Vehicle Driving Assistant

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***Abstract*—Autonomous vehicles has been a common term in our day to day life with car manufacturers like Tesla shipping cars that are SAE Level 3. While these vehicles include a slew of features such as parking assistance and cruise control, they've mostly been tailored to foreign roads. Potholes, and the abundance of them, is something that is unique to our Indian roads. We believe that successful detection of potholes from visual images can be applied in a variety of scenarios. Moreover, the sheer variety in the color, shape and size of potholes makes this problem an apt candidate to be solved using modern machine learning and image processing techniques.**

***Index Terms*—Image processing, Machine Learning, Pot hole detection, Clustering**

I. Introduction

The project aims to provide a comprehensive set of assistance features to aid the driver (or autonomous vehicle) to drive safely. This could includes a number of indicators about the environment, the major cue being detection of potholes in the road ahead.

Fig. 1: Pothole example

The remainder of the paper is structured as follows. We present a brief history of the related work done so far in the field of pothole detection in section 2. Section 3 discusses about the experimental setup we flow in this work. We describes the methodology that we follow in the following section 4. It includes road extraction part and blob detection part. Then the result that we obtained are given briefly in section 5. Finally section 6 concludes the paper.

II. Related Work

In Nienaber et al (2015) [1], a system using basic image processing techniques in a constrained environment without relying on any machine learning techniques is used for pothole detection. It presents a good preliminary method for detecting potholes using a single camera within an range of 2 - 20m from a vehicle moving at a speed of not more than 60km/hr. The method separates a rectangular area of interest just above the hood of the vehicle which contains road surface, assuming that driver maintains a safe distance from the front vehicle. The rectangular area of interest is separated by connecting the various farthest region of interest using convex hull algorithm.

The work presented by Ajit Danti et al (2012) [2], presents a comprehensive approach to address the acute problems of Indian roads such as faded lanes, irregular potholes, improper and invisible road signs. Instead of using image processing techniques for pothole detection as done by Nienaber et al (2015), Ajith Danti et al (2012) uses K-Means clustering based algorithm to detect potholes. By addressing the acute problems above mentioned in the paper it makes automated driving safer and easier in Indian roads.

III. Proposed Work

IV. Methodology

A. Image Processing Techniques

1) Road Extraction Method:

2) Blob Detection Method:

B. Machine Learning Techniques

V. Results

A. Pothole visualisation using Image processing Techniques

B. Pothole detection using Machine Learning Techniques

VI. Conclusion

The conclusion goes here.

Appendix A
Pseudo code for Image processing

Appendix one text goes here.

Appendix B
Pseudo code for Machine Learning

Appendix two text goes here.

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[2] Ajit Danti, Jyoti Y. Kulkarni, and P. S. Hiremath, Member, IACSIT *An Image Processing Approach to Detect Lanes, Pot Holes and Recognize Road Signs in Indian Roads, December 2012* http://www.ijmo.org/papers/204-S3015.pdf

[3] S. Nienaber, R.S. Kroon, M.J. Booysen *"A Comparison of Low-Cost Monocular Vision Techniques for Pothole Distance Estimation"* IEEE CIVTS, December 2015, Cape Town, South Africa.

[4] The annotated image dataset used in the pothole detection paper is freely available at https://goo.gl/3QyeMs

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