




# **GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY**

**Department of Computer Science and Engineering**

**Major Project**

# Title : Pothole Detection



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# Presentation Outlines

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# Abstract

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Potholes are formed due to wear and tear and weathering of roads. They cause not only discomforts to citizens but also deaths due to vehicle accidents. The US records more than 2000 fatal accidents per year due to potholes and bad road conditions.

Cameras installed on moving vehicles can detect potholes in real time and help drivers avoid potholes. At a very high level, the steps are as follows:

- 1)Data acquisition and preparation
- 2)Model training and evaluation
- 3)Model deployment for real time detection

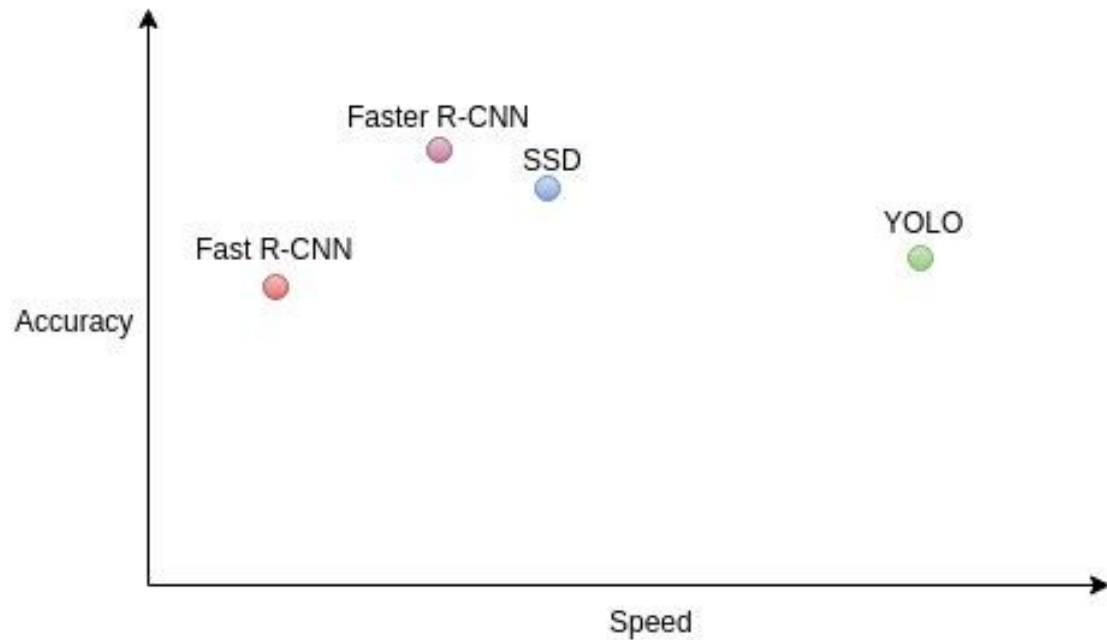


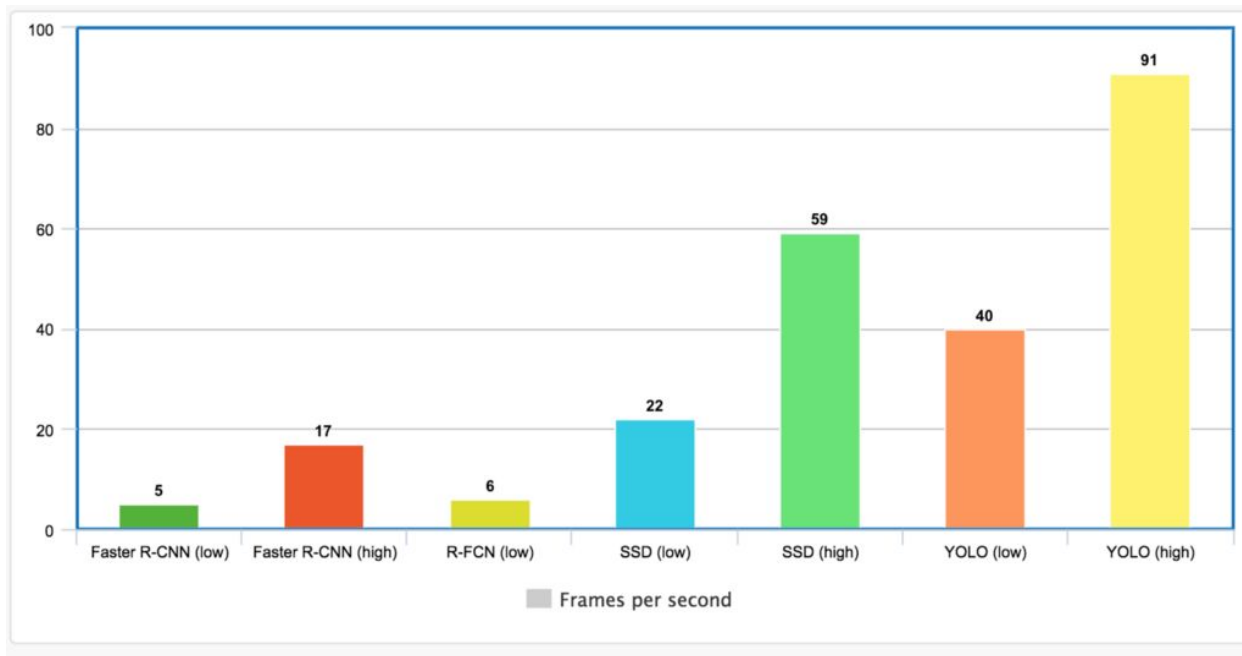
# Introduction

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The strain on the infrastructure has increased as the world's population has grown. Traffic on the roads is at a record high. It has been harder and harder to control this traffic. This is the main