**Caffe RIT User Guide (v0.5-01/2016)**

Shagan Sah (sxs4337@rit.edu)

1. **Getting Started with RIT Research Computing Clusters (RC)**
2. Get an RC account- http://rc.rit.edu/
3. Login to a RC node: Remote Desktop to ion.rc.rit.edu or ssh <username>@ion.rc.rit.edu
4. Two ways to run scripts-
   1. To start a session: sinteractive or sinteractive –C cuda

Specify resources required: # of cores, RAM, time, etc. Start with default i.e. 2 cores, 4096 memory and 120 minutes. Judge the requirements based on the task. The less resources requested, sooner it will get allocated. Use an educated guess and do not request more than needed.

* 1. Use sbatch to schedule your job (Run grab\_examples from your home directory to see examples).

1. Load module: module load <name> Ex. module load matlab
2. Execute your scripts.
3. Other useful commands-
   1. squeue : To list all jobs on the cluster
   2. scancel <jobid> : To cancel a job
   3. module unload <name> : To unload a module
   4. module list : To list all loaded modules
   5. module avail : List of all available modules
   6. Email rc-help@rit.edu if any issues
4. **Running MATLAB on RC**
5. Start a RC session
6. Load MATLAB module: module load matlab
7. Start MATLAB:
   1. MATLAB command line only: matlab –nodisplay
   2. RUN GUI (make sure X11 is enabled in Putty): matlab
8. Execute your scripts.
9. **Running Caffe on RC**
10. Start a RC session
11. Load dependencies: module load caffe or module load caffe-cpu
12. Set the following environment paths:

export LD\_LIBRARY\_PATH=$LD\_LIBRARY\_PATH:/usr/local/cuda/lib64

export LD\_LIBRARY\_PATH=$LD\_LIBRARY\_PATH:/tools/glog/0.3.4/lib

export LD\_LIBRARY\_PATH=$LD\_LIBRARY\_PATH:/tools/boost/1.58.0/lib

export LD\_LIBRARY\_PATH=$LD\_LIBRARY\_PATH:/tools/opencv/3.0.0/lib

If Anaconda installed in your home, also add equivalent of the following path: export LD\_LIBRARY\_PATH=/home/sxs4337/anaconda/lib:$LD\_LIBRARY\_PATH

1. Get Caffe: git clone https://github.com/BVLC/caffe.git in your home directory (only required the first time).
2. Compile Caffe based in instruction on the Caffe documentation at-

http://caffe.berkeleyvision.org/installation.html

* 1. Edit Makefile.config
  2. Run the following commands- make all, make test, make runtest, make pycaffe

1. Add equivalents of the following path variables-
   1. export PYTHONPATH=/home/sxs4337/caffe/python
   2. alias caffe='/home/sxs4337/caffe/build/tools/caffe'
2. Run examples/scripts.
3. Note: All the paths needs to be added each time or could be added to the file ~/.bashrc to save the trouble every time.
4. **Running Caffe on MIL machines**
5. Log in to one of the MIL machines-
   1. mil-02l.main.ad.rit.edu
   2. mil-08l.main.ad.rit.edu
   3. mil-09l.main.ad.rit.edu
   4. kgcoe-cuda-02.main.ad.rit.edu
6. Get Caffe: git clone https://github.com/BVLC/caffe.git in your home directory (only required the first time).
7. Add the following five paths:

export CUDA\_TOOLKIT\_ROOT\_DIR=/usr/local/cuda/

export CUDA\_BIN\_PATH=/usr/local/cuda/

export CPLUS\_INCLUDE\_PATH=/usr/local/cuda/include:$CPLUS\_INCLUDE\_PATH

export PATH=/usr/local/cuda/bin/:$PATH

export LD\_LIBRARY\_PATH=/usr/local/cuda-6.5/lib64:$LD\_LIBRARY\_PATH

export LD\_LIBRARY\_PATH=/usr/local/cuda/lib:$LD\_LIBRARY\_PATH

1. Compile Caffe based in instruction on the Caffe documentation at-

http://caffe.berkeleyvision.org/installation.html

* 1. Edit Makefile.config
  2. Run the following commands- make all, make test, make runtest, make pycaffe

