CSCI446/946 Big Data Analytics

Lab Week 10
Deep Learning

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Introduction

- Deep Neural Networks can be very powerful in image analytics.
  - Network design can be a major challenge.
  - A good network architecture:
    - has a significant impact on outcomes.
    - depends on the problem domain.
  - There is no “one network” that fits all.
- Training deep networks can be very time consuming.

Task (Beginners)

Follow the tutorials on:

tensorflow in R

https://tensorflow.rstudio.com/guide/keras/

Understand what is being done!

Mxnet in R

https://www.r-bloggers.com/image-recognition-tutorial-in-r-using-deep-convolutional-neural-networks-mxnet-package/

Note: mxnet may require R version 3.4 or R version 3.6

Task (For Advanced Students)

1. Train a deep network on the mnist dataset (i.e. as documented in https://tensorflow.rstudio.com/guide/keras/) and identify which training (or test) samples are misclassified.
2. Create and analyse a confusion matrix based on your result from task 1.
3. The network in https://tensorflow.rstudio.com/guide/keras/ defines and trains a fully connected network without any convolutional or pooling layers. Add at least one convolutional and one pooling layer.

Appendix

Install mxnet in R

In R3.4

```
cran <- getOption("repos")
cran["dmlc"] <- "https://s3-us-west-2.amazonaws.com/apache-mxnet/R/CRAN/"
options(repos = cran)
install.packages("mxnet",dependencies = T)
library(mxnet)
```

In R3.6

```
install.packages("https://s3.ca-central-
1.amazonaws.com/jeremiedb/share/mxnet/CPU/3.6/mxnet.zip", repos = NULL)
```

Other R versions:

https://cwiki.apache.org/confluence/display/MXNET/MXNet-R+release+process#MXNetRreleaseprocess-Windows

Install mxnet in python

https://mxnet.apache.org/versions/1.4.1/install/windows_setup.html

Q&A

Images Courtesy of Google Image