Damaged Road detection with IOT using computer vision

K.S.Kumar

- Damaged roads and water filled potholes are major concerns for citizens during every season. Though the wear and tear would damage roads with time, a computer aided analysis would help in measuring the damage caused by rain and other reasons.

- No specific technology to detect and determine the after effects of rains on roads gives a niche space for an IoT device to monitor the state of roads after rainfall. This can also be used to either compare or detect potholes at any site of the camera.

Problems:

P1) Damaged roads detection.

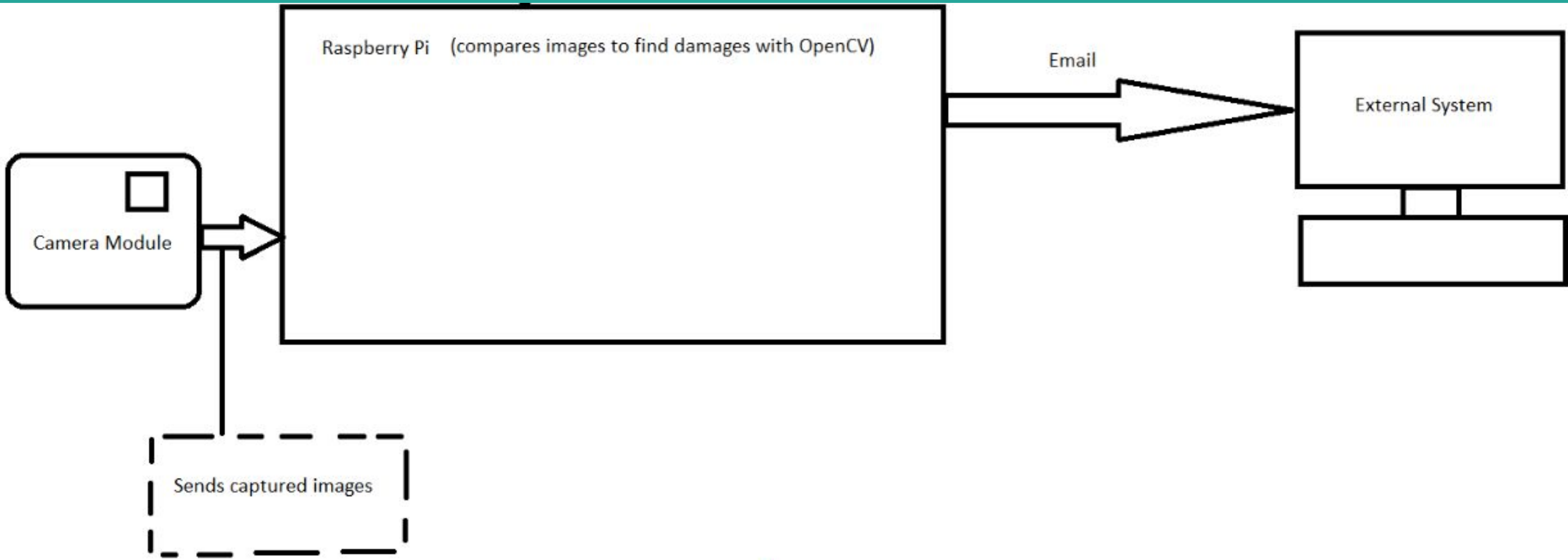
A) The before and after snapshots of roads are compared with computer vision in the raspberry pi and the only major damages are reported to required users in an email.

Youtube Links

Spot the differences in images with python and OpenCV.

1. https://www.youtube.com/watch?v=Xnisf0GP9bA
2. https://www.youtube.com/watch?v=Ph4lI-LxzDg

Architechture:



Hardware, Software

- **Raspberry Pi 3 Model B+**
- **5MP Raspberry Pi 3/4 Model B Camera Module Rev 1.3 with Cable.**
- **Cables/Connectors,**

- Linux/Ubuntu
- Python 3.10.6

Libraries:

- OpenCV
- Numpy
- Skimage

Version 2:

