ENEE631 Image Processing Project Proposal

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1. Overview

   As self-driving cars become more popular, there are a lot of topics related to computer vision, object detection that involves a lot of techniques in image processing. Through this project, I will be trying to identify objects and see how it performs by using different filtering techniques. Since we know high pass filters can increase the performance of edge detection and increase the accuracy of object detection. But the way we design high pass filters is also questionable. Moreover, when we receive images that contain noise, there are a lot of ways to recover the image, and the way we process the image is also very crucial in object detection.

2. System Design

   - The system will be coded in Python
   - First, train a network to identify the car licenses plate with the OpenCV package.
     Dataset: https://www.kaggle.com/andrewmvd/car-plate-detection
   - Pick a few images from the dataset and then add different levels of white noise to the image or blur (low pass filter) it.
   - Using different filters to sharpen or denoise the object. Then pass it back to the model we trained previously and see the output and accuracy of it.
     Filtering techniques: Mean filtering, Median Filtering, Gaussian Smoothing, 3 different filters, Sobel gradient, Robert's cross-gradient.

3. Goals

   See how different filtering techniques affect the system to identify the numbers of those car license plates. I would want to try different datasets if time permits.

   Bonus: If I have time for this project, I will try to train a model myself using CNN (TensorFlow package).

4. Conclusion

   With this system, we can try to see the relationship between different levels of noise and blur effects and also observe what kind of filtering techniques could help us detect numbers on car licenses. And also have a better understanding of which filtering techniques could help us accurately identify the car license plate under different circumstances.

5. Reference

https://homepages.inf.ed.ac.uk/rbf/HIPR2/filtops.htm
https://medium.com/programming-fever/license-plate-recognition-using-opencv-python-7611f85cdd6c