Practice Feed-forward Nets

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1 Tensor Flow Introduction

Install `tensorflow` for CPU/GPU depending on your hardware. Follow the low-level API tutorial here: `https://www.tensorflow.org/programmers_guide/low_level_intro`.

2 Learning to XOR

In this example, we want to replicate the network from section 6.1. in the book. Using the code from the previous problem as a starting point do the following:

- Modify the input data and ground truth labels to hold the four data points for XOR on vectors in $\mathbb{R}^2$.
- Add one hidden layer to the model, with a ReLU activation function. Consult the API at `https://www.tensorflow.org/api_docs/python/`.
- Train the network. How many iterations does it take to converge and what weights / biases do you converge to?
- (optional) Add tensorboard visualization for the graph and the loss. See `https://www.tensorflow.org/programmers_guide/summaries_and_tensorboard`.
- Try adding units to the hidden layer. How is the performance affected? What if you add more layers?
- Try different optimizers (Adagrad and Adam) and different learning rates.
- (optional) What if you use a different activation function?
- (optional) What happens when your input vector is in $\mathbb{R}^3$?

3 Classification

Try out the tutorial on high-level TF API for feed-forward classification: `https://www.tensorflow.org/get_started/premade_estimators`.