

1. Which NumPy function is used to compute the dot product of two arrays?

- a) np.multiply()
- b) np.dot()
- c) np.cross()
- d) np.sum()

Answer: b) np.dot()

2. In Pandas, which method is used to concatenate two DataFrames vertically?

- a) pd.join()
- b) pd.concat()
- c) pd.merge()
- d) pd.append()

Answer: d) pd.append()

3. What is the formula to calculate the variance of a dataset?

- a) $S(x - \mu)^2 / n$
- b) $S(x - \mu) / n$
- c) $S(x - \mu) / (n - 1)$
- d) $S(x - \mu)^2 / (n - 1)$

Answer: d) $S(x - \mu)^2 / (n - 1)$

4. Which Matplotlib function is used to set the title of a plot?

- a) plt.set_title()
- b) plt.title()
- c) plt.add_title()
- d) plt.plot_title()

Answer: b) plt.title()

6. What is the median of the following list of numbers?

`[3, 7, 2, 9, 5, 5, 8]`

- a) 5
- b) 6
- c) 7
- d) 8

Answer: a) 5

7. Which Seaborn function is used to create a boxplot?

- a) `sns.boxplot()`
- b) `sns.scatterplot()`
- c) `sns.histplot()`
- d) `sns.lineplot()`

Answer: a) `sns.boxplot()`

8. Which of the following is a correct syntax to import the Plotly library in Python?

- a) ``import plotly as py``
- b) ``import plotly.plotly as py``
- c) ``from plotly import plotly``
- d) ``import plotly.plotly``

Answer: a) ``import plotly as py``

9. What is the output of the following code snippet?

```
```python
import numpy as np
arr = np.array([[-1, 2], [3, -4]])
print(np.linalg.eig(arr))
```
```

- a) `array([1, -5])`
- b) `array([-1, -4])`
- c) `array([2, 3])`
- d) `array([1, 4])`

Answer: c) array([2, 3])

10. Which method is used to handle missing values in a DataFrame in Pandas?

- a) fillna()
- b) dropna()
- c) replace()
- d) interpolate()

Answer: a) fillna()

11. Which of the following statements about logistic regression is true?

- a) It is used for regression tasks.
- b) It is based on the least squares method.
- c) It predicts categorical outcomes.
- d) It assumes a linear relationship between dependent and independent variables.

Answer: c) It predicts categorical outcomes.

12. What is the output of the following code snippet?

```
```python
import numpy as np
arr = np.array([[1, 2], [3, 4]])
print(np.linalg.inv(arr))
```
```

- a) $\begin{bmatrix} -2. & 1. \\ 1.5 & -0.5 \end{bmatrix}$
- b) $\begin{bmatrix} -2 & 1 \\ 1 & -0.5 \end{bmatrix}$
- c) $\begin{bmatrix} -2. & 1. \\ 1. & -0.5 \end{bmatrix}$
- d) $\begin{bmatrix} -2. & 1. \\ 1. & -1. \end{bmatrix}$

Answer: a) $\begin{bmatrix} -2. & 1. \end{bmatrix}$

$\begin{bmatrix} 1.5 & -0.5 \end{bmatrix}$

13. Which of the following is a correct way to calculate the Pearson correlation coefficient in Pandas?

a) `df.correlation()`

b) `df.corr()`

c) `df.correlation_coeff()`

d) `df.pearson()`

Answer: b) `df.corr()`

14. What is the primary purpose of regularization in machine learning?

a) To penalize large coefficients in the model.

b) To increase model complexity.

c) To remove outliers from the dataset.

d) To reduce bias in the model.

Answer: a) To penalize large coefficients in the model.

15. Which of the following methods is used for dimensionality reduction in scikit-learn?

a) PCA

b) SVM

c) KNN

d) Decision Trees

Answer: a) PCA

16. What is the output of the following code snippet?

```
```python
import numpy as np
arr = np.array([[1, 2], [3, 4]])
print(np.linalg.det(arr))
```
```

- a) 0
- b) 1
- c) 2
- d) 3

Answer: b) 1

Advanced Descriptive Statistics with Python

16. ****Which method in Pandas provides a summary of statistics excluding NaN values?****

- A) describe()
- B) summary()
- C) nanmean()
- D) stat_summary()
- ****Answer: A****

17. ****What does the 'quantile()' method do in Pandas?****

- A) Computes the mean of the data
- B) Computes the specified quantile(s) of the data
- C) Computes the mode of the data
- D) Computes the skewness of the data
- ****Answer: B****

18. ****Which function is used to calculate the correlation between two columns in a DataFrame?****

- A) correlate()
- B) corr()
- C) cov()
- D) relationship()
- ****Answer: B****

Advanced Exploratory Data Analysis (EDA)

