UDACITY

PROJECT

Traffic Sign Classification

A part of the Self Driving Car Engineer Nanodegree Program

PROJECT REVIEW
CODE REVIEW
NOTES

SHARE YOUR ACCOMPLISHMENT! 🐦 f

Requires Changes

7 SPECIFICATIONS REQUIRE CHANGES

Dear Student,

I loved reviewing 👌 your project you have done the hard part and also used the LeNet architecture instead of a simple Feed Forward Network. 👍
Unfortunately, some rubric points need to be improved including some information and visualizations.
I'm sure that with the improvements I've suggested here your model will perform even better and your next submission will meet all requirements.
I believe you will certainly pass the rubric next time.
I've enjoyed very much reviewing your submission, which demonstrates your deep knowledge of machine learning. 😃
I wish you all the success for your next submission. 😃

Extra Important Material

Lately on slack few students asked for a good Deep Learning book.So after lot of research found a book which is also recommended by Elon Musk 😉

- *Deep Learning (Adaptive Computation and Machine Learning series)* Github and on Amazon
  Few more 😃
- Fast.ai

- [A Guide to Deep Learning](#)

Few Articles

[Traffic sign classification using brightness augmentation](#)
[Dealing with unbalanced data](#)

Dataset Exploration

Student performs basic data summary.

Good job performing a basic data summary to come up with the correct figures. 👍🏼

Student performs an exploratory visualization on the dataset.

You've done a great job with the visualizations 💯

- The traffic signs have been plotted.

Design and Test a Model Architecture

Students provides sufficient details of the preprocessing techniques used. Additionally, the student discusses why the techniques were chosen.

- Please provide good concise explanation for the preprocessing techniques used.
- Images are converted to grayscale. That's actually nice going with the power of gray images 👍🏼
  I would love to know your reason to back this decision.

Student provides sufficient details of the characteristics and qualities of the architecture, such as the type of model used, the number of layers, the size of each layer. Visualizations emphasizing particular qualities of the architecture are encouraged.

Well done here in mentioning the type of layers and the number of layers you used. However,

Require Changes

- In this section, you are required to provide a clearly outline section which includes information on:

1.The characteristics of the architecture.
2.The type of model used.
3.The number of layers in the model.
4.The size of each layer.

Note that the aim of this section is to make it so detailed so much so that, any one reading your report can reproduce your same model just from studying this section.

Student describes how the model was trained and evaluated. If the student generated additional data they discuss their process and reasoning. Additionally, the student discusses the difference between the new dataset with additional data, and the original dataset.

Please describe how you trained and evaluated your model and providing details on additional parameters like your batch size, learning rate, number of epochs and optimizer 😃

Student thoroughly discusses the approach taken for deriving and designing a model architecture fit for solving the problem given.

Question Requirement

According to the rubric, student should thoroughly discusses the approach taken for deriving and designing a model architecture fit for solving the problem given. You only stated you were inspired by different parties, however, you still need to illustrate how did you design the model. You could follow the checklist below to make the model architecture design discussion.

Here is a checklist for this question:

- Please discuss how did you choose the optimzer. (Missed Answer)
- Please discuss how did you tell a convolutional layer is well suited for this problem. (Missed Answer)
- Please discuss how did you choose the particular activation (Missed Answer)
- Please discuss how did you tune the hyperparameter. (Missed Answer)

Test a Model on New Images

Student chooses five candidate images of traffic signs taken and visualizes them in the report. Discussion is made as to any particular qualities of the images or traffic signs in the images that may be of interest, such as whether they would be difficult for the model to classify.

- All the candidate images chosen are appropriate.

Requirement

- Please discuss as to any particular qualities of the images or traffic signs in the images that may be of interest, such as whether they would be difficult for the model to classify.

Student documents the performance of the model when tested on the captured images and compares it to the results of testing on the dataset.

Question Requirement

In this section, we are expecting answer included the prediction result of the captured pictures or a live camera stream and compare it with the prediction accuracy of your test set.

- Please compare the prediction accuracy of the result of the captured images with the testing set.
- For example you could say:
  - From the prediction I did to the candidate image, the testing accuracy is 65%, however, the model prediction accuracy on the training set was 92%.
    As a result, I believe my model did not perform well in the real world situation. The possible reasons would be ....

The softmax probabilities of the predictions on the captured images are visualized. The student discusses how certain or uncertain the model is of its predictions.
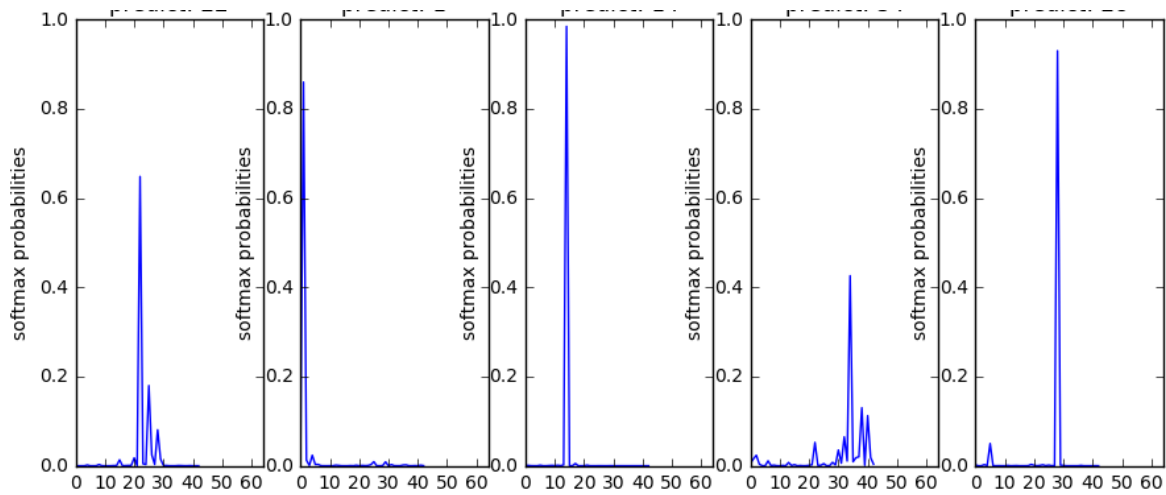
Please recheck this section 😞

Requires Changes

- Please provide a discussion on the certainty and uncertainty of your models predictions and also some visualizations of the softmax probabilities of the predictions

Suggestion

- You might want to expand more on this section by providing a graph which can look a bit like this :

- This enables you to visualize the probabilities easily. Of course this will also help you analyze this certainty and uncertainty easily. This is a plot showing the softmax probabilities obtained for each class for a set of captured images. For example, on this image above, you can clearly see that the prediction for the fifth graph was very certain due to its ridiculously high value compared to others softmax probabilities on that graph.

    - As another way to help with the certainty, it is by looking at the visualizations of softmax probabilities of a set of top K for an image, If there is a class with a way higher probabilities than other in its top K's for a particular image, that means your model was quite certain of this prediction and if the probabilities are nearly the same and not really distinguished, then the model was uncertain of that prediction.

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