

Intro To Keras/TensorFlow

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Tampa R Users Group



TensorFlow/Keras Overview

- TensorFlow: A machine learning library developed by Google
- Keras: a high level api for fast experimentation with machine learning. Supports Theano, CNTK, and TensorFlow.
- Combined with TensorFlow and Keras, Rstudio provides a quick powerful approach to Neural Networks for the R community.
- Tensorflow can be accessed via Keras or directly to the TensorFlow API's

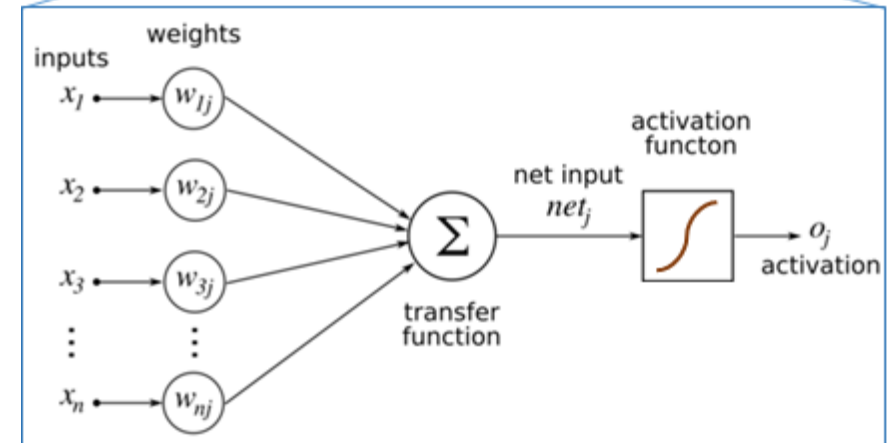
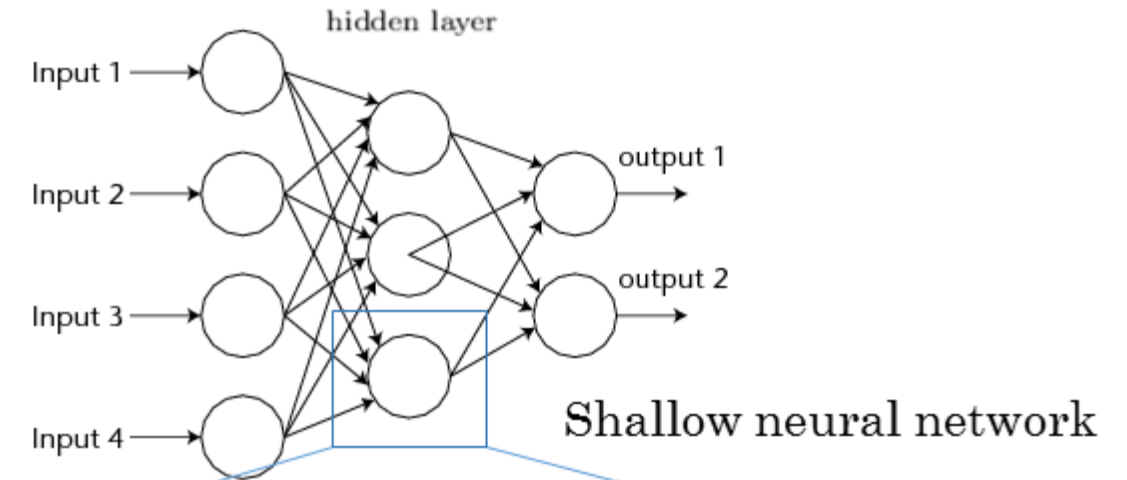
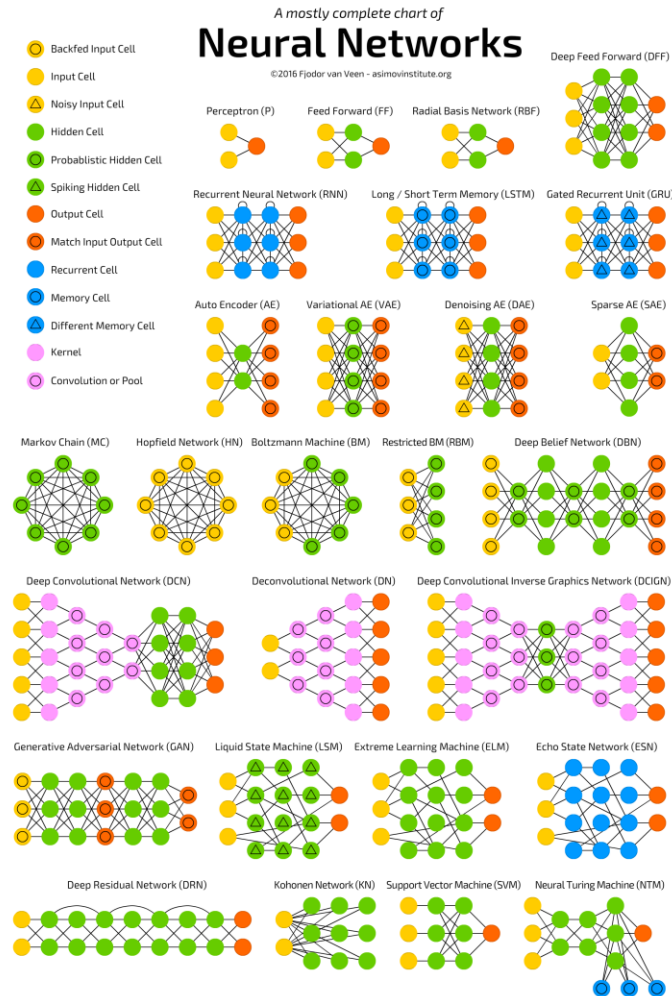