1. Add equivalents of the following path variables-
   1. export PYTHONPATH=/home/sxs4337/caffe/python
   2. alias caffe='/home/sxs4337/caffe/build/tools/caffe'
2. Run examples/scripts.
3. Note: All the paths needs to be added each time or could be added to the file ~/.bashrc to save the trouble every time.
4. **Installing Recurrent/LSTM Caffe**
5. Get Donahue fork of Caffe: git clone https://github.com/jeffdonahue/caffe in your home directory.
6. Merge recurrent branch changes- git pull origin recurrent-v4
7. Follow steps 4 through 7 from **D**.
8. **Install Caffe on independent Linux Machine and run an example**
9. Get Caffe: git clone https://github.com/BVLC/caffe.git in your home directory.
10. Install dependencies:
    1. CUDA: See http://docs.nvidia.com/cuda/cuda-getting-started-guide-for-linux/#axzz3xcWKIA94
    2. Install OpenCV. Details in http://docs.opencv.org/2.4/doc/tutorials/introduction/linux\_install/linux\_install.html
    3. BLAS – ATLAS or OpenBLAS (For ATLAS RUN: sudo apt-get install libatlas-base-dev)
    4. Python: RUN sudo apt-get install python-dev or Install Anaconda https://www.continuum.io/downloads
    5. Others: Run sudo apt-get install libprotobuf-dev libleveldb-dev libsnappy-dev libopencv-dev libboost-all-dev libhdf5-serial-dev

RUN sudo apt-get install libgflags-dev libgoogle-glog-dev liblmdb-dev protobuf-compiler

* 1. Go to http://caffe.berkeleyvision.org/installation.html for more information.

1. Compile Caffe
   1. CD <caffe-root>
   2. cp Makefile.config.example Makefile.config and make necessary changes.
   3. make all
   4. make test
   5. make runtest
   6. make pycaffe
2. MNIST-LeNET example:
   1. RUN CD $CAFFE\_ROOT from home.
   2. RUN ./data/mnist/get\_mnist.sh and ./examples/mnist/create\_mnist.sh to download and convert data.
   3. Analyze and edit network architecture in .prototxt file: $CAFFE\_ROOT/examples/mnist/lenet\_train\_test.prototxt
   4. Analyze and edit training and testing parameters in solver file: $CAFFE\_ROOT/examples/mnist/lenet\_solver.prototxt

(Solver file has parameter for CPU or GPU mode)

* 1. RUN script to train: ./examples/mnist/train\_lenet.sh
  2. To draw network architecture diagram: From <caffe-root> RUN python ./python/draw\_net.py <prototxt file> <png file name>

1. **Some known and common Caffe errors and fixes**
2. Failure to import caffe library inside python:

Add /caffe/python to your PYTHONPATH

export PYTHONPATH=/home/sxs4337/caffe/python:$PYTHONPATH

1. No module named protobuf, although protobuf dependency installed. Maybe due to using anaconda.

pip install protobuf

1. Not finding libhdf5.so.xx where xx is version number normally 10.

export LD\_LIBRARY\_PATH=/home/sxs4337/anaconda/lib:$LD\_LIBRARY\_PATH

1. Failure to draw network from python error in graphviz.

install graphviz

pip install pydot

1. Errors like not recognizing layer parameters.

Importing wrong Caffe in Python

export PYTHONPATH=/home/sxs4337/caffe/python

1. Error during make runtest like (on mil machines)-

error while loading shared libraries: libopencv\_core.so.2.4: cannot open shared object file: No such file or directory

Set following path:

export LD\_LIBRARY\_PATH=$LD\_LIBRARY\_PATH:/usr/local/lib

1. OpenCV errors like “undefined reference to cv::imread(cv::String const&, int)” during make

In the Makefile, add opencv\_imgcodecs in the end of the following line-

LIBRARIES += glog gflags protobuf leveldb snappy \

lmdb boost\_system hdf5\_hl hdf5 m \

opencv\_core opencv\_highgui opencv\_imgproc opencv\_imgcodecs

1. **Other useful commands**
2. nvidia-smi: Gets status of GPU device
3. nvcc --version: Gets version of CUDA drivers installed
4. make clean: Clean any erroneous compilation.
5. find . -name "\*.jpg" -type f –delete: Delete all ‘jpg’ files in a directory
6. du –sh: Get size of a directory
7. nproc: No. of CPU’s in a machine
8. **Using GIT Hub**
9. Clone the github repo into your system

git clone https://github.com/USER-NAME/REPO-NAME.git

1. Set Github account username and email id for authentication

git config --global user.email "your-email-id@example.com"

git config --global user.name "Your-Github-UserName"

git remote set-url origin https://Your-Github-UserNAme@github.com/Your-Github-UserNAme/REPO-NAME

1. Add all files and directory

git add .

1. Write comment on commit

git commit -m 'my first commit'

1. Push the code in Github repo

git push -u origin master