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Pothole Detection and Management System using AI

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Abstract: *Potholes put pedestrian and vehicular safety in peril, creating a traffic hazard. In the majority of developing nations, it ranks among the main factors in traffic accidents that result in the loss of life and property. In order to identify potholes quickly and accurately, this project aims to assess the performance of cutting-edge neural network techniques like YOLO and Faster R-CNN with VGG16 and ResNet-18 architectures. A new YOLOv2 architecture is also proposed to handle the "pothole" and "regular road" class imbalance issue, and its performance is evaluated in comparison to other object identification algorithms using accuracy, recall, intersection over union, and frames processed per second (FPS).*

Keywords: Deep Learning Neural Network; CNN; YOLO Algorithm Object Detection; Image Processing

I. INTRODUCTION

Maintaining the quality of roads in all weather condition, including the worst of the monsoon season, is a huge challenge for communities around the world. Even though it is the government's duty to ensure that the roads are in good condition, they occasionally fail to notice problems and frequently are unaware of them According to an article from the "American Automobile Association (AAA)," 16 million drivers in the United States have experienced damage from potholes during the past five years. According to reports from Guardian News & Media, potholes claimed over ten lives every day in 2017. In honour of the kid he lost in a car accident, "Bereaved Father Mr. Dadarao" reportedly patched 600 potholes in Mumbai, according to IndiaTimes. According to reports, potholes killed more people than the 14,926 fatalities documented by terrorists in traffic accidents. There is a comparable problem on the other side of the globe, according to the American Automobile Association. With the weather constantly changing and governments' limited funds, maintaining decent road conditions and monitoring damage is difficult. Not to mention that it is a duty to keep the populace informed. The objectives of this project were to solve the issues listed.

II. PROCESS DESCRIPTION

There are 5 main sections of the citizen's app.

Create New Report

Users can access the screen where they can add a new report by pressing floating action button in the bottom right corner of the screen.

Once users have selected the method for uploading, the image is validated by the python-based deep learning model installed on the backend server to verify if the image uploaded contains one or more potholes. Alternatively, users can start their report by clicking a new photo using the inbuilt camera algorithm.

Users are given the chance to provide extra information about their report if the media file has one or more potholes. If not, users are given the opportunity to contact support and are given a feedback box for an invalid image.

Users are given the choice to choose a place (either current (shown after requesting permission)) or to enter a custom location, assuming that the supplied image is confirmed correctly. Users are then prompted to indicate, using a progress indicator, how bad they believe the reported pothole(s) to be.

Finally, a needed input text area component is used to request further information from them on their report. The user can now read the report via my complaint screen after successfully submitting it.

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My Complaints

The My Complaints Screen appears when users log in to the app using their Google Accounts. Existing users can use this portion of the app to manage the status of their reports, add new comments to them, or respond to comments made by authorities.

Users can click on any of the reports to get a complete description, keep track of any alerts, or interact with the authority directly through the chat feature.

Route Navigation

The user has the opportunity to input the source and destination locations on this screen. The user is then shown a map based on the source and destination locations they entered. For the user, a route is rendered on the map. It shows the walkway with the identified potholes that were permitted by the authorities. The route is constructed using the Google Maps API.

If there are potholes near the route, the user is shown custom markers for them with a status authorised ranging on severity. With the use of Google Maps' 'isLocationOnEdge' library function, it can tell whether a path contains a pothole.

Additionally, users have access to a street view renderer and a legend that explains the map's many features. Any user who is signed in can use this screen to keep track on a route's status for the various potholes on it and adjust their travel plans.

