Mehrdad Baradarn

Artificial Neural Network

Assignment 3

Train Intel-Image
Using ResNet Model

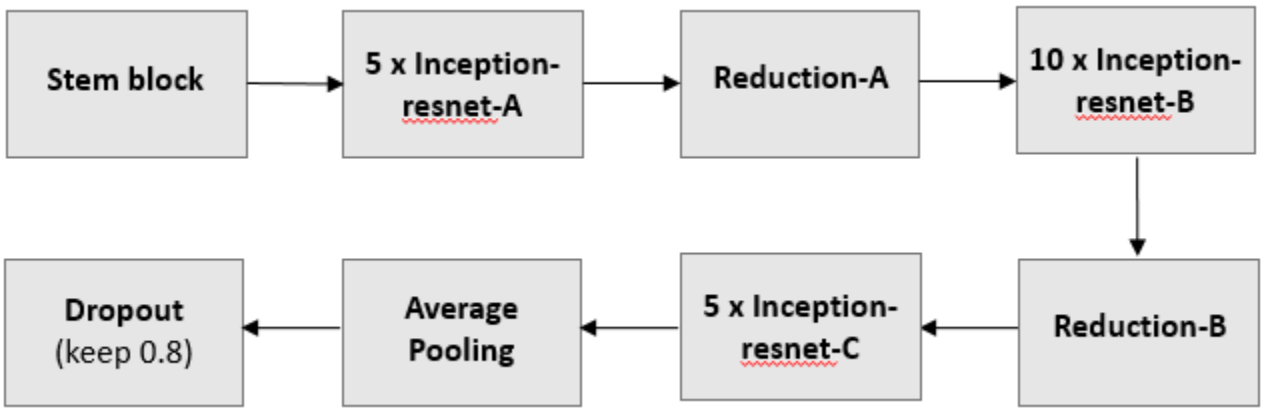
S_Id = 99222020

A pre-trained model is already trained on a data set and contains weights and biases that represent the characteristics of each data set it was trained on. Learned features are often transferable to different data. For example, a model trained on a large dataset of bird images contains learned features such as edges or horizontal lines that you can transfer to your dataset.

With very good performance at relatively low computational cost, ResNet and Inception have been instrumental in the biggest advances in image recognition performance in recent years.

Inception-ResNet combines the Inception architecture with Residual Connections.

Inception-ResNet-v2 is a convolutional neural network trained on over a million ImageNet images. The depth of this network reaches 164 layers and can classify images into 1000 object categories. As a result, the network has learned a wide range of images. The grid has an input image size of 299 x 299 and the output data is classified into one of these classes.



It is written based on a combination of Inception model and Residual connection. In the Inception-Resnet block, multi-size convolution filters are combined with residual connections. The use of residual connections reduces the training time, but also prevents the destruction caused by deep structures.

The Inception-ResNet-v2 model uses residual networks and successfully improves the accuracy and recovery speed of the original model.

But since everything has a disadvantage, one of the disadvantages of the Inception-ResNetV2 model is that due to the architecture and design of the complex structure of the internal modules, the execution time of training and testing is almost higher than other models.

On the other hand, the simpler model inspired by it has its advantages and disadvantages

Networks with a large number (even thousands) of layers can be easily trained without increasing the training error percentage.

ResNet uses identity connectivity, which helps protect the network from the vanishing gradient problem.

But

One of the challenges today is to use networks with the best performance and the lowest computational cost, since Resenet has a relatively heavy computational cost compared to mobilenet and alexnet models. In simpler datasets, using it may be considered a disadvantage and they often require the use of gpu for calculations.

But in larger data and when we have a suitable and strong server for data training. We can use Resnet families, but inception-resnet uses a combination of Resnet and Inception. In terms of increasing accuracy and reducing loss, it has better convergence and improvement than Resnet only models, but of course, in exchange for this improvement, it needs more calculations and more time for training. Resnet models alone are time-consuming. But this family needs a higher proportion of time. In general, inception-resnet does not have many disadvantages compared to its advantages and provides a stronger model in the world of neural networks.

ResNeXt iterates a building block that assembles a set of transforms with the same topology. Compared to ResNet, a new dimension represents cardinality as an underlying factor in addition to the depth and breadth dimensions.

ResNeXt is a homogeneous neural network that reduces the number of hyperparameters required by conventional ResNet. , and this is achieved only by using "Cardinality", an additional dimension on top of the width and depth of ResNet.

One of the challenges we face in ResNet design is the trade-off between non-linearity and dimensionality within a given block. That is, we can add more nonlinearity by increasing the number of layers or by increasing the width of the convolutions. An alternative strategy is to increase the number of channels that can carry information between blocks.