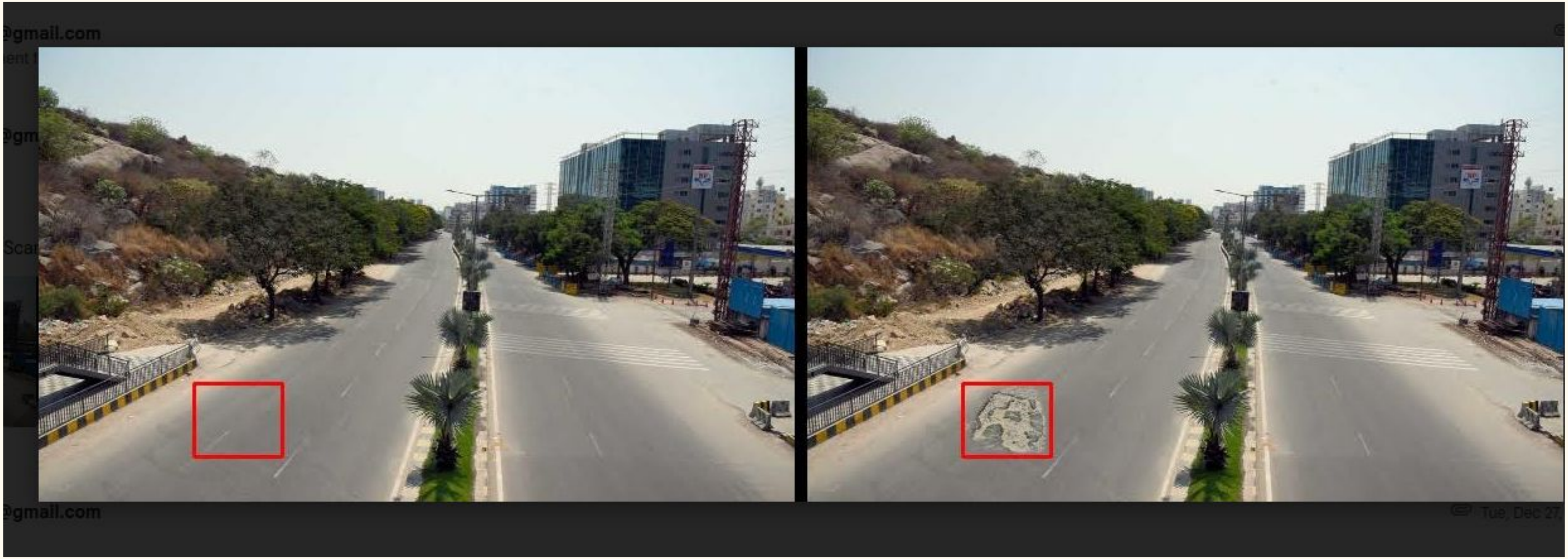
- Yolo

Image Processing:

Libraries imutils(from opencv) or skimmage are used.

- Resize the image
- Find the absolute differences - function: absdiff
- Threshold the resultant image - makes it easier to analyse
- Finding contours : shape analysis and object detection.

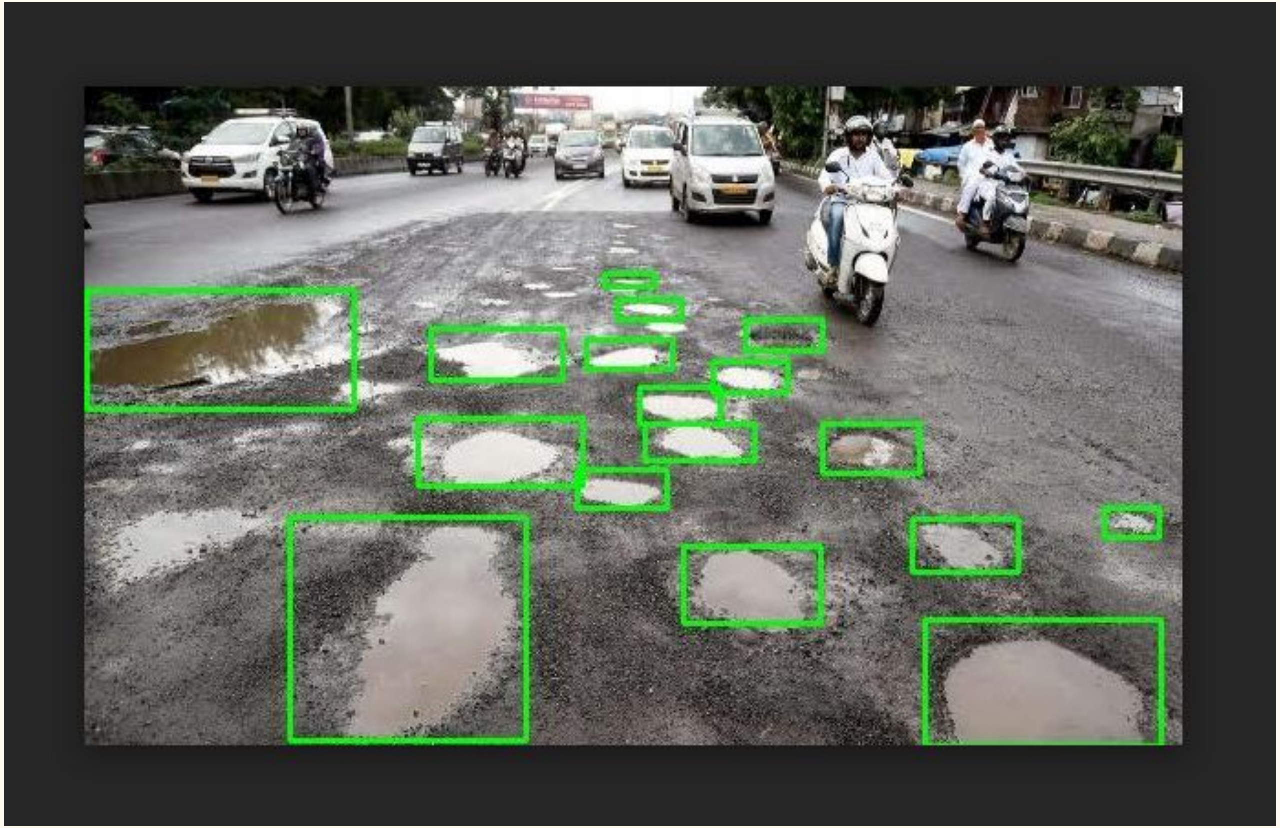
Sample output- Version 1



Since the detection is tough when there is debris and people aswell on roads, comparing with older images or current images with future roads might result in incorrect results. The only solution to make this better is machine learning using neural networks.

- Hence we used yolo-v4 tiny to analyse and train the system by specifying same bounded boxes for potholes.
- This allows the system to ignore the traffic on road and detect only the potholes
- No older image is needed for comparison

Sample output- Version 2



Thank you