Computer Vision_DiscussionQuiz_03

1. For uniformly increased network size, as per the first paper when the size of a network is evenly raised, the number of resources consumed in its computing increases dramatically. As the size increases, we would need a lot of resources. And despite the fact that increasing the network's depth may improve the quality of the network's findings. But the outputs would need a significant amount of further calculation. This leads to increasing computational costs and reduces computing efficiency. These are a handful of the disadvantages for uniformly increased network size.

2. To accommodate several scales, the inception model employs a series of Gabor filters of various sizes. They are also used to obtain picture localisation by utilizing particular features in the images in a specified region in the filter. Multi-scale processing is handled by an inception module in this way.

3. The auxiliary classifiers are coupled to enhance the neural network's feature returns extra selective. As we know that, with the shallow networks, they have far more selective features, and the auxiliary classifiers impose error correction in early layers such that deep networks would also have selective features. In this way, auxiliary classifiers offer regularization. This is the reason auxiliary classifiers are connected.

4. 1x1 convolution is used to minimize computational cost, therefore before employing a larger convolutional filter, we utilize 1x1 convolution. This is one of the functions of the 1x1 convolution filter, and the other is to set up rectified linear activations.

5. In the inception model, the 1x1 filter functions as a reducer, therefore utilizing it instead of simply applying a larger convolution reduces computing cost. As a result, the 1x1 filter acts as a reducer and lowers computing costs. Applying a 1x1 convolutional filter first, followed by a larger convolutional filter, is recommended.

6. We need to dig deeper, like in the movie Inception and the famous meme. They did the same thing in this paper like in the movie, which was to have a dream inside a dream inside a dream. Similarly, they are expanding the depth of each module. Inside a deep network, there's a deep network within a deep network. That’s why author cited that meme reference.

7. In comparison to the inception modules in paper 1, the following changes were done inside an inception module in paper 2: Factoring to decrease convolution, Batch normalizing, and extending filter bangs. Rather than utilizing a larger convolution, we may employ two, three, or more lesser convolution filters, depending on the larger convolution. In addition, we should use a 1x1 convolution filter before applying a convolution filter to lower the computational cost. We may also expand the convolution filter bangs in parallel manner.

8. Overfitting and the discrepancy between the largest logit and the other logits becomes quite significant are the two difficulties described in the study. The model's overfitting can result in extremely high accuracies being reported. The model with a large logits difference and a gradient bound is less versatile. As a result, the model does not adjust in response to the input.

9. General design principles presented in paper-2 are :

   Avoid representational bottlenecks early in the network. Feed-forward networks can be depicted as an acyclic graph from the input layers to the classifier or regressor. The information flow will now be directed in a certain manner. It is possible to get the amount of data passing through any cut dividing inputs and outputs. At bottlenecks, extreme compression should be avoided.

   Within a network, models of larger dimensions are simpler to process. In a CNN, raising the activations per tile allows for more detached features. The generated networks will be able to train more quickly.

   Without much loss in informational capacity, spatial aggregation may be done across less dimensional features.

   The network's depth and width should be balanced. The number of filters per stage and the depth of the network must be balanced to provide optimal network performance. Increasing the network's width and depth can help it become more reliable.

10. Factoring a convolution has the following advantages: it lowers the computational cost and enhances the model's processing efficiency. Another benefit of factoring a convolution is that it aids in the avoidance of early representational bottlenecks in the network. No, factoring has no effect on the neural network's expressiveness.

Note: https://towardsdatascience.com/a-simple-guide-to-the-versions-of-the-inception-network-7fc52b863202

https://arxiv.org/pdf/1512.00567.pdf

https://arxiv.org/pdf/1409.4842.pdf