

CS 512 Computer Vision Project Proposal

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Name of the paper:

Computer Vision Based Detection and Localization of Potholes in Asphalt Pavement Images

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Problem Statement:

Asphalt pavement distresses have significant importance in roads and highways. These distresses in the road can lead to accidents. Currently pothole detection is mostly done either through a manual approach by experts or by high-end equipment using 3D reconstruction, stereo-vision, laser and vibration-based approaches. Potholes being one of the key pavement distresses, this project addresses the detection and localization of the potholes using computer vision.

Approach:

A low-cost, computationally efficient and workable approach without assumptions of visual and shape appearance of the pothole is implemented. Different kinds of pothole and non-pothole images from asphalt pavement are considered for experimentation. A pothole in the asphalt pavement may contain the coarser (dry) or smooth (with water) texture as compared to local neighbourhood. Even the overall surface appearance of the pothole cannot be the same due to varying directions of illumination source throughout the day. In addition to these, generally potholes have an elliptical shape. Considering the appearance-shape based nature of the potholes, Histograms of oriented gradients (HOG) features are computed for the input images. Features are trained and classified using Naïve Bayes classifier resulting in labelling of the input as pothole or non-pothole image. Then, it proceeds towards the localization of the pothole in the image. To locate the pothole in the detected pothole images, normalized graph cut segmentation scheme is employed.

Responsibilities:

Student -1:

- To collect dataset that consist of pothole and non-pothole images
- To extract the features(HOG) from images using python
- To detect features that represent a pothole
- To label the dataset and to split it to training and test data

Student – 2:

- To train a Naïve Bayes classifier from the extracted features using the training data
- To test the classifier on test data
- To locate the pothole in the detected pothole images using normalized graph cut segmentation
- To train the same dataset with other classifiers to compare the results

Dataset:

The dataset in the proposed paper was collected from the paper “Pothole detection in asphalt pavement images” containing 120 pavement images. Out of 120 images, 50 images are used for training and remaining 70 are used for testing purpose in the pothole detection phase. The dataset for our implementation of the paper is yet to be obtained from them.

References:

- Koch, C., and Brilakis, I. “Pothole detection in asphalt pavement images.” Adv. Eng. Inf., 25(3), 507–515, 2011.

Software:

- Python 3.6.6 64-bit
- OpenCV
- Sci-kit Learn