Vehicles Connect

Our project adopts the idea of using vehicle-connect technology, which connects vehicles through an app and a camera mounted on the front of the vehicle. This allows the vehicle to detect the existence of potholes and send the information to the responsible administration, as well as alert other vehicles of the location of the potholes.

We trained our model using YOLOv7 on an open-source, labeled dataset to effectively localize potholes in an image, which enable us to detect the potholes existing in the challenge dataset.

To estimate the magnitude of the potholes we detected, we used a 3D reconstruction technique of the road images i.e structure from motion which consiste of several pahses including features extraction with sift algorithm, features matching, local/global bundel adjustment to reconstruct the 3D point cloud. This allowed us to obtain the shape of the several potholes in the trajectory.

Technically, We used the point cloud data of the road surface and projected it on the images to get the points inside each bounding box, which gave us the shape of the potholes. Using these techniques, we were able to estimate the depth and area of the potholes, and thus the magnitude of the potholes.

Our proposed solution has the potential to accurately detect potholes by using a pre-trained object detection model such as YOLOv7 and fine-tuning it on a dataset of road images with labeled potholes. The 3D reconstruction technique can also help to accurately estimate the magnitude of the potholes by providing the depth and area of the potholes.

Furthermore, the solution can potentially establish the most urgent or problematic potholes in the analyzed data by considering the depth and area of the potholes and comparing them to a predefined threshold.

In terms of maturity, our solution can be considered as an alternative to mobile Lidar on pothole detection via computer vision. It has a high level of solution autonomy and it can potentially scale well. However, it is important to note that the solution is based on the assumption that the input images are of high quality and that the camera is calibrated, and the system may not be able to detect all types of potholes. In addition, it may need human intervention to validate