PotSol- The Pothole Solution

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Abstract— This project aims at providing an effective solution for maintaining the Pothole's information using various tools such as Database and Android Application also a Website Portal. The system has two logins, one for user from the mobile application and the other for admin from the Website Portal. PotSol is a modern solution to the problem of Potholes present throughout the city. PotSol solves the problem of Potholes by using GEO-Tagging. The application is a simple process in which the user clicks the picture of Pothole uploads it, the Admin views the image send by the user, verifies it, resolve it and upload the updated image of the Pothole.

Key words: Login, Geo-Tagging, Pothole, Admin, Vibration-Based Methods, 3D Reconstruction, Grayscale Image, Extracted, Spot Filters, Proximity, Histogram , Identification, Segmentation, Clustering, FGPA

I. INTRODUCTION

Potholes are a common problem throughout which is present everywhere. There have been many incidents where potholes have caused many fatal injuries as well as deaths. PotSol is a solution where the user when sees a pothole can upload the picture of the same, the image is sent to the admin through the application, the admin views the image, verifies it, and after the verification of the problem is completed, the admin assign the workers to complete the work, after the work is completed the updated image of the pothole is uploaded which can be viewed by the user which complained about the same.

It is known that roads are scarred with possibly infinite potholes, throwing the city down in the dumps during monsoons .Not only monsoons but the wear and tear of the roads due to countless vehicles nowadays also effect the condition of the road .One of the main reason of generation of these potholes are the cheap quality material used in making of the roads .But why to every time blame government and be too dependent on them! When we've an answer to this! You can play your part towards a good citizen by just helping the municipal officials by informing about problems you have encountered.

This method has taken inspiration from the government's own Swatch Bharat Application. We found the idea of taking pictures of the problems faced by the Normal citizens very easy as every second person owns a Mobile phone through which they resolve the issues faced by them in day-to-day life.

Existing pothole detection methods can be divided into vibration-based methods, 3D reconstruction-based method and vision-based methods. Vision-based methods are of two types; 2D image-based approaches by Koch and Brilakis and Buza et al. and video-based approaches. Vision-based techniques are cost effective as compared to 3D laser scanner methods. However due to noise, distorted signal is generated in the case of vision based methods and thus we need to develop and improve existing detection methods. Koch and Brilakis presented a supervised method for detecting potholes in an automated way with an overall efficiency of 86% .Under the proposed method, the image is segmented into defect and non-defect regions. The potential pothole shape is then approximated according to the geometric characteristics of a defect region. Next, the texture of a potential region is extracted and compared with the texture of the surrounding region. This implies that the system is trained from a number of texture samples. In order to emphasize structural texture characteristics, the grayscale image is passed through four spot filters. This method assumes all images are shot from same distance and angle and thus no scaling of absolute filter size has been done. However, the images taken from varying heights, angles and proximity need to be considered. Buzau et al. proposed a new unsupervised vision based method consisting of three steps such as image segmentation, shape extraction and identification and extraction. Histogram based thresholding is used for image segmentation. Instead of using traditional clustering algorithms like k-means algorithm, normalized spectral clustering algorithm have been used for shape identification. Seeds are then selected which helps to extract vertical and then horizontal area.81% accuracy was obtained for estimation of a pothole surface area. This method works on pictures taken from good perspectives with explicit focus on the road anomaly, which is not usually possible in real time scenarios. Rajab et al. use Image software for image processing to determine areas of a potholes and show that results from image measurement methods, which are safe, fast and effortless are close to those obtained by applying traditional methods .Their method uses curve fitting to specified International Journal of Computer Science & Information Technology (IJCSIT) Vol 7, No 6, December 2015 99 points at the pothole border to measure the area of a pothole. However, the images are acquired with necessary road marks and units of known length like metal rulers. Such images would be difficult to obtain for all the potholes. Nienaber et al. used a GoPro camera attached to the front windscreen of a car. The extracted road images were converted to grayscale images and Gaussian filter was applied to remove noise. Canny edge detection was performed followed by dilation to remove unwanted edges close to outer boundaries. Sample study performed by them indicated a precision of 81.8% and recall of 74.4%. Pawade et al. proposed a FGPA (Field Programmable Gate Arrangement) system to detect potholes because of its easy reconfiguration and rewritable logic ability that enables the detection system to change its logic every time a new image of the road is captured by the camera. The processing part of the system included detection of potholes using basic edge detection algorithms like Prewitt, Sobel and Canny. The cost overhead generated by the installation of these camera equipments in both the above methods acts as a disadvantage for them.

II. PROPOSED SYSTEM

A. Modules included in the System

1) USER Module

a) User Login

The user need to enter its login credentials such as username or password to perform further steps for security purposes.

b) Uploads Pothole Image

When the user spots a pothole and wants to report it, the user just simply needs to launch the app and open the camera option, click the picture of pothole and submit it to the government side of the software. The submission of the pothole's location will takes place through using, geo-tagging feature.

c) Geo Tagging

GEO TAGGING is a feature by which, with help of longitude and latitude of the location the exact location of the pothole can be located.

2) ADMIN Module

a) Admin View the Uploaded Image

The image uploaded by the general public is then reviewed by the government officials.

b) Admin Assign Tasks

After verification process the government officials will assign people who will carry out the task of repairing the pothole.

c) Change the Status of Uploaded Pothole Image

As soon as the people are applied over, the work phase changes from pending to resolved, the same is changed during this process too.

The status can view the status of the reported pothole as well as the pothole reports in his / her locality.

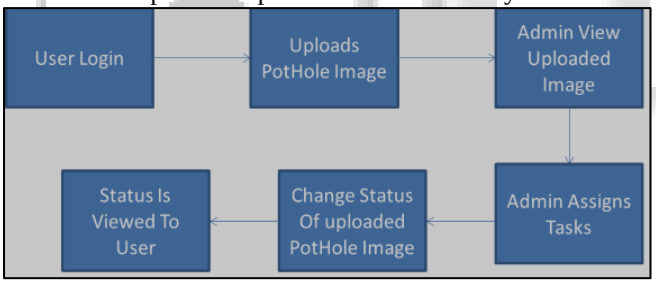

Fig. 1: Architecture System

III. CONCLUSION

A. Developed Nation

By decreasing the number of potholes we may reach one step closer to a Developed nation.

B. Decrease in Death Rate

As potholes causes a lot of road accidents reduction in the number of potholes may eventually lead to decrease in the death rates.

Once the app works successfully in a smaller area we may expand the region.

Traffic Jams happening over the country due to potholes could have a direct solution as the use of application is not restricted only in one region.

Phases involving Centralized database generation, and Geo-tagging will be implemented and the target pothole area will be determined from the images. Further the status associated with the tasks will help to manage potholes in an effective and efficient way thus preventing damage.

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