Installation

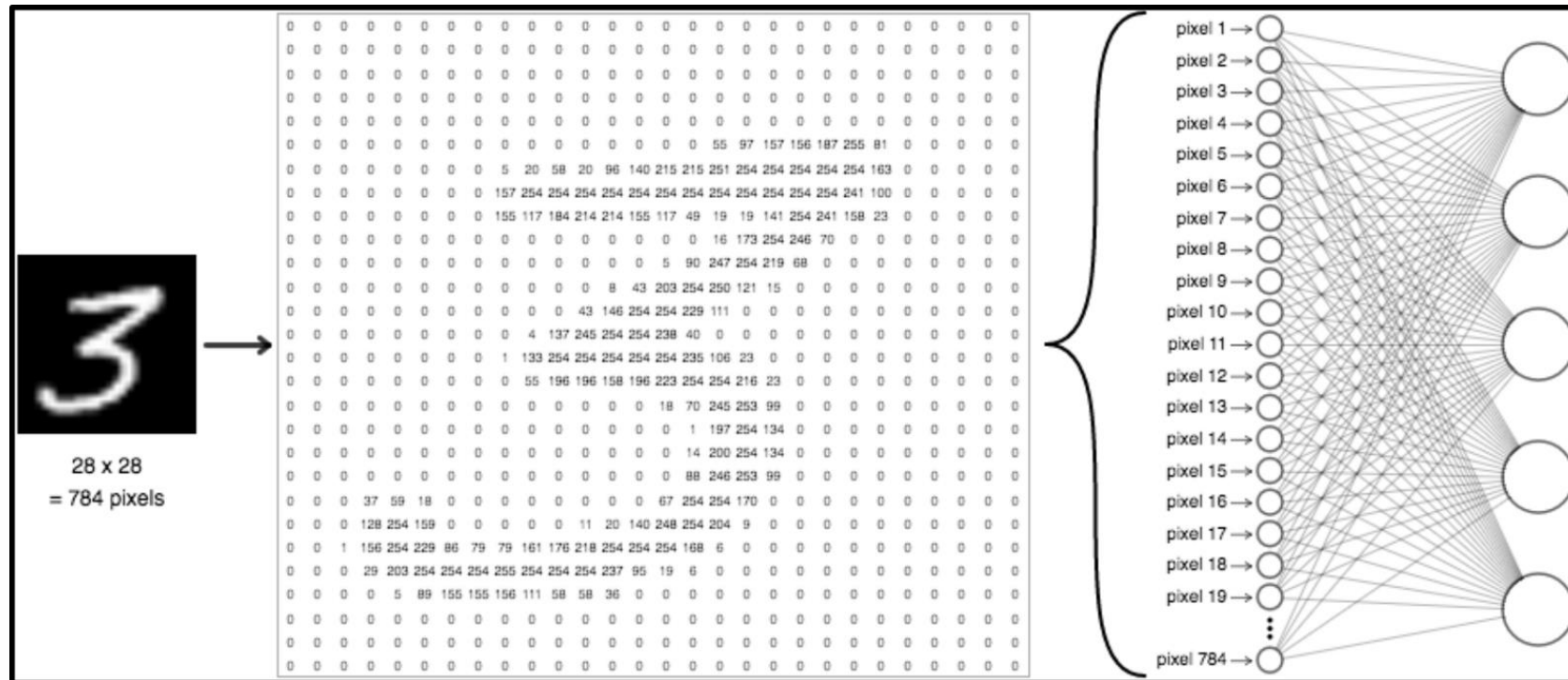
- Preferred platform is Ubuntu (“Deep Learning with R”, F Chollet, JJ Allaire).
- Strong recommendation for either Cloud based computing or availability of NVIDIA GPU (due to CUDA parallel compute platform). As models get more complex, computations get more complex.
- Sample runs were performed on MacBook Air, Core i5 1.3 GHz 8GB
- Keras 2.1.6, TensorFlow 1.9, Rstudio 1.1.423, R 3.5.0



