ROAD OBJECT DETECTION - POTHOLE DETECTION

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ABSTRACT

Our project is on road object detection, we have selected a subdomain called pothole detection. Pothole detection is done by using the YOLOv4 algorithm. YOLO (You Only Look Once) is a real-time object detection algorithm known for its speed and accuracy. We have detected the potholes through images as well as with the videos. We have taken our dataset from roboflow.

Keywords: pothole detection, Yolov4_tin algorithm

INTRODUCTION

Road object detection plays a crucial role in various applications. In our project, we specifically focus on the subdomain of pothole detection. Potholes pose a significant challenge for road maintenance and can lead to accidents and vehicle damage. Therefore, efficient and accurate detection of potholes is of utmost importance. To accomplish this, we employ the YOLOv4_tiny algorithm, which stands for You Only Look Once. YOLOv4_tiny is a state-of-the-art real-time object detection algorithm known for its exceptional speed and accuracy. By leveraging YOLOv4, we aim to detect potholes in road images and videos effectively. Our dataset, sourced from roboflow, provides a diverse collection of annotated images and videos, allowing us to train our model. By employing the YOLOv4_tiny algorithm and utilizing both images and videos, our project aims to contribute to the field of road object detection, specifically in the context of pothole detection [1]. Accurate identification and monitoring of potholes can help prioritize road maintenance efforts, enhance driver safety, and improve overall road conditions [2]. Furthermore, we will present and analyse the results obtained, along with potential avenues for future research and improvement in the field of road object detection, particularly for pothole detection.

MOTIVATION

We are delighted that we have been selected for this internship. From that very moment we have been motivated for every second. Furthermore, by collaborating with Intel, we gain access to cutting-edge technologies and expertise, enabling us to explore the full potential of deep learning in the field of road object detection. The opportunity to work with industry leaders is like a wish come true for any undergraduate student.

PRIOR WORK

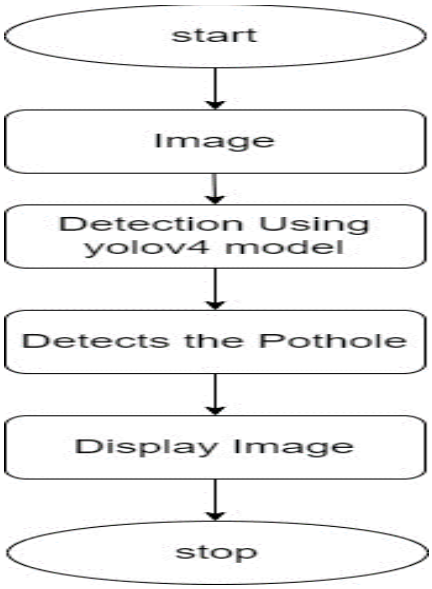
In recent years, there has been growing interest and research in the field of road object detection, with a specific focus on pothole detection. Existing studies have explored various approaches to pothole detection, utilizing both traditional computer vision techniques and deep learning algorithms. Early methods often relied on handcrafted features and image processing techniques to identify potholes based on colour, texture, and geometric properties [3]. However, these approaches

often lacked robustness and struggled with complex real-world scenarios.

With the advancement of deep learning, specifically convolutional neural networks (CNNs), more sophisticated and accurate pothole detection models have emerged. The YOLO algorithm, in particular, has gained prominence for its ability to perform real-time object detection.

Building upon the prior work in pothole detection, our project aims to contribute to the existing knowledge by implementing and evaluating the YOLOv4 algorithm for accurate and real-time pothole detection. By leveraging the advancements in deep learning and utilizing annotated datasets, we strive to develop a robust system that can detect and monitor potholes effectively in diverse road conditions.

ARCHITECTURE DIAGRAM



OUR APPROACH

Data Collection: We gathered a dataset consisting of images and videos capturing road scenes with potholes. This dataset should be annotated with bounding boxes around the potholes.

YOLOv4_tiny Model Training: Train the YOLOv4 object detection model using the annotated dataset. This involves feeding the images and videos into the model and adjusting the model's parameters to optimize pothole detection performance [4].

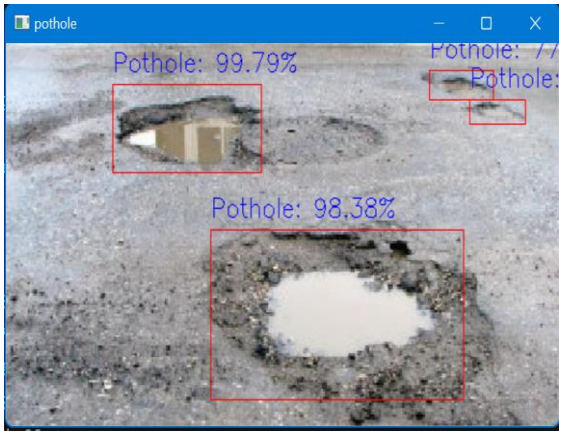
Detecting: Apply the trained YOLOv4 model to new images or videos containing road scenes to detect potholes. The model will analyse the input data and generate bounding boxes around the detected potholes**.**

Input:
The input to the project consists of images or videos capturing road scenes. These can be obtained from a dataset specifically curated for pothole detection, which includes ground truth annotations for pothole detection.

Output:
The output of the project is the detection and localization of potholes in the input images or videos. This is represented by bounding boxes drawn around the detected potholes, indicating their position and size within the road scene.

RESULTS

IMAGES



VIDEO

https://drive.google.com/file/d/1VVgqOM5ccZPuxl8pZJB1lhnNUiFbvo-n/view?usp=sharing

CONCLUSION:

The YOLOv4 object detection model can be used effectively for detecting potholes in both images and videos. The model has demonstrated its ability to accurately identify and locate potholes within an image or a frame of a video. Decision of using YOLOv4 was great because the biggest advantage of using YOLO is its superb speed – it's incredibly detecting the object. YOLO also understands generalized object representation. The model is detecting the potholes with good accuracy.

REFERENCES

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GITHUB URL

https://github.com/ChallaHarika23/intelunnati_-AvengHERs-