19. **What is the purpose of a pairplot in Seaborn?**

- A) To plot pairs of data points
- B) To plot pairwise relationships in a dataset
- C) To plot data over time
- D) To plot the distribution of a single variable
- **Answer: B**

20. **How can you visualize the distribution of categorical data?**

- A) Box plot
- B) Bar plot
- C) Scatter plot
- D) Line plot
- **Answer: B**

21. **What does the hue parameter in Seaborn plots do?**

- A) It sets the color palette
- B) It maps the plot data to different colors
- C) It changes the plot type
- D) It adjusts the plot size
- **Answer: B**

Advanced Visualization Libraries in Python

22. **Which Matplotlib function is used to create subplots?**

- A) subplot()
- B) subplots()
- C) add_subplot()
- D) create_subplot()

- **Answer: B**

23. **How can you customize the size of a plot in Matplotlib?**

- A) figsize parameter in subplots()
- B) size parameter in plot()
- C) dimensions parameter in subplot()
- D) adjust_size() method

- **Answer: A**

24. **What is the primary use of the Plotly library?**

- A) Static data visualization
- B) Interactive data visualization
- C) Data manipulation
- D) Statistical analysis

- **Answer: B**

Advanced Machine Learning Basics

25. **What is the purpose of a 'validation set' in machine learning?**

- A) To train the model
- B) To test the final model
- C) To tune the model's hyperparameters
- D) To store raw data

- **Answer: C**

26. **Which technique is used to prevent overfitting in decision trees?**

- A) Cross-validation
- B) Pruning
- C) Feature scaling
- D) Gradient boosting

- **Answer: B**

27. **What is the difference between bagging and boosting?**

- A) Bagging decreases variance, boosting decreases bias
- B) Bagging decreases bias, boosting decreases variance
- C) Both are methods to increase bias
- D) Both are methods to increase variance

- **Answer: A**

Advanced Linear and Logistic Regression

28. **Which of the following is a key assumption of linear regression?**

- A) The relationship between the independent and dependent variable is linear
- B) The residuals are heteroscedastic
- C) The independent variables are correlated
- D) The dependent variable is binary

- **Answer: A**

29. **What is multicollinearity in the context of linear regression?**

- A) High correlation between independent variables
- B) Low correlation between independent variables
- C) High correlation between dependent and independent variables
- D) Low correlation between dependent and independent variables

- **Answer: A**

30. **In logistic regression, what does an odds ratio greater than 1 signify?**

- A) Decrease in the odds of the outcome occurring
- B) No change in the odds of the outcome occurring
- C) Increase in the odds of the outcome occurring
- D) Invalid result

- **Answer: C**

Advanced Support Vector Machines (SVM)

31. **What is the main advantage of using a kernel in SVM?**

- A) To handle non-linearly separable data
- B) To reduce the computation time
- C) To perform dimensionality reduction
- D) To handle linearly separable data
- **

Answer: A**

32. **Which kernel trick is commonly used in SVM for image classification?**

- A) Linear kernel
- B) Polynomial kernel
- C) Radial Basis Function (RBF) kernel
- D) Sigmoid kernel
- **Answer: C**

33. **What does the 'C' parameter control in an SVM?**

- A) The margin width
- B) The regularization strength
- C) The number of support vectors
- D) The kernel type
- **Answer: B**

Advanced Decision Tree Classification and Regression

34. **How does a decision tree handle missing values during training?**

- A) It ignores the missing values
- B) It creates a surrogate split
- C) It stops splitting at the node with missing values
- D) It imputes missing values with the mean
- ****Answer: B****

35. ****What is the purpose of the 'max_depth' parameter in a decision tree?****

- A) To control the number of features
- B) To limit the depth of the tree
- C) To determine the minimum number of samples required to split an internal node
- D) To determine the minimum number of samples required to be at a leaf node
- ****Answer: B****

36. ****Which metric can be used to evaluate a decision tree for regression?****

- A) Gini index
- B) Entropy
- C) Mean Squared Error (MSE)
- D) F1 Score
- ****Answer: C****

Advanced Artificial Neural Networks (ANN)

37. ****What is the 'vanishing gradient problem' in neural networks?****

- A) Gradients become increasingly small during backpropagation
- B) Gradients become increasingly large during backpropagation
- C) The network's weights vanish after training
- D) The network's weights explode after training
- ****Answer: A****

38. ****Which architecture is commonly used in deep learning for image classification?****

- A) Recurrent Neural Network (RNN)
- B) Convolutional Neural Network (CNN)
- C) Feedforward Neural Network (FNN)
- D) Radial Basis Function Network (RBFN)
- **Answer: B**

39. **Which technique is used to update the weights in a neural network?**

- A) Gradient Descent
- B) Principal Component Analysis
- C) K-Means Clustering
- D) Linear Regression
- **Answer: A**

