Interview Questions on CNN

Easy:

1. What is a Convolutional Neural Network (CNN)?
2. Can you explain the difference between a fully connected layer and a convolutional layer?
3. What are the primary components of a CNN architecture?
4. How do pooling layers work in CNNs, and what is their purpose?
5. What is the role of the ReLU function in a CNN?
6. Can you explain what is meant by 'feature map' in the context of CNNs?
7. What is image augmentation, and why is it used in training CNN models?
8. Describe the concept of transfer learning in the context of CNNs.
9. What are common data preprocessing steps for CNN input?
10. How can you handle imbalanced datasets in CNN models?
11. Explain the difference between local and global pooling.
12. What is meant by "flattening" in the context of CNNs?
13. Describe the softmax function and its role in CNN classification tasks.
14. What are common loss functions used in CNNs for classification problems?
15. How can you calculate the output size of a convolutional layer?
16. What are accuracy metrics used in evaluating CNN models?
17. What is the significance of the learning rate in training CNNs?
18. How do you choose the number of layers and their sizes in a CNN?
19. Describe the role of batch size in CNN training.
20. Why is it important to normalize input data for CNNs?

Medium:

1. How does a CNN extract features from an image?
2. What are stride and padding in CNNs, and how do they affect the output size of the convolutional layer?
3. Can you explain the concept of parameter sharing in CNNs?
4. What is the purpose of using dropout in a CNN?
5. How can you prevent overfitting in a CNN model?
6. Describe the process of backpropagation in CNNs. How does it differ from traditional neural networks?
7. Explain the trade-offs between using larger vs. smaller filters in convolutional layers.
8. How does a CNN model learn from images during training?
9. Discuss the benefits and drawbacks of using pre-trained CNN models for a new task.
10. How can data augmentation impact the performance of a CNN model?
11. Explain how class weights can be used to handle imbalanced data in CNN training.
12. Describe how to use a confusion matrix to evaluate a CNN model.
13. How does one implement real-time data augmentation in CNNs?
14. Discuss the difference between categorical crossentropy and sparse categorical crossentropy loss functions.
15. How can gradient checking be used in CNNs?
16. What is early stopping, and how can it prevent overfitting in CNNs?
17. Describe the difference between validation loss and training loss in the context of CNNs.
18. Explain how convolutional layers can detect spatial hierarchies in images.
19. What are feature detectors in CNNs, and how do they work?

Hard:

1. Explain the concept of dilated convolutions and their advantage over regular convolutions.
21. How do inception networks differ from traditional CNN architectures, and what problem do they solve?
22. Can you describe the mechanism behind residual networks (ResNets) and how they address the vanishing gradient problem?
23. What is batch normalization, and how does it improve CNN training?
24. Explain how a CNN can be used for tasks other than image classification, such as object detection or semantic segmentation.
25. Discuss the impact of using different kernel sizes in convolutional layers on the model's performance and computational efficiency.
26. Discuss the role of skip connections in CNN architectures.
27. How can attention mechanisms be incorporated into CNNs, and what benefits do they offer?
28. Describe the concept and advantages of using group convolutions in CNNs.
29. Explain the principle of spatial pyramid pooling and its advantages.
30. How does the U-Net architecture work, and for what type of problems is it suited?
31. What are adversarial examples, and how can they affect CNN models?
32. Discuss the challenges and solutions for training very deep CNNs.
33. How can CNNs be applied to non-image data, and what modifications are necessary?
34. Describe the process and challenges of transferring learning from one domain to another using CNNs.
35. Explain the concept of focal loss and its application in class-imbalanced scenarios.
36. How do you calculate the number of parameters in a convolutional layer?
37. What are the implications of using different types of pooling (max pooling vs. average pooling) in CNNs?
38. How does the architecture of a CNN change when used for regression instead of classification?
39. Discuss the concept of model ensembling in the context of improving CNN performance.