

A SURVEY ON POTHOLE DETECTION AND IT'S AVOIDANCE USING MACHINE LEARNING

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Abstract- Pothole detection is one of the most important tasks for road maintenance. Computer vision approaches are generally based on either 2D road image analysis or 3D road surface modelling. However, these two categories are always used independently. Furthermore, the pothole detection accuracy is still far from satisfactory. The proposed pothole detection and avoidance system focuses not only on the detection of potholes but also assist the driver to avoid potholes; by giving directions towards left or right to avoid the pothole. Moreover, it will also have an automatic control over the speed of vehicle which will reduce the speed of the vehicle as the car approaches towards the pothole. All the data will be collected in the local database/cloud. The data will be further used for various types of analysis such as the road that has a greater number of potholes, tracking the lifeline of the road and prioritize the road reconstruction.

Keywords:-IR, CNN, Machine Learning

I INTRODUCTION

Traffic congestion has been increasing world-wide as a result of increased motorization, urbanization, population growth and changes in population density. Congestion reduces utilization of the transportation infrastructure and increases travel time, air pollution, fuel consumption and most significantly, traffic accidents. While different factors contribute to the leading cause of around 95% percent of all accidents. The driver behaviour can be improved by either alerting him about the probable

collision or controlling the vehicle itself.

At present, the commercially available traffic detecting equipment's include loop detectors, pressure sensors,

Infrared, radar, ultrasound-based sensors and video cameras. are cheap to manufacture, their installation and repair are very expensive because they involve digging and re-surfacing of the road, which is labour intensive, time consuming and causes disruption to the traffic. The pressure-based traffic sensors have the same problem. Infrared, radar and ultrasound sensors, on the other hand, are more expensive to make. The use of these active devices in urban areas may have safety and other regulatory implications. The effectiveness of this type of sensors can also be affected by bad weather. Also, the images have to be processed further to obtain useful data from them.

Road conditions is a key part for safe and comfortable driving efficiency in one's day to day life. It is desirable to have a mechanism by which people can know about the road conditions on the routes on which they wish to travel, in real time.

Also understanding conditions of road surface is also very important for road maintenance and asset management. The proposed system will provide, vehicle assistance to driver, in case if potholes are detected. Assistance includes giving directions to the driver, to move left or right in order to avoid potholes. System will consist of camera and an IR sensor. Camera will be used to detect speed-breaker whereas IR sensor will be used to detect potholes.

II LITERATURE SURVEY

Rui Fan, Umar Ozunlap et al. have developed a pothole detection system based on disparity transformation of 3D surface models. This technique requires 3D surface modelling of roads using lasers. Thus the process involves lasers which is costly.

Kwang Eun An, Sung Won Lee, Seung-Ki Ryu et al. have developed an informative paper to investigate the performance of deep Convolutional neural network in detecting a pothole.

Manjusha Ghadge, Dheeraj Pandey, Dhananjay kalbande proposed a smart phone-based method which uses Accelerometer and GPS sensors to analyze the road conditions. The drawback of system is that it is not real time based.

Aniket Kulkarni, Nitish mhalgi, Sagar Gurnani, Dr. Nupur Giri proposed a system investigates an application of mobile sensing detection of pothole on roads. But this system does not have a centralized database. System also provides less GPS accuracy.

Yuzhong Yan, Lei Huang published a paper which gives a brief idea about how images, videos which are being produced on large scale are processed with the help of image processing algorithm. In this paper the use of Hadoop hampers the data distribution. Hadoop is also not good at handling low-latency requirement

Karmel. A, Adhithiyar. M, Senthil Kumar proposed a pothole detection technique which is carried out using two techniques namely image processing and machine learning. This system is distracted by sense which has heavy shadows, lighting problem, etc.

III PROPOSED SYSTEM

In this system there is an IR based sensing module along with deep CNN. These low-cost components are placed on the vehicles so its efficient for users as they don't have to install an external sensing function when they get on or off the automobiles. This module will be used to detect potholes on road as well as to provide assistance to the driver to avoid pothole, by providing left, right indicators so as to avoid the pothole or by performing automatic optimal speed reduction on the vehicle if these

indicators are ignored or if the vehicle gets dangerously close to the pothole.

IV SYSTEM ARCHITECTURE

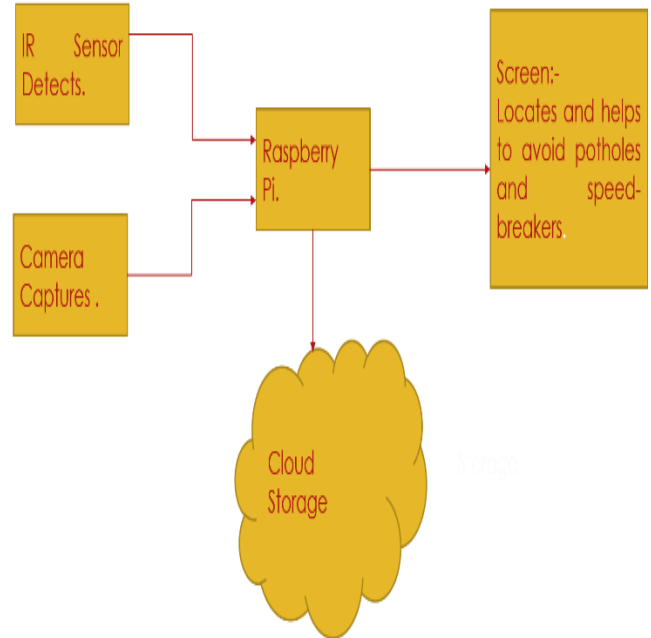


Figure -1: System Architecture

V ADVANTAGES

The proposed system is cost-efficient as it doesn't use high spec camera. The user does not have to perform any manual operations rather user receives a warning or gets notified when pot hole is detected. It will help to decrease the accident count happening due to pot holes. The system will also help in deciding which road need to be repaired first.

VI REAL TIME APPLICATIONS

- Pot holes detected in real time
- Real time warnings to user

VII CONCLUSIONS

According to the real time road conditions evaluation, the abnormal road condition can be detected and saved in traffic centre. The drivers of the vehicles will be made aware of the upcoming bad road conditions to manage their driving behaviours for improving driving safety, comfort and efficiency. The road conditions will improve thus making one's journey safe and comfortable.

AND ENGINEERING TRENDS

VIII FUTURE SCOPE

The system can be made useful as a part of smart city Campaign. Also, applying machine learning techniques in classifying data can help the system to adapt to changing factors like nature of the road and vehicle type the users use. And the data collected can be sent to the government officials and help them in choosing the right person for the job to do a rightful job.

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