

# CE6146 Introduction to Deep Learning

## 20230921 Exercise

1. Which of the following statements is FALSE about deep learning?  
(A) Deep learning models are usually more complex than traditional machine learning models. (B) Deep learning models do not require labeled data. (C) Deep learning has proven effective in domains like natural language processing and computer vision. (D) Deep learning models are inspired by the structure of the human brain.

Reason: While deep learning can work with unlabeled data, saying it does not require labeled data is misleading. Both supervised and unsupervised approaches exist in deep learning.

2. You are given a dataset with missing values. What is the first step in handling this?  
(A) Ignore missing values. (B) Use deep learning to predict missing values. (C) Remove all features with missing values. (D) Explore the data to understand the nature of the missing values.

Reason: Understanding the nature of the missing data helps in deciding the best method to handle it.

3. Your neural network is showing high accuracy on the training data but poor performance on the validation data. What could be the issue?  
(A) The model is underfitting. (B) The model is overfitting. (C) The model is well-fitted  
(D) There is no issue; this is expected behavior

Reason: If the model performs well on training data but poorly on validation data, it's likely overfitting.

4. What is a common technique for dealing with imbalanced datasets in classification problems?  
(A) Ignore the imbalance. (B) Use a simple model. (C) Resampling techniques. (D) None of the above.

Reason: Resampling methods like SMOTE or undersampling can balance the class distribution.

5. What is the purpose of the validation set?  
(A) Training the model. (B) Evaluating the model. (C) Hyperparameter tuning. (D) Data preprocessing.

Reason: The validation set is often used for tuning the model's hyperparameters.

6. What does the term 'hyperparameter' refer to?  
(A) Model parameters that are learned. (B) Parameters like learning rate. (C) Model's prediction. (D) Loss function.

Reason: Hyperparameters are settings that are not learned from the data but are set prior to the learning process.

7. Which of the following is a common loss function for classification problems?  
(A) Mean Squared Error. (B) Cross-Entropy. (C) Hinge Loss. (D) Kullback-Leibler Divergence

Reason: Cross-Entropy is commonly used for classification problems. Hinge Loss also used in classification, particularly for Support Vector Machines and some types of neural networks.

8. What is the main difference between supervised and unsupervised learning?  
(A) Type of data. (B) Presence of labels. (C) Computational complexity. (D) Type of neural network.

Reason: Supervised learning uses labeled data, whereas unsupervised doesn't.

9. What is the purpose of data normalization?  
(A) Reduce overfitting. (B) Increase model speed. (C) Balance class distribution. (D) Scale feature values.

Reason: Normalization is used to scale the input features.

10. What is the role of the optimizer in machine learning?  
(A) Data preprocessing. (B) Model evaluation. (C) Parameter update. (D) Feature selection.

Reason: The optimizer adjusts the model parameters to minimize the loss function.

11. Which deep learning library is known for its dynamic computation graph?  
(A) TensorFlow. (B) PyTorch. (C) Keras. (D) Caffe.

Reason: PyTorch is known for its dynamic computation graph.

12. You notice that your model is overfitting. What should you NOT do?  
(A) Increase the dropout rate. (B) Use more training data. (C) Decrease model complexity. (D) Increase model complexity.

Reason: Increasing model complexity would likely worsen the overfitting issue.

13. Which of the following is true about the learning rate?  
(A) A high learning rate always speeds up training. (B) A low learning rate can cause the model to get stuck. (C) A high learning rate can cause the model to overfit. (D) A low learning rate always avoids overfitting.

Reason: Too low a learning rate can cause the model to converge too slowly or get stuck in a

local minimum.

14. You are given a task to predict stock prices. What type of learning would you likely use?  
(A) Supervised learning. (B) Unsupervised learning. (C) Reinforcement learning. (D) Semi-supervised learning.

Reason: Stock price prediction is generally a supervised learning task.

15. You are given the task to optimize a poorly performing model. Which of the following techniques would you not consider?  
(A) Hyperparameter tuning. (B) Feature selection. (C) Adding more data. (D) Increasing model complexity.

Reason: Increasing complexity could lead to overfitting, which might not solve the problem of poor performance.

16. Your deep learning model is suffering from high bias. What could be a possible solution?  
(A) Add more layers. (B) Simplify the model. (C) Get more data. (D) None of the above.

Reason: A high bias problem indicates underfitting, which may be mitigated by increasing model complexity. (A) Add more layers: Increasing the complexity of the model by adding more layers can help reduce bias, making this a viable solution. (B) Simplify the model: This would exacerbate the problem of high bias, so it's not a good solution. (C) Get more data: While getting more data can sometimes help a model generalize better, it usually doesn't solve the issue of high bias. High bias indicates a problem with the model itself being too simple, rather than a lack of data.

17. What does the ROC curve represent?  
(A) Precision-Recall tradeoff. (B) True Positive Rate vs False Positive Rate. (C) Sensitivity vs Specificity. (D) AUC value.

Reason: The ROC curve plots the TPR against the FPR.

18. Which metric would you consider if your dataset is highly imbalanced?  
(A) Accuracy. (B) Precision. (C) Recall. (D) F1-Score.

Reason: F1-Score is more informative than accuracy for imbalanced datasets.

19. Which of the following is an example of unsupervised learning?  
(A) Clustering. (B) Classification. (C) Regression. (D) Reinforcement Learning.

Reason: Clustering is an unsupervised learning technique.

20. What does the variance measure in a dataset?  
(A) Central Tendency. (B) Spread. (C) Skewness. (D) Kurtosis.

Reason: Variance is a statistical measure that represents the dispersion or spread of a set of data points. It quantifies how far individual data points are from the mean of the dataset. Variance

does not measure any of the following: (A) Central Tendency: This refers to metrics like mean, median, and mode that indicate the "center" of the data distribution. Variance is not a measure of central tendency. (C) Skewness: This measures the asymmetry of the data distribution. A distribution can be symmetric but still have a high or low variance. (D) Kurtosis: This measures the "tailedness" of the data distribution. Like skewness, kurtosis is independent of variance.