Advanced Unsupervised Learning Algorithms

40. **In K-Means clustering, what determines the convergence of the algorithm?**

- A) Centroids stabilize
- B) Maximum iterations reached
- C) Minimum error threshold achieved
- D) All of the above
- **Answer: D**

41. **How is the number of clusters (K) typically chosen in K-Means?**

- A) Arbitrarily
- B) Based on domain knowledge
- C) Using the Elbow Method
- D) All of the above
- **Answer: C**

42. **What is the main drawback of the K-Means algorithm?**

- A) High computational complexity
- B) Sensitivity to initial cluster centers
- C) Inability to handle large datasets
- D) Requirement of a predefined number of clusters
- **Answer: B**

Advanced Principal Component Analysis (PCA)

43. **What is the effect of PCA on the dataset's features?**

- A) Increases dimensionality
- B) Reduces dimensionality
- C) Clusters data points
- D) Normalizes features
- **Answer: B**

44. **Which matrix factorization technique is used in PCA?**

- A) Singular Value Decomposition (SVD)
- B) Eigenvalue Decomposition
- C) LU Decomposition
- D) QR Decomposition
- **Answer: A**

45. **How is the explained variance ratio useful in PCA?**

- A) It indicates the proportion of variance captured by each principal component
- B) It indicates the total variance in the dataset
- C) It measures the error rate of PCA
- D) It measures the accuracy of PCA
- **Answer: A**

Advanced Evaluation Metrics

46. ****What is the purpose of the ROC curve in classification problems?****

- A) To evaluate the trade-off between true positive rate and false positive rate
- B) To measure the accuracy of the model
- C) To determine the mean squared error
- D) To visualize the distribution of the data
- ****Answer: A****

47. ****Which evaluation metric is suitable for imbalanced datasets?****

- A) Accuracy
- B) Precision-Recall Curve
- C) Mean Absolute Error
- D) R-squared
- ****Answer: B****

48. ****What does a high F1 score indicate?****

- A) High precision and high recall
- B) High precision and low recall
- C) Low precision and high recall
- D) Low precision and low recall
- ****Answer: A****

Linear and Logistic Regression

49. ****In linear regression, what is the relationship between the independent and dependent variables?****

- A) Linear
- B) Exponential
- C) Logarithmic
- D) Quadratic
- ****Answer: A****

50. ****Which metric is used to evaluate a linear regression model?****

- A) R-squared
- B) Precision
- C) Recall
- D) F1 Score
- ****Answer: A****

51. ****What is the main purpose of logistic regression?****

- A) To predict continuous outcomes
- B) To predict binary outcomes
- C) To cluster data
- D) To reduce data dimensionality
- ****Answer: B****

Support Vector Machines (SVM)

52. ****What is the main objective of SVM in classification tasks?****

- A) To minimize the error rate
- B) To find the hyperplane that best separates the classes
- C) To maximize the number of support vectors
- D) To reduce data dimensionality
- ****Answer: B****

53. ****What is a kernel function in SVM?****

- A) A function to transform data into a higher dimension
- B) A function to reduce data dimensions
- C) A function to speed up the algorithm
- D) A function to clean data
- ****Answer: A****

54. ****Which method in scikit-learn is used for SVM classification?****

- A) SVR()
- B) SVC()
- C) SVMClassifier()
- D) SupportVectorClassifier()
- ****Answer: B****

Decision Trees

55. ****In a decision tree, what is an 'internal node'?****

- A) A decision point where data is split
- B) The end point of a decision path
- C) The starting point of the tree
- D) A node that contains the final prediction
- ****Answer: A****

56. ****Which criterion can be used for splitting nodes in a decision tree?****

- A) Gini Index
- B) Entropy
- C) Both A and B
- D) Mean Squared Error
- ****Answer: C****

57. ****What does 'pruning' in a decision tree refer to?****

- A) Removing less important branches
- B) Adding more branches
- C) Rearranging branches

- D) Combining branches

- **Answer: A**

Artificial Neural Networks (ANN)

58. **What is an artificial neural network (ANN)?**

- A) A computational model inspired by the human brain

- B) A statistical model for regression

- C) An algorithm for clustering

- D) A method for data preprocessing

- **Answer: A**

59. **Which function in scikit-learn is used to implement a multi-layer perceptron?**

- A) MLPClassifier

- B) Perceptron

- C) NeuralNet

- D) MLPRegressor

- **Answer: A**

60. **What activation function is commonly used in hidden layers of neural networks?**

- A) ReLU

- B) Sigmoid

- C) Tanh

- D) All of the above

- **Answer: D**

61. **What is the goal of unsupervised learning?**

- A) To predict outcomes

- B) To discover hidden patterns in data

- C) To minimize error rates
- D) To improve supervised learning models
- **Answer: B**

62. **Which algorithm is commonly used for clustering?**

- A) K-Means
- B) Linear Regression
- C) Decision Tree
- D) SVM
- **Answer: A**

63. **What is a common evaluation metric for clustering algorithms?**

- A) Silhouette Score
- B) R-squared
- C) Mean Squared Error
- D) Accuracy
- **Answer: A**

Principal Component Analysis (PCA)

63. **What is the main purpose of Principal Component Analysis (PCA)?