Neural Network Overview



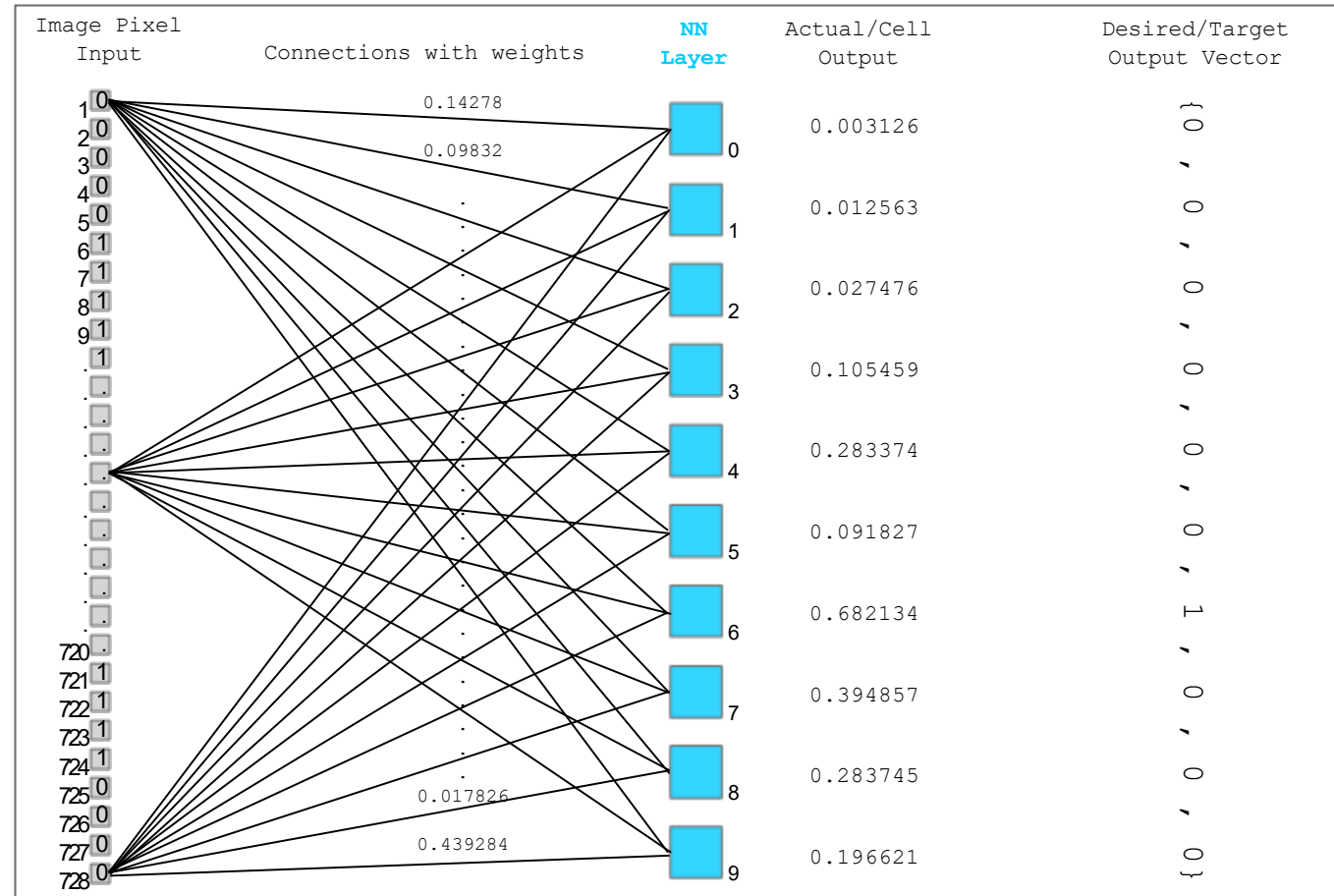
Preparing the data



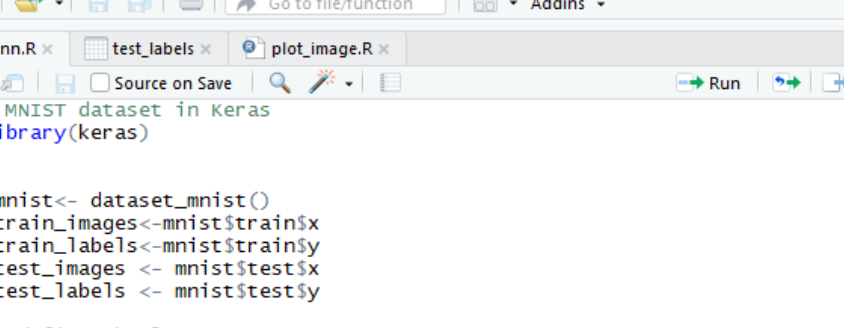
