MES COLLEGE OF ENGINEERING, KUTTIPPURAM
DEPARTMENT OF COMPUTER APPLICATIONS
20MCA245 – MINI PROJECT

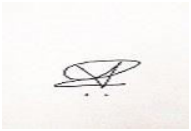
## PRO FORMA FOR THE APPROVAL OF THE THIRD SEMESTER MINI PROJECT

*(Note: All entries of the pro forma for approval should be filled up with appropriate and complete information. Incomplete Pro forma of approval in any respect will be rejected.)*

| | |
|---|---|
| Mini Project Proposal No : _____ *(Filled by the Department)* | Academic Year : 2020-2022<br>Year of Admission : 2020 |

Title of the Project : ROAD DAMAGE PREDICTION FOR INTELLIGENT TRANSPORTATION SYSTEM

1. Name of the Guide : NOWSHAD C V
2. Number of the Student: 1
3. Student Details (in BLOCK LETTERS)

| | Name | Roll Number | Signature |
|---|---|---|---|
| 1. | VARSHA C | 59 |  |

Date: 01/12/2021

**Approval Status :** Approved / Not Approved

Signature of Committee Members

**Comments of The Mini Project Guide** Dated Signature

Initial Submission :

First Review :

Second Review :

**Comments of The Project Coordinator** Dated Signature

Initial Submission:

First Review

Second Review

Final Comments :

Dated Signature of HOD

# ROAD DAMAGE PREDICTION FOR INTELLIGENT TRANSPORTATION SYSTEM

VARSHA C

## Introduction:

In our life, road structure is an essential component. We use public transport to commute almost every day and get a delivery service such as food, clothes or furniture through the road. From the perspective of autonomous driving technology, the road infrastructure has to be managed and kept to be maintaining as perfect as possible to get rid of uncertain obstacles on the road. But, how could we find out the road damage before it acts up? As monitoring the road surface, we could notice where is a problem on the road and prevent the accident. A human-based road damage monitoring system could be the first answer but not a perfect solution because it is affected by a different condition such as weather, speed of the vehicle, the complexity of the road, and the difference of criteria from the individual inspection. Thus, researchers have developed much more robust and accurate automatic road surface detectors through various methods. For example, using a probabilistic relaxation technique based on 3D information , combining 2D gray-scale image and 3D laser scanning data or implementing a deep learning-based model such as CrackNet . In this challenge, the dataset is gathered by a Smartphone based method and we evaluated with various scenarios using YOLO based on a deep learning-based algorithm. It is light-weight and fast in the object detection task, so it is available to improve the Smartphone-based model for detecting road damage. Deep learning-based technology is a good key to unlock the object detection tasks in our real world. By using deep neural networks, we could break a problem that is dangerous and very time-consuming but has to be done every day like detecting the road state. This paper describes the solution using YOLO to detect the various types of road damage in the IEEE Big Data Cup Challenge 2020. Our YOLOv5x based-solution is light-weight and fast, even it has good accuracy. We achieved an F1 score of 0.58 using our ensemble model with TTA, and it could be an adequate candidate for detecting real road damage in real-time.

## Objectives:

- The main advantage of Intelligent Transportation System is to provide a smooth and safe movement of road transportation.
- It's also helpful in the perspective of environment friendliness to reduce carbon emission. It provides many opportunities for automotive or automobile industries to enhance the safety and security of their travelers.
- These methods provide a good effect for traffic damage prediction, and can establish a rapid and effective forecasting model. Most of these methods are the prediction and analysis of traffic flow parameters.

## Problem Definition:

**EXISTING SYSTEM: -**

Deep learning-based technology is a good key to unlock the object detection tasks in our real world. By using deep neural networks, we could break a problem that is dangerous andvery time-consuming but has to be done every day like detecting the roadstate. We could find out the road damage as monitoring the

road surface. A human-based road damage monitoring system could be the first answer but not a perfect solution because it is affected by a different condition such as weather, speed of the vehicle, the complexity of the road, and the difference of criteria from the individual inspection.

**PROPOSED SYSTEM: -**

Road damage detection is a crucial problem, and many kinds of researches have developed to break it in this challenge. As one of the deep-learning way, we used a YOLO-based solution to detect road damage. We eliminated the bounding boxes of useless classes in the dataset , every image is checked whether it has an object or not. We trained our models by splitting them into training dataset and validation dataset such as 5Foldcrossvalidation, used various data augmentation options, for example, hue, saturation, value for HSV, image translation, image scale, mosaic, etc, therefore the input images are augmented to train the model.We used ensemble models that are trained with adataset to predict the road damage.

## Basic functionalities:

**USER MODULE: -**

1. Admin
2. User

1.Admin

- Login
- View users details
- Add notification
- View feedback
- Track user
- Add and manage routs

2.User

- Register
- Login
- View profile
- Road quality alert
- feedback
- View rout

**Functional modules :-**

**Object Detection Using Deep Learning**

Nowadays, deep learning has an important role in image classification. It extracts the feature maps from an input image using a neural network with hidden layers, and several deep learning networks based on Convolutional

Neural Networks (CNNs), such as AlexNet , VGGNet , ResNet , etc, achieved a successful performance in the ImageNet Large Scale Visual Recognition Challenge (ILSVRC). A main point is that object detection could be a combination of classification and localization, thus many approaches have developed to solve object detection tasks using deep learning-based technology. The detection model is trained with the image dataset which contains the bounding-boxes and the labels to detect an object. From the perspective of region proposal-based methods, they propose a region that may include the object, classify the object, refine and get rid of overlapped bounding boxes, and score them based on other objects in the input image. And there are representative region-based models such as R-CNN , Fast R-CNN , and Faster R-CNN , and they also called by two-stage object detectors.

**YOLO**

YOLO has a single neural network architecture, predicts a set of bounding boxes and class probabilities at a sitting for every test image. First of all, it divides the full image by several a grid with a specific size, and anchor boxes are generated in every grid of input image by predefined scale and size. Each anchor box predicts the objectness score, box center offset x, box center offset y, box width, box height, and class scores at one time in contrast to a two-stage detector. Thus, YOLO is an extremely fast end-to-end algorithm to detect the objects, and it is called a one-stage object detector. Also, the performance of YOLO has improved over the development of deep learning technology, so there are updated versions for improving the light-weight, inference speed, and accuracy.

## HARDWARE AND SOFTWARE REQUIREMENTS:-

This specifies the hardware and the support software required to carry out the development.

### HARDWARE REQUIREMENTS:-

The selection of hardware is very important in the existence and proper working of any software. Then selection hardware, the size and capacity requirements are also important.

- Processor : 64 bit
- RAM: Min 3 GB
- Hard Disk: 10 GB

### SOFTWARE REQUIREMENTS: -

One of the most difficult task is selecting software for the system, once the system requirements is found out then we have to determine whether a particular software package fits for those system requirements. The application requirement:

- OPERATING SYSTEM: WINDOWS 10
- FRONT END: HTML, CSS, JAVASCRIPT
- BACK END: Mysql
- SOFTWARES USED: Jetbrains Pycharm, Android Studio
- TECHNOLOGY USED: PYTHON,JAVA
- FRAME WORK USED: Flask