UDACITY

PROJECT

Machine Learning Capstone Project

A part of the Machine Learning Engineer Nanodegree Program

PROJECT REVIEW

CODE REVIEW

NOTES

SHARE YOUR ACCOMPLISHMENT!

Requires Changes

2 SPECIFICATIONS REQUIRE CHANGES

Nice job on your resubmission! There are only a couple small fixes I would make in terms of the language you use to discuss some preprocessing steps and metrics, but overall you are very close to passing specifications! Keep up the great work and good luck with your next submission.

Definition

Student provides a high-level overview of the project in layman's terms. Background information such as the problem domain, the project origin, and related data sets or input data is given.

Great work defining your problem domain and doing a solid introduction to the image processing field.

The problem which needs to be solved is clearly defined. A strategy for solving the problem, including discussion of the expected solution, has been made.

Nice brief step-by-step overview of your intended strategy for solving this problem.

Metrics used to measure performance of a model or result are clearly defined. Metrics are justified based on the characteristics of the problem.

Great job defining and discussing accuracy and the pitfalls in using it with imbalanced classes. A slight suggestion would be to also investigate the within-sequence accuracies if you wanted to get a better idea of how wrong your incorrect predictions were -- seeing whether the whole sequence is off or if there is an insertion or deletion digit in the sequence could be revealing.

I would also advise adding that log loss indeed rewards high probability predictions that are correct, but also penalizes larger margins of prediction error more. With a log loss metric, what is desirable is isolating high confidence predictions when making guesses and being conservative in uncertain situations.

Analysis

If a dataset is present, features and calculated statistics relevant to the problem have been reported and discussed, along with a sampling of the data. In lieu of a dataset, a thorough description of the input space or input data has been made. Abnormalities or characteristics about the data or input that need to be addressed have been identified.

Nice job describing the dataset shape dimensions and the distribution of labels. I would gently push back on the idea that the imbalanced classes might not matter -- since you're using a softmax classifier, your predictions are made relative to one another. If you have half the examples of 0 or 9 digits compared to 1, there might be the concern that your model doesn't have enough examples of those labels to properly converge to describe the label and would instead predict a label for which it has high amounts of data. This could be a good caution to mention in your discussion.

A visualization has been provided that summarizes or extracts a relevant characteristic or feature about the dataset or input data with thorough discussion. Visual cues are clearly defined.

Great graphs for data exploration and visualization.

Algorithms and techniques used in the project are thoroughly discussed and properly justified based on the characteristics of the problem.

Nice job describing the mechanics and function of convolutional neural networks! I like the way you

go through the different layers and parameters.

Student clearly defines a benchmark result or threshold for comparing performances of solutions obtained.

Nice job creating your own benchmark through a ordinary NN model.

Methodology

All preprocessing steps have been clearly documented. Abnormalities or characteristics about the data or input that needed to be addressed have been corrected. If no data preprocessing is necessary, it has been clearly justified.

Great documentation of your preprocessing steps -- other suggestions for preprocessing could include image processing like Hough transformations on the gradient of the image to detect edges.

The process for which metrics, algorithms, and techniques were implemented with the given datasets or input data has been thoroughly documented. Complications that occurred during the coding process are discussed.

Great job debugging your model and coming up with the intuition of keeping RGB channels. These kinds of adjustments can make an enormous difference in your model.

The process of improving upon the algorithms and techniques used is clearly documented. Both the initial and final solutions are reported, along with intermediate solutions, if necessary.

You documented your intermediate models and results very well. I like the way you regularized based on feedback from your parameter tuning. It seems like the clearest next improvement would just be to make the network deeper with better computational hardware, as you note in your report.

Results

The final model's qualities — such as parameters — are evaluated in detail. Some type of analysis is used to validate the robustness of the model's solution.

The graphs were a great way to validate your training error curve to confirm that it plateaus across

time. Other techniques could involve using things like K-fold cross validation splits through sklearn's cross_validation library on your data in order to obtain a higher power of robustness in your model.

The final results are compared to the benchmark result or threshold with some type of statistical analysis. Justification is made as to whether the final model and solution is significant enough to have adequately solved the problem.

Great job beating your benchmark! A great result using limited local hardware.

Conclusion

A visualization has been provided that emphasizes an important quality about the project with thorough discussion. Visual cues are clearly defined.

Great intuition giving incorrectly and correctly classified images -- a lot is evident through looking at where mistakes and successes are happening. It could be interesting to see the proportions of mistakes and successes across sequence length and then across digit labels to see if there is any imbalance in those predictions.

Student adequately summarizes the end-to-end problem solution and discusses one or two particular aspects of the project they found interesting or difficult.

Great summary of your project and reflections on your process.

Discussion is made as to how one aspect of the implementation could be improved. Potential solutions resulting from these improvements are considered and compared/contrasted to the current solution.

You make a great point about real world usability through the suggestion on localization. This would certainly be necessary in order to automatically generate bounding boxes for digit sequences.

Quality

Project report follows a well-organized structure and would be readily understood by its intended audience. Each section is written in a clear, concise and specific manner. Few grammatical and spelling mistakes are present. All resources used to complete the project are

cited and referenced.

A very well written report with clear and direct language -- I enjoyed reading it!

Code is formatted neatly with comments that effectively explain complex implementations.
Output produces similar results and solutions as to those discussed in the project.

Your code is nicely formatted with good comments. Great work.

RESUBMIT

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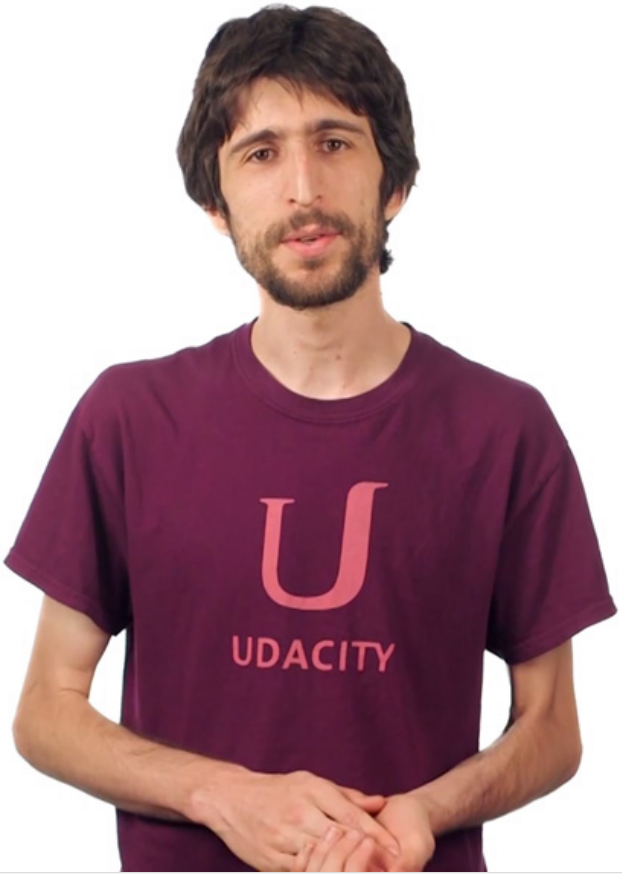

Best practices for your project resubmission

Ben shares 5 helpful tips to get you through revising and resubmitting your project.

Watch Video (3:01)

Have a question about your review? Email us at review-support@udacity.com and include the link to this review.

Student FAQ