Data is flattened to form a 2D Tensor and normalized for processing.



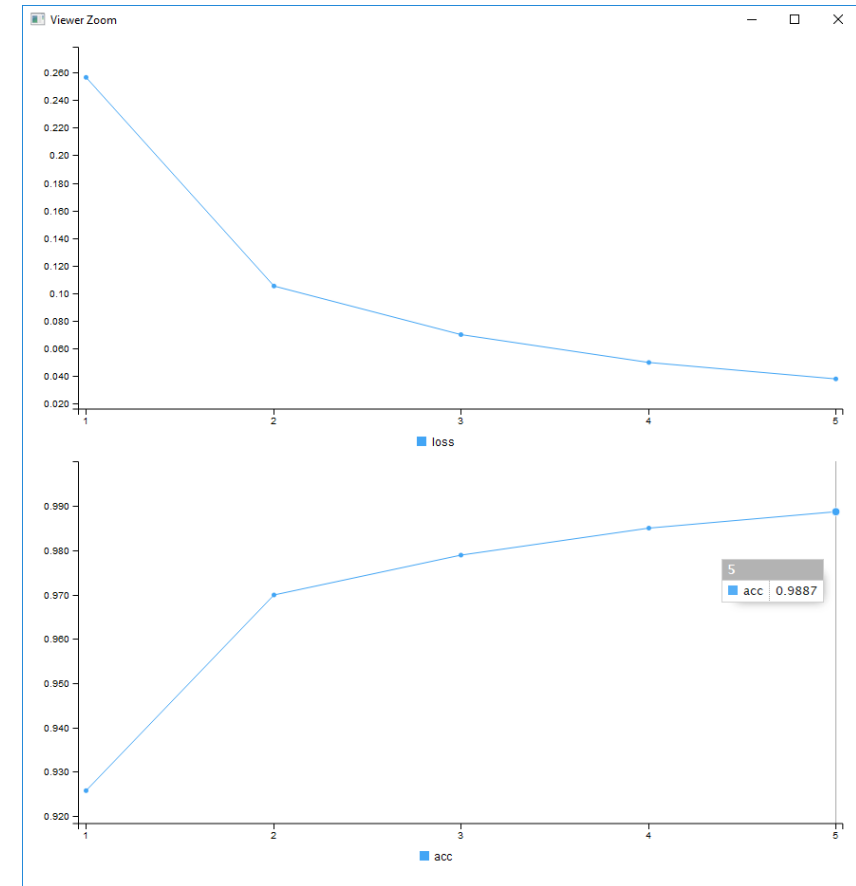
Output detail (Sample)



