

3-2 CSM (R20) MID-II Deep Learning Important Questions

1. What are the thumb rules in the designing of artificial neural networks?

Hint: <https://towardsdatascience.com/17-rules-of-thumb-for-building-a-neural-network-93356f9930af#:~:text=The%20first%20layer%20should%20be,is%20the%20number%20of%20classes.>

2. Explain batch normalization in the context of CNNs.
3. Define dropout. What are different types of dropouts? Explain how dropout is helpful in the regularization of the neural network model.
4. Define under fitting and overfitting in the performance of a trained neural network for a classification task. How the early stopping is useful in neural network training for maintaining bias and variance trade-off? Explain in detail.

Hint: Write about early stopping

5. What are the basic building blocks of a CNN model? Explain why each of them is necessary in tasks related to computer vision.
6. Which CNN model first studied the trade-off between the kernel size and the depth of the network? Describe its architecture and performance on SOTA ImageNet dataset.

Hint: VGG

7. What are skip connections in CNNs? Explain how ResNet has exploited skip connections in reducing Top 5% error in ImageNet classification.
8. Distinguish the features learned by the 1x1 convolutions and the other traditional convolutions of kernel size greater than or equal to 2.
9. What are the kernel sizes used in Inception V1 module? Explain how the CNNs (like GoogleNet) benefited from these Inception modules.

Hint: Write about GoogleNet

10. What is word2vec? Why the first layer in a natural language processing neural network has to be an embedding layer?
11. Why is the one-hot word vector inferior to that of word embeddings in text representation?
12. Compare and contrast one-hot word vector and word embeddings. Discuss the process of learning skipgram embeddings.
13. Draw the unwrapped architecture of RNN and explain the difficulties in training them.
14. Distinguish skipgram and CBOW embeddings. How the CBOW embeddings are learned? Explain with relevant example.
15. How the different memory gates of LSTM helps in addressing the problems faced by RNNs while training? Explain with in detailed architecture diagram of LSTM.

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1. What is normalization? How is it useful in neural network training?
 2. What is the objective of regularization? How the dropout mechanism fulfills that objective?
 3. What modifications are necessary to CNNs used for image classification, so that they work well for semantic segmentation also?
 4. What makes U-Net different from regular CNN? Explain in detail.
 5. Vanishing gradient problem makes it difficult to train RNNs. How the LSTM dealt with that problem?
 6. List the architectures capable of learning from sequential data. What makes them different from others?
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