

1. Why does the pooling operation in CNN reduce the number of parameters while retaining important information?

A: Because the assumptions behind CNN is that low-level features will be closer to each other. So pooling will retain essential information by capturing dominant features.

2. What is the core purpose of padding? How does it address the issue of rapidly shrinking feature map sizes in deep models?

A: The purpose of padding is avoiding feature maps that keep getting smaller when using deeper models and increasing the contribution of corner pixels. By adding extra pixels around the edges of the input, padding can prevent the output feature map sizes from decreasing too quickly in deep models.

3. In CNNs, how does the size of the kernel affect the model's performance?

A: Smaller kernels (e.g., 3x3) will capture local patterns (e.g., edges, textures) and are computationally efficient. Larger kernels (e.g., 5x5 or 7x7) will capture more global features but are more computationally expensive and may lead to overfit.

4. Briefly explain how does the stride in CNN regulate the size of the feature map?

A: The stride determines the step size with which the convolution filter moves across the input. Larger strides lead to smaller feature maps, increasing computational efficiency but may lose some details.

5. What happens when the number of filters in a CNN model increases? What are the potential risks?

A: More filters allow the model to learn more complex and diverse features, and it increases the model's capacity to capture details. Too many filters are more computationally expensive and may cause the model to overfit.

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

A: Because general neural network is unable to scale to inputs with large amounts of data (e.g., 320 x 320). And as data grows larger, it is easier to overfit. Compared to general neural network, CNN can share the filter parameter and discard some pixels without losing important information.