

Deep Learning Lab 5

Spring 2018

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Introduction:

Convolutional Neural Networks CNN models are usually used in image classification or detection applications. However, an interesting application that we are applying is the text classification which uses numerical representations for large sets of vocabularies that the learning model we are using is revolving over. We are using here five classes model that uses five different review levels from Amazon.com for the Kindle product. So, we start with classifying the input data in five categories each in separate file then we load them to the model with a specific training/testing splitting percentage.

Objective:

Analyzing a TensorFlow model with Convolutional Neural Network CNN. With python we can use the TensorFlow module that is able to generate the sessions samples. Also, we are using the TensorBoard to illustrate the graph. Finally, we will study the impact of the hyperparameters value changing on the analysis accuracy.

The objective for each task:

- 1- Implementing the CNN in the TensorFlow model with using the Amazon.com review sample data set.
- 2- Showing the resultant graph on the TensorBoard to provide visualized understanding for the computations and data flows in our model.
- 3- Changing the hyperparameters values and explain the impact of the change.

Approaches/Methods:

The theoretical approach is by using the Convolutional Neural Networks on a TensorFlow model that is the Kindle review data set.

The programmatical approach is by let the python program load the data set from the example datasets folder. Then we set the training/splitting percentages of the datasets used. Next, we create an initial numerical representation for the vocabularies used. Next, we apply the CNN filters that are been randomized initially. Finally, we test the learned data to compare the accuracy.

Workflow:

- 1- Setting the data sets in separate files (five files i.e. one star, two stars, three stars, four stars, and five stars)
- 2- Loading the Kindle Amazon.com review dataset files.
- 3- Parse and read the dataset.
- 4- Include the data as sessions in loop to start run it.
- 5- These sessions will maintain training the data and optimizing it.
- 6- Provide the reached accuracy.
- 7- While the sessions are looping, the program is logging the data interactions in an event handler, so it can be used in the last step to illustrate the tensor graph using the TensorBoard.
- 8- Changing the hyperparameters to find out their impact on the work flow and the results.

Datasets:

We used a real data form Amazon.com that is the customers reviews for a popular product which is Amazon Kindle. We divided the reviews into five categories and files based on the stars given by the reviewer which is the review standard of Amazon (from one to five stars).

Parameters:

- 1- Learning Rate
- 2- Training Epoch
- 3- Batch Size
- 4- Display Step

Evaluation & Discussion:

As the model running, it is being trained and optimized based on the hyperparameters values that are impacting the training and learning speed. they also change the model accuracy and the processing speed which will affect the machine resources utilization. The model processing and its results are shown in the screenshots in the assignment page on GitHub.

Changing the hyperparameters values resulted to the following observations:

- Python code with result (Low learning Rate): The accuracy is low.
- Python code with result (High learning Rate): The accuracy is high.
- Python code with result (Low Training Epoch): The accuracy is low.
- Python code with result (High Training Epoch): The accuracy is high, and longer processing time.
- Python code with result (Low Batch Size): The accuracy is too low, and longer processing time.
- Finally, changing the Display Step does not affect the model accuracy.

Conclusion

The TensorFlow module provides a very handful collection of tools to deal with TensorFlow models. The model accuracy can be affected by the hyperparameters values. However, the TensorFlow graph does not change with the hyperparameters values.

References

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- <http://deeplearning.net/tutorial/lenet.html>
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