**Edge detection** includes a variety of mathematical methods that aim at identifying points in a [digital image](https://en.wikipedia.org/wiki/Digital_image) at which the [image brightness](https://en.wikipedia.org/wiki/Luminous_intensity) changes sharply or, more formally, has discontinuities. The points at which image brightness changes sharply are typically organized into a set of curved line segments termed *edges*. The same problem of finding discontinuities in 1D signals is known as [step detection](https://en.wikipedia.org/wiki/Step_detection) and the problem of finding signal discontinuities over time is known as [change detection](https://en.wikipedia.org/wiki/Change_detection). Edge detection is a fundamental tool in [image processing](https://en.wikipedia.org/wiki/Image_processing), [machine vision](https://en.wikipedia.org/wiki/Machine_vision) and [computer vision](https://en.wikipedia.org/wiki/Computer_vision), particularly in the areas of [feature detection](https://en.wikipedia.org/wiki/Feature_detection_(computer_vision)) and [feature extraction](https://en.wikipedia.org/wiki/Feature_extraction).[[1]](https://en.wikipedia.org/wiki/Edge_detection#cite_note-1)

Canny Edge Detection..

Aims : The main aims of the Canny Edge Detector are as follows:

(a) Good detection - There should be a low probability of failing to mark real edge points, and low probability of falsely marking nonedge points. Since both these probabilities are monotonically decreasing functions of the output signal-to-noise ratio, this criterion corresponds to maximizing signal-to-noise ratio. So basically, we need to mark as many real edges as possible.

(b) Good localization - The points marked out as edge points by the operator should be as close as possible to the centre of the true edge. In essence, the marked out edges should be as close to the edges in the real edges as possible.

(c) Minimal response - Only one response to a certain edge. This is implicitly captured in the first criterion since when there are two responses to the same edge, one of them must be considered false. So, the idea is that an edge should be marked only once, and image noise should not create false edges

<https://www.math.washington.edu/~morrow/336_13/papers/debosmit.pdf>

Concept of solution..

To build a robust which fulfils the following aims :

a) Good detection - There should be a low probability of failing to mark real edge points, and low probability of falsely marking nonedge points. Since both these probabilities are monotonically decreasing functions of the output signal-to-noise ratio, this criterion corresponds to maximizing signal-to-noise ratio. So basically, we need to mark as many real edges as possible.

(b) Good localization - The points marked out as edge points by the operator should be as close as possible to the centre of the true edge. In essence, the marked out edges should be as close to the edges in the real edges as possible.

(c) Minimal response - Only one response to a certain edge. This is implicitly captured in the first criterion since when there are two responses to the same edge, one of them must be considered false. So, the idea is that an edge should be marked only once, and image noise should not create false edges

Detailed Description :

We will combine the data from two sources one is by using LIDAR which is a surveyiong methode that measures distance by illuminating the target. Secondly we will use image processing and Machine perception techniques to detect edges on the surface of the road with the help of a infrared camera the image from which would be fed onto our ML algorithms and by that we can detect the potholes onto the road and advice the drivers to act accordingly.

Pros and Cons

It would allow the drivers to appropriate decisions while driving and avoiding the potholes whenever and wherever possible

It would lead to increase in fuel efficiency and would also increase the longetivity of tires.

The main challenge of this project is to make the driver aware of the potholes well in advance and that too when the car is moving at high speeds..

Technology background

Open Cv

LIDAR

Edge detection algos..

Dev procedure … ??????

POC

Open cv images for edge detecgtions that we have attached in the challenge submission …

Testing/Analysis …

Review the results of the above photos …

Cost/benifts

……pros ko thoda badal ke likh denge …