These are very personal suggestions, no offense will be taken if you completely ignore this chapter.

0.1 Inception Network

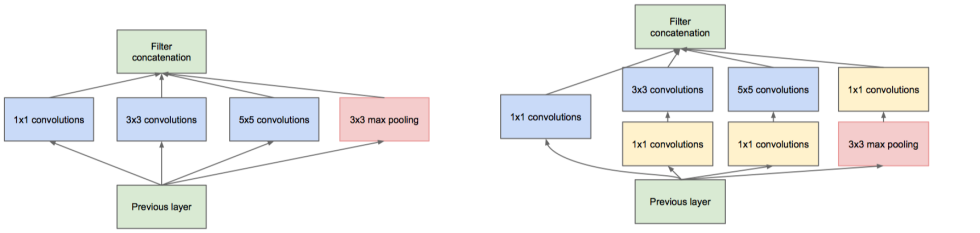
The Inception network is an important milestone of CNN classifiers. Before Inception network, most popular CNN networks just stack convolution layers deeper and deeper, hoping to get better performance. However, deeper network has more parameters which make gradient descent less effective and lead to overfitting. The Inception network is carefully designed in terms of speed and accuracy while keeping the computational budget constant. The network is organized in the form of «Inception module» which makes it possible for the network to grow both in width and depth. The performance is verified by GoogleLeNet, a 22 layers deep network which won ILSVRC14 competition.

The main difference between Inception module and normal CNN convolution layer is that Inception uses various sizes of filters in each layer while CNN uses only one. The idea of Inception architecture is based on finding out how an optimal local sparse structure in a convolutional vision network can be approximated. One straight forward way is to use more than one filter size and let the training phase to decide the best approximation area. The outputs of each filter are stacked together to form the input of the next stage. As we can see in the figure, there are three shapes of filter: 1x1, 3x3 and 5x5. The 1x1 filter is also used for dimension reduction. In the left figure, we can see the naive implementation of this idea. This implementation, however, has one big issue, even a modest number of 5x5 convolutions can be prohibitively expensive on top of a convolutional layer with a large number of filters. This problem becomes even more pronounced when we stack all the outputs together. This leads to the second implementation structure, as we can see in the right figure. Whenever the computational requirements increase too much, we can simply apply a 1x1 convolution to reduce the dimension. Another thing to mention is the max pooling layer, it exists for no particular reason. Historically, good performance networks have pooling layers.

0.2 Reviews

Your advisor will review what are you writing and he will, most likely, add annotations on a pdf. However, correction contained inside annotations are difficult to integrate, manly because you will spend a lot of time in finding where to modify your document. LyX supports a very powerful method to review a document, just look the examples below.

Where have you learned english stupid dumbass?



(a) Inception module, naive version (b) Inception module with dimension reductions

Figure 1: Inception module

The derivative of e^x is e^{2x} .

After having considered all the other solutions we proved that this is the most efficient way to determine the medium length of horse's mane.

These result shows that the first method is way better than the second. The integration of these reviews is much easier than reviews inside annotation of a pdf. Unfortunately you have to convince your advisor to use this system, I think it is worth a try.

This feature is called Change Tracking, there is a dedicated toolbar that you can show by activating the Change Track option (Document ▷ Change Tracking ▷ Track Changes or simply CTRL + SHIFT + E). This document has the Change Tracking option already enabled.

0.3 Final presentation

Once you have written your thesis you will have to present it. Timing is critical. You will have from 15 to 20 minutes to present the work of months. A very useful tool that you may use during your presentation is `pdfpc` (`http://davvil.github.io/pdfpc/`). By using this program, on the screen of your laptop you will have some additional information that are not showed on the external monitor. These extra information are

Time left you can set the duration of the presentation and see how many minutes and seconds you have left

Next slide you will see both the current and the next slide

Annotations you can add some annotation to remember you some key points that you may forget

This tool is very very useful, but do not forget that there is always the demo effect. You MUST try it before even thinking to use for your final presentation.

To install the program on a Linux system there should be a package named pdf-presenter-console, for other OS on the websites of the program there are the instruction how to install it.