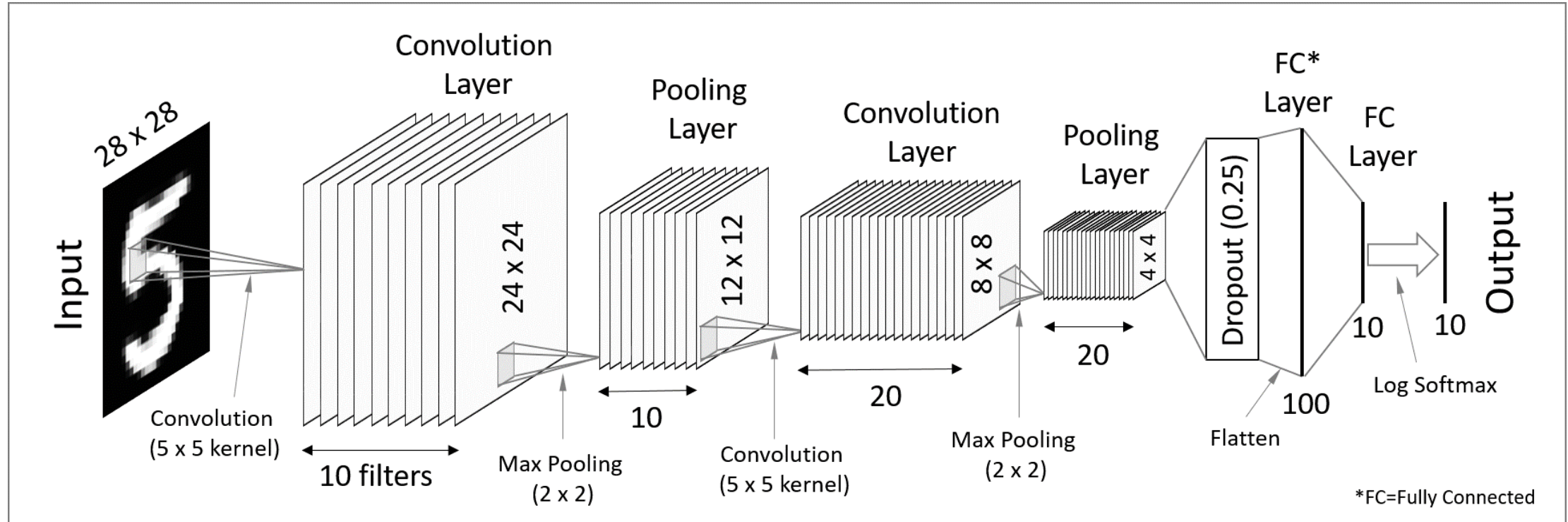
Demo – Simple Neural Network MNIST



```
1 # MNIST dataset in keras
2 library(keras)
3
4
5 mnist<- dataset_mnist()
6 train_images<-mnist$train$x
7 train_labels<-mnist$train$y
8 test_images <- mnist$test$x
9 test_labels <- mnist$test$y
10
11 # define the layers
12 network <- keras_model_sequential() %>%
13   layer_dense(units = 512, activation = "relu", input_shape = c(28*28)) %>%
14   layer_dense(units = 10, activation = "softmax")
15
16 # compile the model
17 network %>% compile(
18   optimizer = "rmsprop",
19   loss = "categorical_crossentropy",
20   metrics = c("accuracy")
21 )
22
23 # prep the data by reshaping and normalizing
24 train_images <- array_reshape(train_images, c(60000, 28*28))
25 train_images <- train_images/255
26
27 test_images <- array_reshape(test_images, c(10000, 28*28))
28 test_images <- test_images/255
29
```



CNN – Flow and Demo



References

- “Deep Learning with R” – Francois Chollet, J.J.Allaire
- <https://keras.rstudio.com/> , <https://keras.io/>
- <https://tensorflow.rstudio.com/> , <https://tensorflow.org>
- A million youtube videos.
- AWS, Azure websites for cloud support.