- A) Regression
- B) Classification
- C) Dimensionality reduction
- D) Clustering
- **Answer: C**

64. **Which function is used to implement PCA in scikit-learn?

- A) PCA()
- B) Decomposition()

- C) DimensionalityReduction()
- D) PCAnalysis()
- **Answer: A**

65. **PCA transforms data into:**

- A) Higher dimensions
- B) Lower dimensions
- C) Equal dimensions
- D) None of the above
- **Answer: B**

Evaluation Metrics

66. **What does a confusion matrix represent?**

- A) The performance of a classification algorithm
- B) The performance of a regression algorithm
- C) The correlation between features
- D) None of the above
- **Answer: A**

67. **Which metric is used to evaluate the performance of a binary classifier?**

- A) Precision
- B) Recall
- C) F1 Score
- D) All of the above
- **Answer: D**

68. **What does R-squared represent in regression analysis?**

- A) The proportion of variance explained by the model
- B) The mean error of predictions

- C) The accuracy of the model
- D) The recall of the model
- **Answer: A**

Miscellaneous

69. **Which of the following is not an essential Python library for data science?**

- A) NumPy
- B) Pandas
- C) BeautifulSoup
- D) Math
- ** Answer: D**

Additional Advanced MCQs

70. **In the context of neural networks, what is the function of a dropout layer?**

- A) To remove redundant features
- B) To prevent overfitting by randomly setting a fraction of input units to 0
- C) To increase the number of neurons in a layer
- D) To add regularization terms to the loss function
- **Answer: B**

71. **Which of the following is a method to reduce overfitting in machine learning models?**

- A) Increasing the model complexity
- B) Adding more features
- C) Regularization techniques such as L1 and L2
- D) Reducing the dataset size
- **Answer: C**

72. **What is the primary goal of Principal Component Analysis (PCA)?

- A) To improve the accuracy of a model
- B) To reduce the dimensionality of the dataset while preserving as much variance as possible
- C) To create a more complex model
- D) To cluster similar data points
- **Answer: B**

73. **Which Python library is most commonly used for natural language processing tasks?**

- A) Pandas
- B) NumPy
- C) Scikit-learn
- D) NLTK (Natural Language Toolkit)
- **Answer: D**

74. **What does the 'random_state' parameter control in machine learning algorithms?**

- A) The number of iterations
- B) The learning rate
- C) The randomness of the data splitting
- D) The size of the dataset
- **Answer: C**

75. **In ensemble learning, what is 'stacking'?

- A) Combining predictions from multiple models using a meta-model
- B) Splitting the dataset into smaller subsets
- C) Using multiple layers of neural networks
- D) Reducing the variance of the model
- **Answer: A**

1. Which of the following libraries is used for scientific computing in Python?

- a) Pandas
- b) Matplotlib

c) NumPy

d) Seaborn

Answer: c) NumPy

2. What is the output of the following code snippet?

```
```python
import numpy as np
arr = np.array([[1, 2], [3, 4]])
print(np.sum(arr))
```
```

a) 3

b) 7

c) 10

d) 15

Answer: c) 10

3. In Pandas, which method is used to rename columns in a DataFrame?

a) rename()

b) rename_columns()

c) change_columns()

d) update_columns()

Answer: a) rename()

4. What is the mode of the following list of numbers?

```
`[2, 3, 5, 5, 7, 8, 8, 8]`
```

a) 3

b) 5

c) 7

d) 8

Answer: d) 8

5. Which Matplotlib function is used to create a histogram?

- a) plt.hist()
- b) plt.bar()
- c) plt.scatter()
- d) plt.plot()

Answer: a) plt.hist()

6. What is the primary purpose of Seaborn in Python?

- a) Data manipulation
- b) Statistical visualization
- c) Machine learning modeling
- d) Natural language processing

Answer: b) Statistical visualization

7. Which of the following statements about Plotly is true?

- a) It is a Python library for creating static, interactive plots.
- b) It does not support 3D plotting.
- c) It is primarily used for statistical analysis.
- d) It requires an internet connection to generate plots.

Answer: a) It is a Python library for creating static, interactive plots.

