Computer Vision_DiscussionQuiz_06

1. The four advantages of DenseNet are the following: it improves feature propagation, cuts the number of parameters in half, promotes feature reuse, and it also solves the vanishing-gradient problem.

2. DenseNet connections are different from ResNet connections, as in ResNet we sum features before passing them into a layer; but in DenseNet, we concatenate them before passing them into a layer. So, the author chose DenseNet as in here, it has feature maps from all previous convolutional blocks.

3. DenseNet needs fewer parameters than a traditional CNN as in DenseNet, it already has information of feature maps from previous convolutional blocks, so it doesn't have to be retrained about feature maps. The benefits of having fewer parameters in DenseNet are as it has previous feature maps data, each layer writes to the next layers about the previous data, so it helps DenseNet to give on the important information to next layers that needs to be retained.

4. DenseNet architecture leads to implicit deep supervision as every layer has total connection to the input signal and loss function gradients. DenseNet also reduces overfitting as it has regularizing impact.

5. Desired output should include localization in paper-1 which means that each pixel should be allocated a class name. As for classification tasks, single class label is used as image's output.

6. When the resolution of features is lowered by half, U-net doubles the number of features, which aids in the effective storage of context information. And, with this improved method of storing data, useful data may be passed on to subsequent layers, improving localization.

7. The different purposes served by the feature connection from contracting path to expanding are, a series of convolutional layers can train to produce accurate ensemble output. And it can aid the model's ability to localize more successfully.

8. With smaller datasets, a design like U-net is appropriate as the data augmentation strategies allowed for acceptable outputs even when the dataset had few labeled images. In the study it is also mentioned about the U-net that this network has achieved SOTA performance when it has been trained on just 30 photos.

9. Differences between DenseNet and GoogLeNet architectures are as follows. DenseNet considers feature reuse option whereas in GoogLeNet, several feature maps are combined by various filters. So, the feature reuse method is one of the major

differences. We get deeper in DenseNet when we want to go deeper, while we go broader in GoogleNet when we want to go deeper.

10.

a. Dense blocks: A Dense block consists of a Batch Normalization layer, and a ReLu layer, and a 3x3 convolutional layer. These three layers make up a Dense block. So, it is a collection of numerous layers that are all related to each other.

b. Transition layer: To form a transition layer we need a batch normalization layer, 1x1 convolution layer, and an average pooling layer. Transition layer is formed by concatenating feature maps of various layers. So, we perform down-sampling so that we can get the same size to concatenate feature maps effectively.

c. Growth rate: The growth rate of a layer is the number of feature maps it creates as output.

d. Compression factor: We use a compression factor to minimize feature maps at transition layers. We perform this minimizing process by restricting the output feature maps at those transition layers. For this restriction we use a compression factor. With this usage of compression factor to compress the output helps in increasing the model's coherence.

Note:

Papers - U-Net: Convolutional Networks for Biomedical Image Segmentation (Links to an external site.)

Densely Connected Convolutional Networks (Links to an external site.)