CNN

The input image is converted into vectors and given as an input to the CNN model. The CNN model will uses a special operation called convolution. Convolution takes vector and multiply it with filters to get output. Later the weights of filters are updated by using back propogation. CNN classify the given input image into car and truck.

Pytorch

pytorch consists of yolo weights which are pretrained on COCO dataset which consists of 80 class labels. Whenever input image is given yolov5 will identify the class of image by using pretrained weights.

IMPLEMENTATION

The Self driving car application is implemented by using python, opencv, HTML, CSS and Flask.

PYTHON

Python is an interpreted programming language, it contains various libraries which are useful for object detection. Those are opencv, numpy, pandas, pytorch and matplotlib. Object detection and decision making modules of this self driving car are implemented by using python programming language.

OPENCV

Opencv is the huge open source library for computer vision, maching learning and image processing. We used opencv for many purposes in self driving car, these includes reading an input image, displaying image, image analyzing and manipulating.

HTML

HTML is a markup language used in this application for creating web pages. HTML is used in this self driving car for taking input image and for redirecting the output from home page to output page when lets drive button is clicked.

CSS

CSS is a stylesheet used to style an HTML document. In this self driving car application we added styling properties like background color, text alignment, font size, border, margin, padding and some more properties.

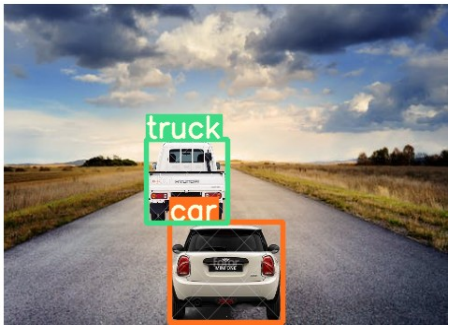
FLASK

Flask is small and light weight python web framework that is used as backend server in our application. Flask uses python programming language and our application is deployed on server using flask.

RESULTS

Input Image

Output Image



In the above input image the truck is present infront of the car and that truck is present at left side. So the car has to take 80 steps towards right side.

Input Image

Output Image

In the above input image the truck is present infront of the car and that truck is present at right side. So the car has to take 85 steps towards left side.

Input Image

Output Image

In the above input image there is no chance for the car to overtake so it has to slow down until the truck clears the road.

TESTING

S.NO	ACTION	INPUT	EXPECTED RESULTS	ACTUAL RESULTS	STATUS
1	To verify object detection	Upload an image	Sholud detect the different vehicles and obstacles in the given image	Detected	Pass
2	To verify decision making for left side	Upload an image where obstacle is present on right side	Should display to take “left direction”	Displayed	Pass
3	To verify decision making for right side	Upload an image where obstacle is present on left side	Should display to take “right direction”	Displayed	Pass
4	To verify decision making when there is no chance to overtake	Upload an image where obstacle is present on both side	Should display to move slowly	Displayed	Pass
5	To verify number of steps towards left direction	Upload an image where obstacle is present on right side	Should display number of steps to move towards left side	Displayed	Pass
6	To verify number of steps towards right direction	Upload an image where obstacle is present on left side	Should display number of steps to move towards right side	Displayed	Pass

CONCLUSION

We developed a demonstrative application for self driving car which detects the objects in the given image and suggest you to take correct decision according to the obstacle position on the road and also able to tell you how much deviation can be taken inorder to avoid accidents.
Using YOLO object detection tool we done object detection in the given image and based on coordinates produced by the YOLO we implemented decision making to the self driving car.

REFERENCES

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3) https://youtu.be/0_KKyfUsmS8

4) https://analyticsindiamag.com/yolov5