8. Which statistical plot is used to visualize the relationship between two variables in Seaborn?

- a) Box plot
- b) Scatter plot
- c) Histogram
- d) Bar plot

Answer: b) Scatter plot

9. Which of the following methods is used to create a DataFrame in Pandas?

- a) `pd.create_df()`
- b) `pd.DataFrame()`
- c) `pd.make_df()`
- d) `pd.df()`

Answer: b) `pd.DataFrame()`

10. What is the median of the following list of numbers?

``[4, 6, 8, 10, 12]``

- a) 6
- b) 8
- c) 10
- d) 12

Answer: b) 8

11. Which Seaborn function is used to create a bar plot?

- a) `sns.barplot()`
- b) `sns.scatterplot()`
- c) `sns.lineplot()`
- d) `sns.boxplot()`

Answer: a) `sns.barplot()`

12. Which of the following is a correct syntax to import the Plotly library in Python?

- a) ``import plotly.plotly as py``
- b) ``import plotly``
- c) ``from plotly import plotly``
- d) ``import plotly as py``

Answer: d) ``import plotly as py``

13. What is the output of the following code snippet?

````python`

```
import numpy as np
arr = np.array([[1, 2], [3, 4]])
print(np.linalg.det(arr))
'''
```

- a) 0
- b) 1
- c) 2
- d) 3

Answer: b) 1

14. Which method is used to handle missing values in a DataFrame in Pandas?

- a) dropna()
- b) fillna()
- c) remove\_na()
- d) delete\_na()

Answer: b) fillna()

15. What is the primary objective of PCA (Principal Component Analysis)?

- a) To increase model complexity
- b) To reduce the dimensionality of the data
- c) To remove outliers from the dataset
- d) To perform feature selection

Answer: b) To reduce the dimensionality of the data

16. Which of the following is a supervised learning algorithm?

- a) K-means clustering
- b) K-nearest Neighbors
- c) Hierarchical clustering
- d) DBSCAN

Answer: b) K-nearest Neighbors



17. What is the primary objective of hierarchical clustering?

- a) Maximizing intra-cluster similarity
- b) Minimizing intra-cluster similarity
- c) Maximizing inter-cluster similarity
- d) Minimizing inter-cluster similarity

Answer: d) Minimizing inter-cluster similarity

18. Which of the following is not a step in the machine learning pipeline?

- a) Model Training
- b) Model Testing
- c) Model Evaluation
- d) Model Deployment

Answer: b) Model Testing

19. Which method is used to evaluate the performance of a regression model?

- a) Confusion Matrix
- b) R-squared
- c) Precision and Recall
- d) F1-score

Answer: b) R-squared

20. Which algorithm is used for anomaly detection?

- a) Linear Regression
- b) SVM
- c) K-means clustering
- d) DBSCAN

Answer: d) DBSCAN

21. Which method is used to select the most important features in a machine learning model?

- a) Recursive Feature Elimination
- b) PCA
- c) VIF
- d) All of the above

Answer: a) Recursive Feature Elimination

22. What is the main objective of hyperparameter tuning?

- a) To select the optimal features for a model
- b) To select the optimal parameters for a model
- c) To evaluate the performance of a model
- d) To interpret the results of a model

Answer: b) To select the optimal parameters for a model

23. Which algorithm is used for density estimation and clustering?

- a) DBSCAN
- b) K-means clustering
- c) Linear Regression
- d) Decision Tree

Answer: a) DBSCAN

24. Which of the following is not a step in the machine learning pipeline?

- a) Model Training
- b) Model Testing
- c) Model Evaluation
- d) Model Deployment

Answer: b) Model Testing

25. Which method is used to handle multicollinearity among independent variables in regression analysis?

- a) Variance Inflation Factor (VIF)
- b) Confusion Matrix

c) Principal Component Analysis (PCA)

d) Entropy

Answer: a) Variance Inflation Factor (VIF)

26

. What is the primary objective of hierarchical clustering?

a) Maximizing intra-cluster similarity

b) Minimizing intra-cluster similarity

c) Maximizing inter-cluster similarity

d) Minimizing inter-cluster similarity

Answer: d) Minimizing inter-cluster similarity

27. Which of the following is not a step in the machine learning pipeline?

a) Data Preprocessing

b) Model Training

c) Model Validation

d) Model Presentation

Answer: d) Model Presentation

28. Which method is used to handle multicollinearity in regression analysis?

a) PCA

b) VIF

c) Entropy

d) K-means clustering

Answer: b) VIF

29. Which algorithm is used for density estimation and clustering?

a) DBSCAN

b) K-means clustering

c) Linear Regression

d) Decision Tree

Answer: a) DBSCAN

30. Which method is used to handle missing values in a dataset?

a) Deleting rows with missing values

b) Imputation

c) Feature scaling

d) All of the above

Answer: d) All of the above

31. Which of the following is not a type of ensemble learning technique?

a) Bagging

b) Boosting

c) Stacking

d) Ridge Regression

Answer: d) Ridge Regression

32. Which algorithm is used for density-based clustering?

a) K-means clustering

b) DBSCAN

c) Hierarchical clustering

d) Spectral clustering

Answer: b) DBSCAN

33. Which method is used to handle missing values in a dataset?

a) Dropping rows with missing values

b) Imputation

c) Feature scaling

d) All of the above

Answer: d) All of the above

34. What is the primary purpose of feature scaling?

- a) To increase the interpretability of the model
- b) To reduce the computational time
- c) To bring features to a similar scale
- d) To improve the model accuracy

Answer: c) To bring features to a similar scale

35. Which of the following is not a classification algorithm?

- a) Logistic Regression
- b) Decision Tree
- c) K-means clustering
- d) Naive Bayes

Answer: c) K-means clustering

36. Which method is used to assess multicollinearity among independent variables in regression analysis?

- a) Variance Inflation Factor (VIF)
- b) Confusion Matrix
- c) Principal Component Analysis (PCA)
- d) Entropy

Answer: a) Variance Inflation Factor (VIF)

37. What is the primary objective of hierarchical clustering?

- a) Maximizing intra-cluster similarity
- b) Minimizing intra-cluster similarity
- c) Maximizing inter-cluster similarity
- d) Minimizing inter-cluster similarity

Answer: d) Minimizing inter-cluster similarity

38. Which algorithm is used for time series forecasting?

- a) ARIMA
- b) K-means clustering
- c) Decision Tree
- d) Logistic Regression

Answer: a) ARIMA

39. Which method is used to split a dataset into multiple subsets for training and testing?

- a) Holdout validation
- b) K-fold Cross Validation
- c) Leave-One-Out Cross Validation
- d) Ridge Regression

Answer: b) K-fold Cross Validation

40. Which library is used for creating heatmaps in Python?

- a) Matplotlib
- b) Seaborn
- c) Plotly
- d) Pandas

Answer: b) Seaborn

41. Which of the following is a supervised learning algorithm?

- a) K-means clustering
- b) K-nearest Neighbors
- c) Hierarchical clustering
- d) DBSCAN

Answer: b) K-nearest Neighbors

42. What is the primary objective of hierarchical clustering?

- a) Maximizing intra-cluster similarity

- b) Minimizing intra-cluster similarity
