**Interview Question**

1. What exactly is a feature?

2. For a top edge detector, write out the convolutional kernel matrix.

3. Describe the mathematical operation that a 3x3 kernel performs on a single pixel in an image.

4. What is the significance of a convolutional kernel added to a 3x3 matrix of zeroes?

5. What exactly is padding?

6. What is the concept of stride?

7. What are the shapes of PyTorch's 2D convolution's input and weight parameters?

8. What exactly is a channel?

9.Explain relationship between matrix multiplication and a convolution?

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10. What is the function of a summation junction of a neuron? What is threshold activation function?

11.What is a step function? What is the difference of step function with threshold function?

12.Explain the McCulloch–Pitts model of neuron.

13.Explain the ADALINE network model.

14.What is the constraint of a simple perceptron? Why it may fail with a real-world data set?

15.What is linearly inseparable problem? What is the role of the hidden layer?

16.Explain XOR problem in case of a simple perceptron.

17.Design a multi-layer perceptron to implement A XOR B.

18.Explain the single-layer feed forward architecture of ANN.

19.Explain the competitive network architecture of ANN.

20.Consider a multi-layer feed forward neural network. Enumerate and explain steps in the backpropagation algorithm used to train the network.

21.What are the advantages and disadvantages of neural networks?

22.Write short notes on any two of the following:

* + 1. Biological neuron
    2. ReLU function
    3. Single-layer feed forward ANN
    4. Gradient descent
    5. Recurrent networks

1. Explain One-Hot Encoding
2. Explain Bag of Words
3. Explain Bag of N-Grams
4. Explain TF-IDF
5. What is OOV problem?
6. What are word embeddings?
7. Explain Continuous bag of words (CBOW)
8. Explain SkipGram
9. Explain Glove Embeddings.
10. 1. What does one mean by the term "machine learning"?
11. 2.Can you think of 4 distinct types of issues where it shines?
12. 3.What is a labeled training set, and how does it work?
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22. 13.What are the criteria that model-based learning algorithms look for? What is the most popular method they use to achieve success? What method do they use to make predictions?
23. 14.Can you name four of the most important Machine Learning challenges?
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25. 16.What exactly is a test set, and why would you need one?
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27. 18.What precisely is the train-dev kit, when will you need it, how do you put it to use?
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7. Identify the three blocks in this code:

spam = 0

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22. What are the two most important concepts to grasp in order to comprehend Python OOP code?

23. What is the concept of human learning? Please give two examples.

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2. What different forms of human learning are there? Are there any machine learning equivalents?

3. What is machine learning, and how does it work? What are the key responsibilities of machine learning?

4. Define the terms "penalty" and "reward" in the context of reinforcement learning.

5. Explain the term "learning as a search"?

6. What are the various goals of machine learning? What is the relationship between these and human learning?

7. Illustrate the various elements of machine learning using a real-life illustration.

8. Provide an example of the abstraction method.

9. What is the concept of generalization? What function does it play in the machine learning process?

What is classification, exactly? What are the main distinctions between classification and regression?

11. What is regression, and how does it work? Give an example of a real-world problem that was solved using regression.

12. Describe the clustering mechanism in detail.

13. Make brief observations on two of the following topics:

i. Machine learning algorithms are used

ii. Studying under supervision

iii. Studying without supervision

iv. Reinforcement learning is a form of learning based on positive reinforcement.