driving force behind creating a car with enough intelligence to help the driver in several ways. Road conditions getting worse is one of the issues that are getting worse for the roadways. The road is challenging to drive for a variety of reasons, including rain, traffic accidents, or normal wear and tear. Unexpected obstacles on the road could lead to more collisions. Additionally, the vehicle's fuel usage rises as a result of the poor road conditions, wasting valuable gasoline. Due to these factors, learning about such dangerous roads is crucial.

Due to these factors, it is crucial to gather information about these hazardous road conditions and warn the driver about the road condition. We in this project try to design and build such a system which can help drivers find the road condition . In this system the collects the information about the potholes and road conditions and sends an alert to the driver.



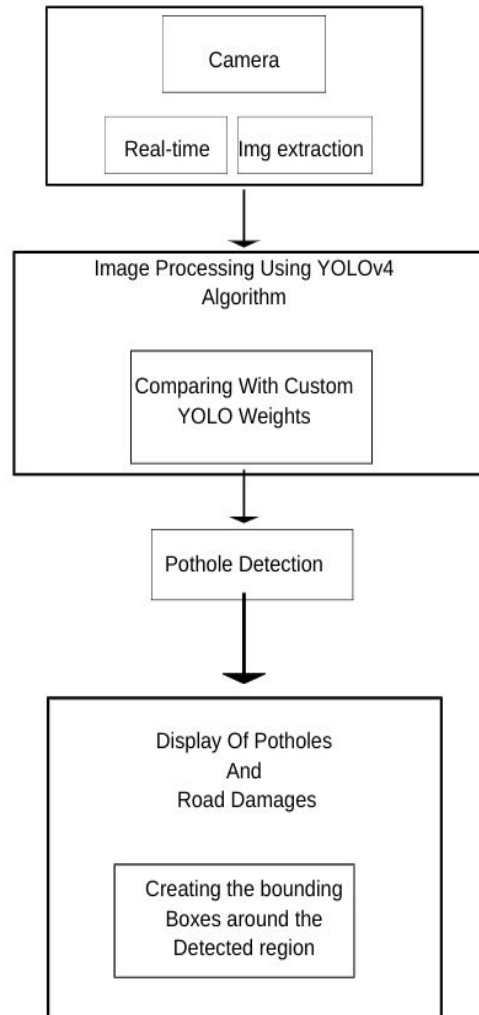


# Methodology



- Taking the video input from the webcam
- Feeding it into the Yolo pretrained model
- Once after the execution starts
  - If a pothole is detected , driver gets warned by using the alarm
  - If there is water on the road different type of alarm will ring