- c) Maximizing inter-cluster similarity
- d) Minimizing inter-cluster similarity

Answer: d) Minimizing inter-cluster similarity

43. Which of the following is not a step in the machine learning pipeline?

- a) Model Training
- b) Model Testing
- c) Model Evaluation
- d) Model Deployment

Answer: b) Model Testing

44. Which method is used to evaluate the performance of a regression model?

- a) Confusion Matrix
- b) R-squared
- c) Precision and Recall
- d) F1-score

Answer: b) R-squared

45. Which algorithm is used for anomaly detection?

- a) Linear Regression
- b) SVM
- c) K-means clustering
- d) DBSCAN

Answer: d) DBSCAN

46. Which method is used to select the most important features in a machine learning model?

- a) Recursive Feature Elimination
- b) PCA
- c) VIF

d) All of the above

Answer: a) Recursive Feature Elimination

47. What is the main objective of hyperparameter tuning?

- a) To select the optimal features for a model
- b) To select the optimal parameters for a model
- c) To evaluate the performance of a model
- d) To interpret the results of a model

Answer: b) To select the optimal parameters for a model

48. Which algorithm is used for density estimation and clustering?

- a) DBSCAN
- b) K-means clustering
- c) Linear Regression
- d) Decision Tree

Answer: a) DBSCAN

49. Which of the following is not a step in the machine learning pipeline?

- a) Model Training
- b) Model Testing
- c) Model Evaluation
- d) Model Deployment

Answer: b) Model Testing

50. Which method is used to handle multicollinearity among independent variables in regression analysis?

- a) Variance Inflation Factor (VIF)
- b) Confusion Matrix
- c) Principal Component Analysis (PCA)
- d) Entropy

Answer: a) Variance Inflation Factor (VIF)



Section - B (2 marks 25 questions)

51. What is the primary objective of hierarchical clustering?

- a) Maximizing intra-cluster similarity
- b) Minimizing intra-cluster similarity
- c) Maximizing inter-cluster similarity
- d) Minimizing inter-cluster similarity

Answer: d) Minimizing inter-cluster similarity

52. Which of the following is not a step in the machine learning pipeline?

- a) Data Preprocessing
- b) Model Training
- c) Model Validation
- d) Model Presentation

Answer: d) Model Presentation

53. Which method is used to handle multicollinearity in regression analysis?

- a) PCA
- b) VIF
- c) Entropy
- d) K-means clustering

Answer: b) VIF

54. Which algorithm is used for density estimation and clustering?

- a) DBSCAN
- b) K-means clustering
- c) Linear Regression
- d)

) Decision Tree

Answer: a) DBSCAN

55. Which method is used to handle missing values in a dataset?

- a) Deleting rows with missing values
- b) Imputation
- c) Feature scaling
- d) All of the above

Answer: d) All of the above

56. Which of the following is not a type of ensemble learning technique?

- a) Bagging
- b) Boosting
- c) Stacking
- d) Ridge Regression

Answer: d) Ridge Regression

57. Which algorithm is used for density-based clustering?

- a) K-means clustering
- b) DBSCAN
- c) Hierarchical clustering
- d) Spectral clustering

Answer: b) DBSCAN

58. Which method is used to handle missing values in a dataset?

- a) Dropping rows with missing values
- b) Imputation
- c) Feature scaling
- d) All of the above

Answer: d) All of the above

59. What is the primary purpose of feature scaling?

- a) To increase the interpretability of the model
- b) To reduce the computational time
- c) To bring features to a similar scale
- d) To improve the model accuracy

Answer: c) To bring features to a similar scale

60. Which of the following is not a classification algorithm?

- a) Logistic Regression
- b) Decision Tree
- c) K-means clustering
- d) Naive Bayes

Answer: c) K-means clustering

61. Which method is used to assess multicollinearity among independent variables in regression analysis?

- a) Variance Inflation Factor (VIF)
- b) Confusion Matrix
- c) Principal Component Analysis (PCA)
- d) Entropy

Answer: a) Variance Inflation Factor (VIF)

62. What is the primary objective of hierarchical clustering?

- a) Maximizing intra-cluster similarity
- b) Minimizing intra-cluster similarity
- c) Maximizing inter-cluster similarity
- d) Minimizing inter-cluster similarity

Answer: d) Minimizing inter-cluster similarity

63. Which algorithm is used for time series forecasting?

- a) ARIMA
- b) K-means clustering
- c) Decision Tree
- d) Logistic Regression

Answer: a) ARIMA

64. Which method is used to split a dataset into multiple subsets for training and testing?

- a) Holdout validation
- b) K-fold Cross Validation
- c) Leave-One-Out Cross Validation
- d) Ridge Regression

Answer: b) K-fold Cross Validation

5. What method is used in Pandas to remove duplicate rows?

- A. dropna()
- B. drop\_duplicates()
- C. remove\_duplicates()
- D. clean\_duplicates()

- **Answer:** B

66. How do you fill missing values in a DataFrame with the mean of the column?

- A. fillna(mean())
- B. replace\_na(mean())
- C. fillna(DataFrame.mean())
- D. fillna(df.mean())

- **Answer:** D

### Descriptive Statistics with Python (Lectures 19-22)

67. Which of the following is a measure of central tendency?

- A. Variance
- B. Standard Deviation
- C. Mean
- D. Range
- **\*\*Answer:\*\* C**

68. What function in Pandas can be used to compute summary statistics?

- A. summary()
- B. describe()
- C. statistics()
- D. info()
- **\*\*Answer:\*\* B**

69. Which measure is used to describe the spread of data around the mean?

- A. Median
- B. Mode
- C. Standard Deviation
- D. Skewness
- **\*\*Answer:\*\* C**

### Exploratory Data Analysis (Lectures 23-26)

70. What is the primary goal of exploratory data analysis (EDA)?

- A. To build machine learning models
- B. To summarize the main characteristics of the data
- C. To clean the data
- D. To visualize data only
- **\*\*Answer:\*\* B**

71. Which plot is used to show the distribution of a single variable?

- A. Bar plot

- B. Scatter plot
- C. Histogram
- D. Line plot
- **\*\*Answer:\*\* C**

72. Which method in Pandas is used to compute pairwise correlation of columns?

- A. correlate()
- B. corr()
- C. pairwise\_corr()
- D. cov()
- **\*\*Answer:\*\* B**

### Visualization Libraries in Python (Lectures 27-30)

73. Which Python library is known for its simplicity and efficiency in creating basic plots?

- A. Seaborn
- B. Matplotlib
- C. plotly
- D. Bokeh
- **\*\*Answer:\*\* B**

74. Which library is built on top of Matplotlib and provides a high-level interface for drawing attractive statistical graphics?

- A. Seaborn
- B. plotly
- C. ggplot
- D. pandas
- **\*\*Answer:\*\* A**

75. What is a key feature of plotly?

- A. Static plots
- B. Interactive plots

- C. Basic plotting capabilities
- D. Text editing
- **\*\*Answer:\*\* B**

1. Which of the following libraries is used for scientific computing in Python?

- a) Pandas
- b) Matplotlib
- c) NumPy
- d) Seaborn

Answer: c) NumPy

2. What is the output of the following code snippet?

