Deep Learning
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TensorFlow Introduction

In this third LAB, you will experiment with the TensorFlow. TensorFlow is a framework for deep learning that can be accessed through Python. You will need to read the file GettingStarted-PyCharm.pdf on the D2L site to learn how to set up PyCharm for use with TensorFlow.

TensorFlow Basics

You will need to go through parts of the First Contact with TensorFlow book http://jorditorres.org/first-contact-with-tensorflow/ to find answers to the following questions.

1. What are ”placeholders”, and how are they used? Give some examples.
2. What are ”variables”, and how are they used?
3. What are ”tensors” in TensorFlow?
4. Explain how TensorFlow uses a dataflow graph to represent networks and operations.
5. What are the nodes of the graph? What are the edges?
6. How do you run the graph?

Deliverables

1. For all parts below, include the results into one PDF file, and upload it to the dropbox on D2L. Include all program listings, plots, command line printouts, discussion, etc.

2. Hand in the answers to the questions in the TensorFlow Basics section.

3. Download the file `one_layer.py` from D2L. Debug the program in PyCharm, stepping line by line through the code. Explain what the program is doing.

4. Modify `one_layer.py` to solve Problem 3 on Homework 1. Perform steepest descent, starting with the initial weight and bias equal to zero. Use pyplot (see http://matplotlib.org/api/pyplot_api.html for instructions) to plot the final network response on the same plot with the target values versus the input as p ranges from -1.5 to 1.5 in steps of 0.1. Plot the network response as a continuous line and the targets with a '+'.

5. Download the file `count.py` from D2L. Debug the program in PyCharm, stepping line by line through the code. Explain what the program is doing.

6. Modify `count.py` so that it will determine the parity of binary sequences of length 15. Demonstrate the performance on several test sequences.