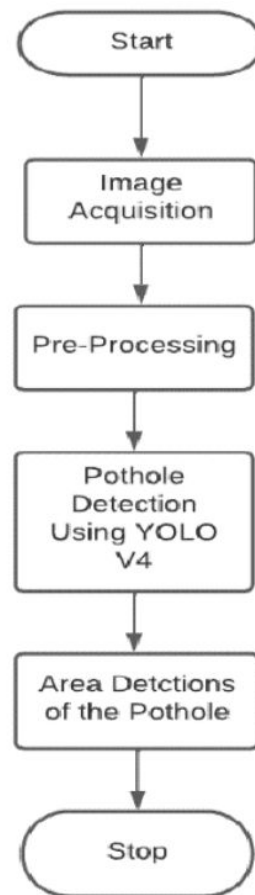





# Implementation



- Training the Yolo algorithm Model
- Save the trained Model
- Importing the video from the webcam
- Feeding it to the trained Model to get the output



Flowchart of the model




```
import cv2
import numpy as np

net = cv2.dnn.readNetFromDarknet('/home/vasusena/yolo.cfg' , '/home/vasusena/yolo.weights')
classes = []

with open('/home/vasusena/obj.names','r') as f:
    classes = f.read().splitlines()

cap = cv2.VideoCapture('/home/vasusena/pothole.mp4')

while True:
    _,img = cap.read()
    height, width, _ = img.shape
    blob = cv2.dnn.blobFromImage(img, 1 / 255, (416, 416), (0, 0, 0), swapRB=True, crop=False)
    net.setInput(blob)
    output_layers_names = net.getUnconnectedOutLayersNames()
    layerOutPuts = net.forward(output_layers_names)
```