```
```python
import numpy as np
arr = np.array([[1, 2], [3, 4]])
print(np.sum(arr))
```
```

- a) 3
- b) 7
- c) 10
- d) 15

Answer: c) 10

3. In Pandas, which method is used to rename columns in a DataFrame?

- a) rename()
- b) rename\_columns()
- c) change\_columns()
- d) update\_columns()

Answer: a) rename()

4. What is the mode of the following list of numbers?

`[2, 3, 5, 5, 7, 8, 8, 8]`

a) 3

b) 5

c) 7

d) 8

Answer: d) 8

5. Which Matplotlib function is used to create a histogram?

a) `plt.hist()`

b) `plt.bar()`

c) `plt.scatter()`

d) `plt.plot()`

Answer: a) `plt.hist()`

6. What is the primary purpose of Seaborn in Python?

a) Data manipulation

b) Statistical visualization

c) Machine learning modeling

d) Natural language processing

Answer: b) Statistical visualization

7. Which of the following statements about Plotly is true?

a) It is a Python library for creating static, interactive plots.

b) It does not support 3D plotting.

c) It is primarily used for statistical analysis.

d) It requires an internet connection to generate plots.

Answer: a) It is a Python library for creating static, interactive plots.

8. Which statistical plot is used to visualize the relationship between two variables in Seaborn?



- a) Box plot
- b) Scatter plot
- c) Histogram
- d) Bar plot

Answer: b) Scatter plot

9. Which of the following methods is used to create a DataFrame in Pandas?

- a) `pd.create_df()`
- b) `pd.DataFrame()`
- c) `pd.make_df()`
- d) `pd.df()`

Answer: b) `pd.DataFrame()`

10. What is the median of the following list of numbers?

`[4, 6, 8, 10, 12]`

- a) 6
- b) 8
- c) 10
- d) 12

Answer: b) 8

11. Which Seaborn function is used to create a bar plot?

- a) `sns.barplot()`
- b) `sns.scatterplot()`
- c) `sns.lineplot()`
- d) `sns.boxplot()`

Answer: a) `sns.barplot()`

12. Which of the following is a correct syntax to import the Plotly library in Python?

- a) `import plotly.plotly as py`

- b) ``import plotly``
- c) ``from plotly import plotly``
- d) ``import plotly as py``

Answer: d) ``import plotly as py``

13. What is the output of the following code snippet?

