Introduction, Related Works & System Background

CSE499A.10

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Introduction

Now -a- days traffic accidents are a common occurrence in this modern world. On average 3700 people are dying around the world everyday in road accidents and the number is 1.35 million if we consider the time period of a year.**[1]** One of the main reasons behind these accidents is not seeing the traffic signs properly due to bad daylight or bad weather and thereby not recognizing the traffic signs. Another main problem is many drivers don't know the meaning of road signs. The aim of our project is to build a system which will help drivers or AI to recognize the traffic signs even in bad daylight. Moreover, it will also help the drivers who have bad eyesight. There are few works which have similarities with our project. One among those works has the most similarity as it has worked on three models we plan to implement.**[2]** We will use YOLOv5 instead of YOLOv2 which they had used. Again, we will try to find different precision results and thereby get different comparison data. Beside this, there are some similar works on individual models among our three. We will try to achieve improvement there too. In the future, we are planning to develop our project for automated cars. We will use three different models and compare their accuracy. The models we plan to use are YOLOv5 , SSD and Faster RCNN. Our system may face some barriers during the implementation such as bad lighting, different camera angles, corrupted data in dataset etc.

Related Works

In this paper, they discussed a method of traffic sign recognition and tried comparing three different models (YOLOv2,SSD,faster RCNN) to determine which has the best accuracy. They trained all the different three models with five different classes of objects and then tested them. They used Tensorflow2 and for the dataset they used ‘German Traffic sign dataset’. They used mAp, FPS as evaluation parameters. As a result they found that the accuracy of YOLOv2 is better than Faster RCNN and SSD by 3.5% and 21% respectively. Besides, YOLOv2 was 3 times quicker than Faster RCNN with a better accuracy. **[2]**

In this paper, they worked with Railway Traffic Signals. Here they followed a procedure that consisted of two steps for detecting the static and the blinking states. They used YOLOv5 for detecting the railway signals. For dataset they used FRsign dataset which was consisted of almost 100,000 pictures of traffic signals. **[3]**

In this paper, they detected traffic signs based on YOLOv5. For implementation, they used the Iraqi Traffic Sign Detection Benchmark (IQTSDB) dataset. According to the experiment, YOLOv5 showed high efficiency in different weather conditions and is also efficient in detecting different sizes of traffic signs such as small, medium and large. They compared the mAp value to YOLOv2 and YOLOv3. **[4]**

Here they detected traffic signs using Faster R-CNN. The most positive part of this project is they did not need to extract image features manually. And this experiment was based on traffic sign detection competition by CCF and UISEE company in 2016. Their mAp value was 0.3449. **[5]**

System Background:

For reducing traffic accidents, following traffic signs can be very useful. There has been many work on this aspect on developing a traffic sign detection system. Many of them were successful with different models. We will try to find a new approach to find a more precise model and a different comparison result. Most of the other related works regarding this idea used YOLOv2 but we are planning to use YOLOv5.

In the roads, there are traffic signals in critical path sections such as turn points, rail crossings, highways etc. When a driver along with his vehicle comes to these points where traffic signs are located, it is really difficult to notice and realize the meaning of signs all the time due to bad light, bad eyesight etc. In our system, when a driver approaches any traffic sign, the sign will be detected and the driver will be notified. The notification will be either by a text message shown on the screen or by generating a voice signal to the driver. We are planning to notify the driver within approximately 4-6 seconds before passing that signal. So, we will be trying to implement this system where drivers of all ages and all types can use this system easily and have easy entrance.

The main challenges will be to make sure it is working perfectly as many lives are depending on the accuracy of our system. So we need to work on improving our accuracy. Besides, high precision vs low precision can determine the difference between life and death.

References:

[1] https://www.google.com/search?q=On+average+3700+people+are+dying+around+the+world+&rlz=1C1CHBD_enBD930BD930&biw=1366&bih=625&ei=YHhsY6TFIdmQseMPhMer8A8&ved=0ahUKEwik9bz-3aL7AhVZSGwGHYTjCv4Q4dUDCA8&uact=5&oq=On+average+3700+people+are+dying+around+the+world+&gs_lcp=Cgxnd3Mtd2l6LXNlcnAQA0oECE0YAUoECEEYAEoECEYYAFAAWABglwloAHABeACAAasBiAGrAZIBAzAuMZgBAKABAcABAQ&sclient=gws-wiz-serp

[2] Garg, P., Chowdhury, D. R., & More, V. N. (2019, July). Traffic sign recognition and classification using YOLOv2, faster RCNN and SSD. In *2019 10th International Conference on Computing, Communication and Networking Technologies (ICCCNT)* (pp. 1-5). IEEE.

[3] Staino, A., Suwalka, A., Mitra, P., & Basu, B. (2022). Real-Time Detection and Recognition of Railway Traffic Signals Using Deep Learning. *Journal of Big Data Analytics in Transportation*, *4*(1), 57-71.

[4] Aggar, A., & Zaiter, M. (2021, July). Iraqi Traffic Signs Detection Based On Yolov5. In *2021 International Conference on Advanced Computer Applications (ACA)* (pp. 5-9). IEEE.

[5] Z. Zuo, K. Yu, Q. Zhou, X. Wang and T. Li, "Traffic Signs Detection Based on Faster R-CNN," 2017 IEEE 37th International Conference on Distributed Computing Systems Workshops (ICDCSW), 2017, pp. 286-288, doi: 10.1109/ICDCSW.2017.34.