Progress Update

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Brief Introduction

- My project: Develop a machine learning algorithm to identify electrons/muons. (continue on Emily’ s work)

- Steps of detecting neutrinos with WC detector:
  - Simulate events with WCSim and Skdetsim.
  - Collect information from PMTs to get images.
  - **Analyze the images to identify particles (electron/muon).**
  - Determine the flavor of their corresponding neutrinos.

Build Tensorflow

- Acquire Tensorflow directly on SciNet by:

```
module unload intel/12.1.3
module unload python/2.7.2

module load intel/15.0.6
module load python/2.7.8
```

Build WCSim

- Preparations:
  - ✓Build ROOT (first use module load, now source from Hiro’ s directory)
  - ➢ “DISPLAY not set”
  - ✓Build Geant4
  - ✓Download Geant4 data files online

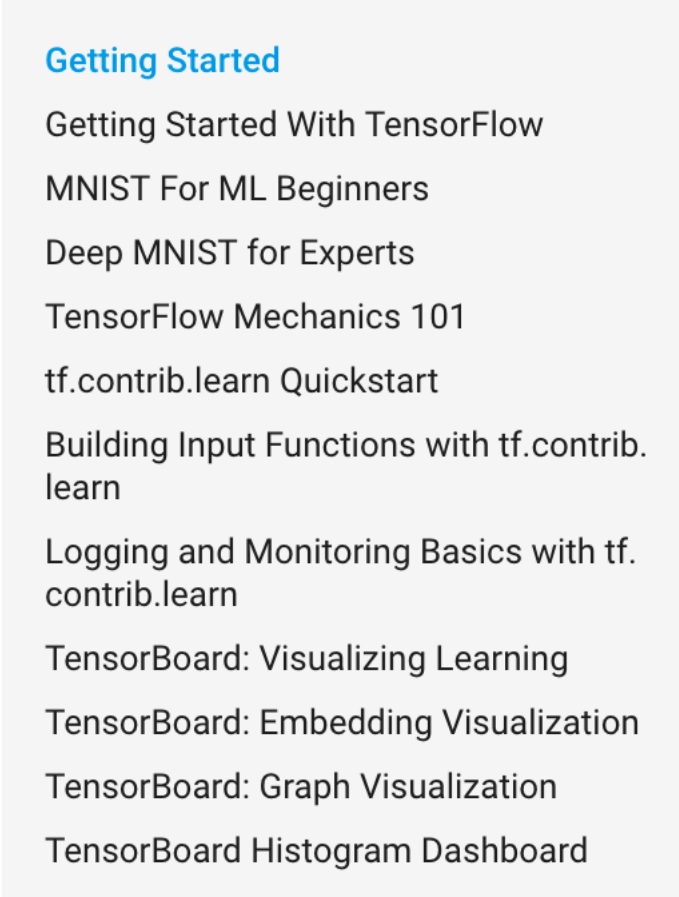
- Build WCSim with Cmake:
  - ➢ “Could not find ROOTConfig.cmake provided by ROOT”

Learn Tensorflow

- Introduction:
  - **TensorFlow** is **an open source software library for machine learning** across a range of tasks, and developed by Google to meet their needs for **systems capable of building and training neural networks** to detect and decipher patterns and correlations, analogous to the learning and reasoning which humans use.

Learn Tensorflow

- Progress:
  - Download Tensorflow in my native computer.
  - Finish reading *Getting Started* part of the tutorial, and run all the scripts in it.



Learn Tensorflow

- ***MNIST for ML Beginners*** uses MNIST problem to describe the fundamental components of a tensorflow script, including model parameters, input and output, loss function, optimizer, training loop and evaluation.

- ***Deep MNIST for Experts*** substitutes the Softmax Regression Model with a more complicated convolutional neural network which performs much better.

Learn Tensorflow

- ***tf.contrib.learn*** introduces TensorFlow’ s high-level machine learning API (tf.contrib.learn), and ***Logging and Monitoring Basics with tf.contrib.learn*** implements it with some logging and monitoring methods, explaining how to audit the progress of model training.

- The last four chapters is about TensorBoard, a utility to visualize different aspects of machine learning.

Learn Tensorflow

```
tensorflow_learning — -bash — 72×24
Adding run metadata for 799
Accuracy at step 800: 0.9639
Accuracy at step 810: 0.9643
Accuracy at step 820: 0.9629
Accuracy at step 830: 0.9655
Accuracy at step 840: 0.9649
Accuracy at step 850: 0.9655
Accuracy at step 860: 0.9646
Accuracy at step 870: 0.963
Accuracy at step 880: 0.9637
Accuracy at step 890: 0.9665
Adding run metadata for 899
Accuracy at step 900: 0.9643
Accuracy at step 910: 0.9682
Accuracy at step 920: 0.9673
Accuracy at step 930: 0.9679
Accuracy at step 940: 0.9645
Accuracy at step 950: 0.9659
Accuracy at step 960: 0.9642
Accuracy at step 970: 0.9645
Accuracy at step 980: 0.966
Accuracy at step 990: 0.9678
Adding run metadata for 999
(tensorflow) inside-65-51-209:tensorflow_learning zhangenze$
```