ML hw8

1. Why does the pooling operation in CNN reduce the number of parameters while retaining important information?
ANS: This is because adjacent pixels usually have similar characteristics. For example, if we use max pooling, we only choose the pixels with the largest value, which means only the important information is retained.

2. What is the core purpose of padding? How does it address the issue of rapidly shrinking feature map sizes in deep models?
ANS: The core purpose of padding is to prevent the image from becoming too small and increase the contribution of corner pixels. It addresses the issue of rapidly shrinking feature map sizes by adding layers of zeros to the input image.

3. In CNNs, how does the size of the kernel affect the model's performance?
ANS: Larger kernels can get larger characteristics, while smaller kernels get smaller characteristics. Smaller kernel gives a lot of details, which may lead to overfitting.

4. Briefly explain how does the stride in CNN regulate the size of the feature map?
ANS: If stride=1, the filter moves 1 pixel when calculating each pixel. When the stride gets larger, the filter moves more pixels one time, which makes the feature map smaller.

5. What happens when the number of filters in a CNN model increases? What are the potential risks?
ANS: Increasing the number of filters makes the CNN model able to learn more abstract features. However, if the number of filters is larger than the number of channels in the input, the convolution operation cannot be performed.

6. Why is a general neural network less suitable for processing images compared to CNN?
ANS:

1. General neural networks are unable to scale to inputs with large amounts of data.
2. Overfit.