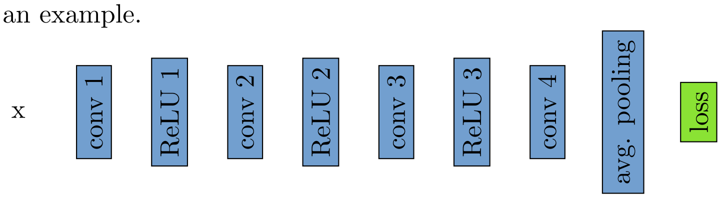
Exercise 6: Convolutional models

Name: .... UTID:................

Last week we looked at several popular architectures in class. We compared their model size, inference speed and accuracy. A recap of popular models can be seen on the right. While AlexNet and VGG have fully connected layers, all other models listed do not. They are all-convolutional. See below for an example.



In a all-convolutional network all computation, including the output classification, is performed using convolutions. Moreover, all-convolutional networks often produce more than a single prediction for an image. These predictions are then averaged in a pooling layer.

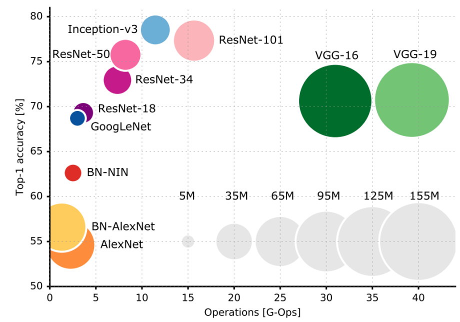


Figure 1: Comparison of popular architectures w.r.t. accuracy (on imagenet classification), operations, and model size.

a) What are some of the advantages of all-convolutional networks?

- ☐ Fewer parameters
- ☐ Faster inference
- ☐ Faster training
- ☐ Run on images of any resolution and aspect ratio

b) All-convolutional network also overfit less. In fact, they mimic some of the strategies we learned and implemented in class inside the network. Which strategies to all-convolutional networks implicitly employ to reduce overfitting?

- ☐ Batch Normalization
- ☐ Early Stopping
- ☐ Weight regularization
- ☐ Parameter Sharing
- ☐ Dropout
- ☐ Color augmentation
- ☐ (Random) cropping
- ☐ Ensembles

c) Should you always make your network all-convolutional (with multiple spatial outputs you average)? If yes, briefly explain why, if no, give a counter-example.

d) You trained a fully-connected network (e.g. AlexNet). It took one month to train. Now that you know about all-convolutional networks, you'd like to convert your architecture to an all-convolutional one. Do you have to retrain your model, or is there a way to skip training the all-convolutional model?