

Notes on DNN and Colab

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Colab 90 minute rule

- Notebook is disconnected when it has been idle for 90 minutes. See for prevention:
 - How to prevent Google Colab from disconnecting?
<https://stackoverflow.com/questions/57113226/how-to-prevent-google-colab-from-disconnecting>

Colab 12 hour rule

- No mentioning in
<https://research.google.com/colaboratory/faq.html>
- But it exists

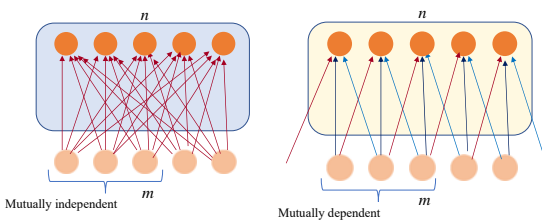
R Kernel

- System commands are not executed as in Python kernel, but system function in R will be a substitute.
 - In Python: `!ls -l`
 - In R: `system("ls -l", intern=T)`
- You cannot mount my drive as you can in Python.
- When you use `%load_ext rpy2.ipynb` to run R, you cannot use keras package because of some unknown interferences between the modules. You can evaluate a few functions when keras is introduced, but you will encounter an error message shortly.

Mounting “my Drive”

- In Python kernel, you can mount your my Drive by
 - from `google.colab import drive`
`drive.mount('/content/drive')`
- But I could not find how we could do to get equivalent results in R.

FC vs. Conv.

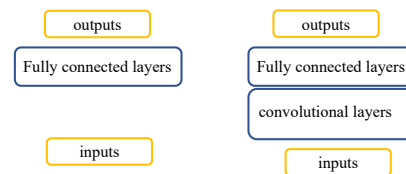


The quantity represented by each unit in the previous layer is supposed to be independent from the other units in the layer

The quantity represented by each unit in the previous layer is supposed to be closely related to its “neighboring” units and the relation is invariant to the positions. Image and time-series are full-fledged for the inputs.

FC vs. Conv.+FC

- Often (but not always) output units require a combination of quantities not related each other
 → full connected layers for output-side
- Input quantities are spatially or sequentially related
 → convolutional layers for input-side

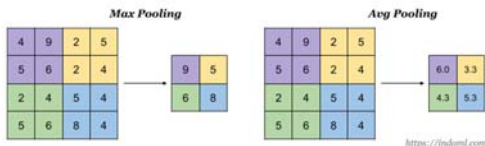


Two basic architectures of artificial neural networks

By learning, a conv. unit is understood to be a “(good) feature” variable. Therefore the output of conv. layers can be inputs to any ML methods. (5.3-using-a-pretrained-convnet-svm.R.ipynb)

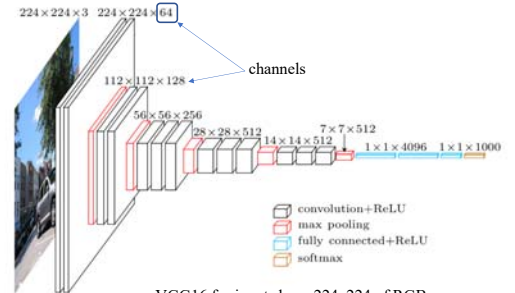
Pooling layers

- A type of layer to reduce the size of previous layers.
- E.g. 256x256 to 64x64 by combining 2x2 units to 1
- Used for obtaining units to look around wider area



<https://towardsdatascience.com/beginners-guide-to-understanding-convolutional-neural-networks-ac9ed58bb17d>

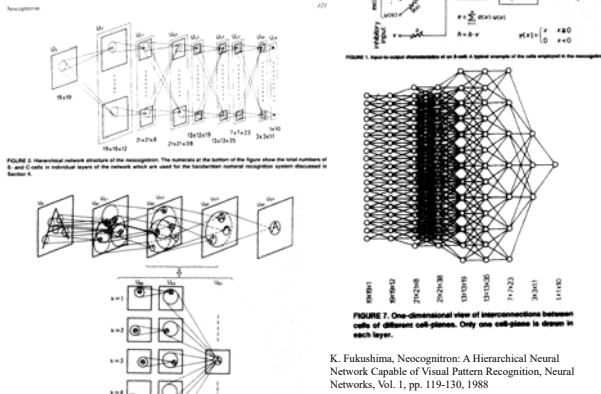
A typical convolutional NN



VGG16 for input shape 224x224 of RGB

<https://newtechnologylifestyle.net/vgg16originalpicture/>

Its origin



tensor

In mathematics, a tensor is an algebraic object that describes a **linear mapping** from one set of algebraic objects to another. <https://en.wikipedia.org/wiki/Tensor>

A tensor may be represented as a (potentially multidimensional) array (although a multidimensional array is not necessarily a representation of a tensor).

Apply functions in R

- There are several types of “apply” functions in R.
- They are function of function: apply a function in arguments to each element one by one in a data structure (array, list, or other sequence type structure).
- See, for example, a document for sapply: <https://www.rdocumentation.org/packages/memisc/versions/0.99.21/topics/Sapply>

Notes:

- Please submit the “report” by noon 12th Feb. to me by e-mail.
- The report should include and compress by zip:
 - The body of report
 - “ipynb” that you have run
- But do not include large data.