1. Describe the structure of an artificial neuron. How is it similar to a biological neuron? What are its main components?
2. What are the different types of activation functions popularly used? Explain each of them.
   1. Explain, in details, Rosenblatt’s perceptron model. How can a set of data be classified using a simple perceptron?
   2. Use a simple perceptron with weights *w*0, *w*1, and *w*2 as −1, 2, and 1, respectively, to classify data points (3, 4); (5, 2); (1, −3); (−8, −3); (−3, 0).
3. Explain the basic structure of a multi-layer perceptron. Explain how it can solve the XOR problem.
4. What is artificial neural network (ANN)? Explain some of the salient highlights in the different architectural options for ANN.
5. Explain the learning process of an ANN. Explain, with example, the challenge in assigning synaptic weights for the interconnection between neurons? How can this challenge be addressed?
6. Explain, in details, the backpropagation algorithm. What are the limitations of this algorithm?
7. Describe, in details, the process of adjusting the interconnection weights in a multi-layer neural network.
8. What are the steps in the backpropagation algorithm? Why a multi-layer neural network is required?
9. Write short notes on:
   * + 1. Artificial neuron
       2. Multi-layer perceptron
       3. Deep learning
       4. Learning rate
10. Write the difference between:-
    * + 1. Activation function vs threshold function
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17. 7. Why should we avoid starting training with a high learning rate?
18. 8. What are the pros of studying with a high rate of learning?
19. 9. Why do we want to end the training with a low learning rate?
20. Explain the basic architecture of RNN cell.
21. Explain Backpropagation through time (BPTT)
22. Explain Vanishing and exploding gradients
23. Explain Long short-term memory (LSTM)
24. Explain Gated recurrent unit (GRU)
25. Explain Peephole LSTM
26. Bidirectional RNNs
27. Explain the gates of LSTM with equations.
28. Explain BiLSTM
29. Explain BiGRU
30. 1. Why are functions advantageous to have in your programs?
31. 2. When does the code in a function run: when it's specified or when it's called?
32. 3. What statement creates a function?
33. 4. What is the difference between a function and a function call?
34. 5. How many global scopes are there in a Python program? How many local scopes?
35. 6. What happens to variables in a local scope when the function call returns?
36. 7. What is the concept of a return value? Is it possible to have a return value in an expression?
37. 8. If a function does not have a return statement, what is the return value of a call to that function?
38. 9. How do you make a function variable refer to the global variable?
39. 10. What is the data type of None?
40. 11. What does the sentence import areallyourpetsnamederic do?
41. 12. If you had a bacon() feature in a spam module, what would you call it after importing spam?
42. 13. What can you do to save a programme from crashing if it encounters an error?
43. 14. What is the purpose of the try clause? What is the purpose of the except clause?
44. 1. What is the concept of an abstract superclass?
45. 2. What happens when a class statement's top level contains a basic assignment statement?
46. 3. Why does a class need to manually call a superclass's \_\_init\_\_ method?
47. 4. How can you augment, instead of completely replacing, an inherited method?
48. 5. How is the local scope of a class different from that of a function?
49. Is it OK to initialize all the weights to the same value as long as that value is selected randomly using He initialization?
50. Is it OK to initialize the bias terms to 0?
51. Name three advantages of the SELU activation function over ReLU.
52. In which cases would you want to use each of the following activation functions: SELU, leaky ReLU (and its variants), ReLU, tanh, logistic, and softmax?
53. What may happen if you set the momentum hyperparameter too close to 1 (e.g., 0.99999) when using an SGD optimizer?
54. Name three ways you can produce a sparse model.
55. Does dropout slow down training? Does it slow down inference (i.e., making predictions on new instances)? What about MC Dropout?
56. Practice training a deep neural network on the CIFAR10 image dataset:
    1. Build a DNN with 20 hidden layers of 100 neurons each (that’s too many, but it’s the point of this exercise). Use He initialization and the ELU activation function.
    2. Using Nadam optimization and early stopping, train the network on the CIFAR10 dataset. You can load it with keras.datasets.cifar10.load\_​data(). The dataset is composed of 60,000 32 × 32–pixel color images (50,000 for training, 10,000 for testing) with 10 classes, so you’ll need a softmax output layer with 10 neurons. Remember to search for the right learning rate each time you change the model’s architecture or hyperparameters.
    3. Now try adding Batch Normalization and compare the learning curves: Is it converging faster than before? Does it produce a better model? How does it affect training speed?
    4. Try replacing Batch Normalization with SELU, and make the necessary adjustements to ensure the network self-normalizes (i.e., standardize the input features, use LeCun normal initialization, make sure the DNN contains only a sequence of dense layers, etc.).
    5. Try regularizing the model with alpha dropout. Then, without retraining your model, see if you can achieve better accuracy using MC Dropout.
57. 1. What is the concept of cyclical momentum?
58. 2. What callback keeps track of hyperparameter values (along with other data) during training?
59. 3. In the color dim plot, what does one column of pixels represent?
60. 4. In color dim, what does "poor teaching" look like? What is the reason for this?
61. 5. Does a batch normalization layer have any trainable parameters?
62. 6. In batch normalization during preparation, what statistics are used to normalize? What about during the validation process?
63. 7. Why do batch normalization layers help models generalize better?
64. 8.Explain between MAX POOLING and AVERAGE POOLING is number eight.
65. 9. What is the purpose of the POOLING LAYER?
66. 10. Why do we end up with Completely CONNECTED LAYERS?
67. 11. What do you mean by PARAMETERS?
68. 12. What formulas are used to measure these PARAMETERS?
69. 1) . What is the difference between enclosing a list comprehension in square brackets and parentheses?
70. 2) What is the relationship between generators and iterators?
71. 3) What are the signs that a function is a generator function?
72. 4) What is the purpose of a yield statement?
73. 5) What is the relationship between map calls and list comprehensions? Make a comparison and contrast between the two.
74. Q1. What is the distinction between a numpy array and a pandas data frame? Is there a way to convert between the two if there is?
75. Q2. What can go wrong when an user enters in a stock-ticker symbol, and how do you handle it?
76. Q3. Identify some of the plotting techniques that are used to produce a stock-market chart.
77. Q4. Why is it essential to print a legend on a stock market chart?
78. Q5. What is the best way to limit the length of a pandas data frame to less than a year?
79. Q6. What is the definition of a 180-day moving average?
80. Q7. Did the chapter's final example use "indirect" importing? If so, how exactly do you do it?

2. What is the difference between string and variable?

3. Describe three different data types.

4. What is an expression made up of? What do all expressions do?

5. This assignment statements, like spam = 10. What is the difference between an expression and a statement?

6. After running the following code, what does the variable bacon contain?

bacon = 22

bacon + 1

7. What should the values of the following two terms be?

'spam' + 'spamspam'

'spam' \* 3

8. Why is eggs a valid variable name while 100 is invalid?

9. What three functions can be used to get the integer, floating-point number, or string version of a value?

10. Why does this expression cause an error? How can you fix it?

'I have eaten ' + 99 + ' burritos.'

Q1. What is the purpose of Python's OOP?

Q2. Where does an inheritance search look for an attribute?

Q3. How do you distinguish between a class object and an instance object?

Q4. What makes the first argument in a class’s method function special?

Q5. What is the purpose of the \_\_init\_\_ method?

Q6. What is the process for creating a class instance?

Q7. What is the process for creating a class?

Q8. How would you define the superclasses of a class?

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