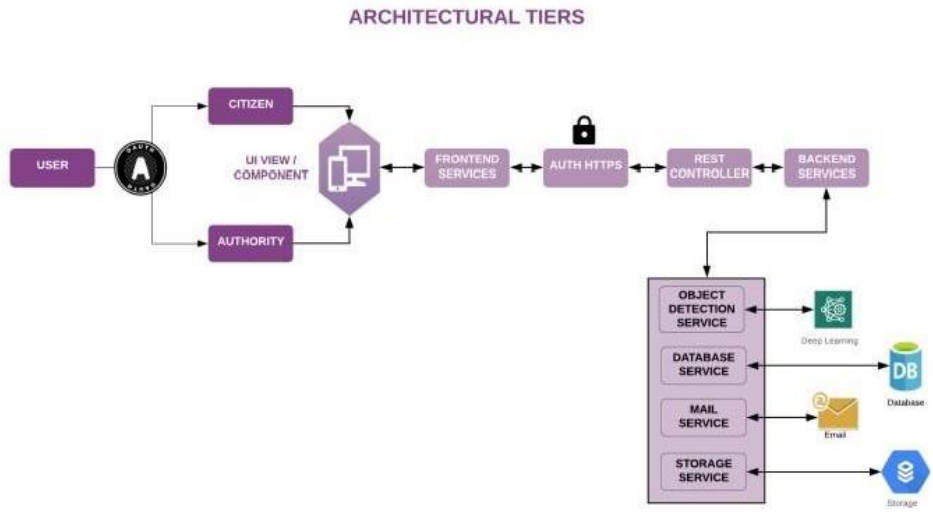
Profile

The user's basic information (avatar, name, and email address) are mentioned on this screen, which is then followed by a counter for reports that list their status as either submitted, approved, or completed. Based on the aforementioned counters, the user is given a badge score that represents how much they have contributed to the community.

This score, which is a weighted average based on the aforementioned counters, can then be utilised to award the user.

Sign-In Screen

The Google login option is available on this screen. This logs the user in using Google's OAuth 2.0 GAPI. Additionally, this makes use of the Unsplash API to provide arbitrary backgrounds. (When using a desktop) Additionally, the app actively maintains the session state each time it communicates with GAPI by using local storage. OAuth2.0 Logout Local Storage Unsplash.



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Software requirement:

Sr.No.	Software Component	Details(Technical details with Purpose)
1	Operating System	64bit Windows 10 and on words
2	Technology	Python
3	IDE	Spyder
4	Database	DBSqlite

Hardware requirement:

Sr.No.	Component	Details(Technical details with Purpose)
1	System Processor	Core 2 Duo
2	Hard Disk	150GB
3	Speed	2.4 GHz

REFERENCES

[1]. Silvister et al., "Deep Learning Approach to Detect Potholes in Real-Time using Smartphone," 2019 IEEE Pune Section International Conference (PuneCon), 2019, pp. 1-4, doi: 10.1109/PuneCon46936.2019.9105737.

[2]. Rastogi, U. Kumar, A. Kashyap, S. Jindal and S. Pahwa, "A Comparative Evaluation of the Deep Learning Algorithms for Pothole Detection," 2020 IEEE 17th India Council International Conference (INDICON), 2020, pp. 1-6, doi: 10.1109/INDICON49873.2020.9342558.

[3]. R and N. S, "Pothole and Object Detection for an Autonomous Vehicle Using YOLO," 2021 5th International Conference on Intelligent Computing and Control Systems (ICICCS), 2021, pp. 1585-1589, doi: 10.1109/ICICCS51141.2021.9432186.

[4]. Rasyid et al., "Pothole Visual Detection using Machine Learning Method integrated with Internet of Thing Video Streaming Platform," 2019 International Electronics Symposium (IES), 2019, pp. 672-675, doi: 10.1109/ELECSYM.2019.8901626.

[5]. Kumar, Chakrapani, D. J. Kalita and V. P. Singh, "A Modern Pothole Detection technique using Deep Learning," 2nd International Conference on Data, Engineering and Applications (IDEA), 2020, pp. 1-5, doi: 10.1109/IDEA49133.2020.9170705.

[6]. A Deep Learning Approach for Street Pothole Detection DO 10.1109/BigDataService49289.2020.00039