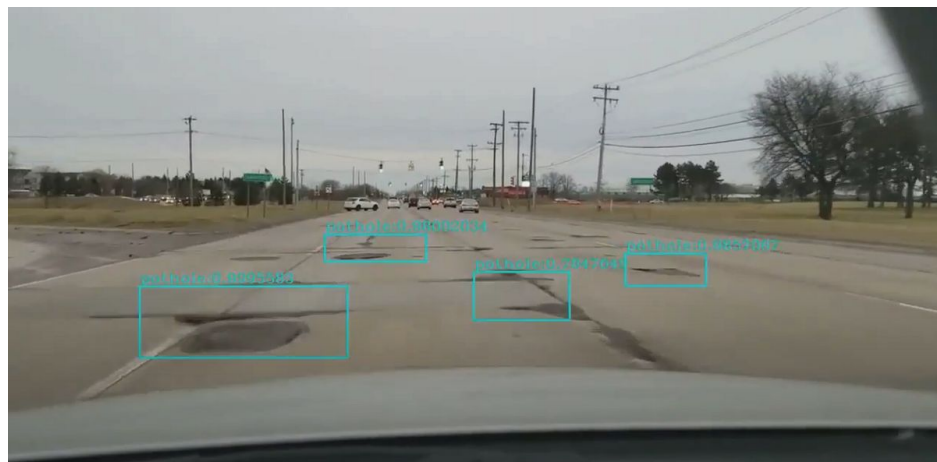
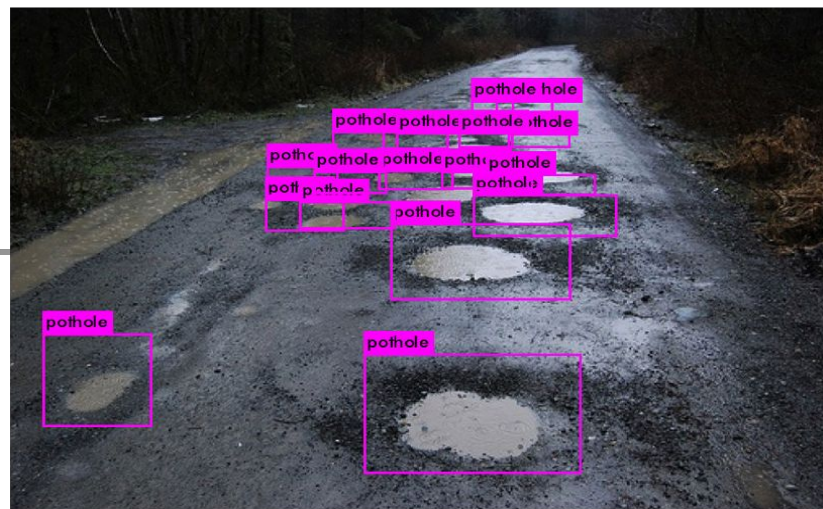
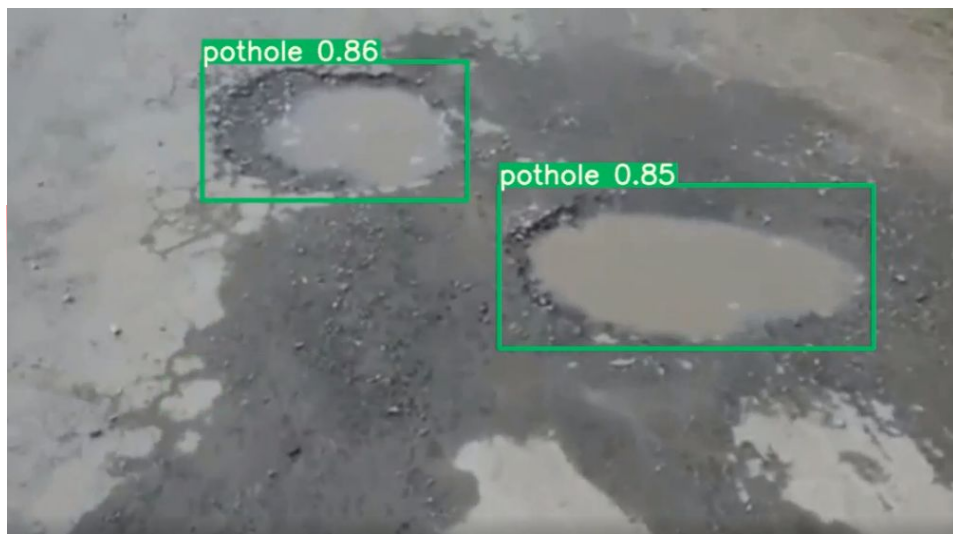
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```
indexes = cv2.dnn.NMSBoxes(bboxes, confidences, 0.5, 0.4)
font = cv2.FONT_HERSHEY_PLAIN
colors = np.random.uniform(0, 255, size=(len(bboxes), 3))

if len(indexes) > 0:
    for i in indexes.flatten():
        x, y, w, h = bboxes[i]
        label = str(classes[class_ids[i]])
        confidence = str(round(confidences[i], 2))
        color = colors[i]
        cv2.rectangle(img, (x, y), (x + w, y + h), color, 2)
        cv2.putText(img, label + " " + confidence, (x, y + 20), font, 2, (255, 255, 255), 2)

cv2.imshow('image', img)
key = cv2.waitKey(100)
if key == 27:
    break

cap.release()
cv2.destroyAllWindows()
```





## References

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- [1] In a paper titled 'Deep Learning Based Pothole Detection and reporting System (IEEE 2020)
- [2] In the paper, 'A Modern Pothole Detection technique using Deep Learning (IEEE 2020)
- [3] Pothole detection and reporting using image processing using a Raspberry Pi microcontroller in a paper (IEEE 2018)
- [4] In the article "Deep Learning," YOLO Neural Network-based learning algorithm for finding potholes in a pavement surface
- [5] In the article written by E. N. Ukhwah et al is a YOLOv3 based pothole detection system