```
```python
import numpy as np
arr = np.array([[1, 2], [3, 4]])
print(np.linalg.det(arr))
```
```

- a) 0
- b) 1
- c) 2
- d) 3

Answer: b) 1

14. Which method is used to handle missing values in a DataFrame in Pandas?

- a) `dropna()`
- b) `fillna()`
- c) `remove_na()`
- d) `delete_na()`

Answer: b) `fillna()`

15. What is the primary objective of PCA (Principal Component Analysis)?

- a) To increase model complexity
- b) To reduce the dimensionality of the data
- c) To remove outliers from the dataset
- d) To perform feature selection

Answer: b) To reduce the dimensionality of the data

16. Which of the following is a supervised learning algorithm?

- a) K-means clustering
- b) K-nearest Neighbors
- c) Hierarchical clustering
- d) DBSCAN

Answer: b) K-nearest Neighbors

17. What is the primary objective of hierarchical clustering?

- a) Maximizing intra-cluster similarity
- b) Minimizing intra-cluster similarity
- c) Maximizing inter-cluster similarity
- d) Minimizing inter-cluster similarity

Answer: d) Minimizing inter-cluster similarity

18. Which of the following is not a step in the machine learning pipeline?

- a) Model Training
- b) Model Testing
- c) Model Evaluation
- d) Model Deployment

Answer: b) Model Testing

19. Which method is used to evaluate the performance of a regression model?

- a) Confusion Matrix
- b) R-squared
- c) Precision and Recall
- d) F1-score

Answer: b) R-squared

20. Which algorithm is used for anomaly detection?

- a) Linear Regression
- b) SVM
- c) K-means clustering
- d) DBSCAN

Answer: d) DBSCAN

21. Which method is used to select the most important features in a machine learning model?

- a) Recursive Feature Elimination
- b) PCA
- c) VIF
- d) All of the above

Answer: a) Recursive Feature Elimination

22. What is the main objective of hyperparameter tuning?

- a) To select the optimal features for a model
- b) To select the optimal parameters for a model
- c) To evaluate the performance of a model
- d) To interpret the results of a model

Answer: b) To select the optimal parameters for a model

23. Which algorithm is used for density estimation and clustering?

- a) DBSCAN
- b) K-means clustering
- c) Linear Regression
- d) Decision Tree

Answer: a) DBSCAN

24. Which of the following is not a step in the machine learning pipeline?

- a) Model Training
- b) Model Testing

- c) Model Evaluation
- d) Model Deployment

Answer: b) Model Testing

25. Which method is used to handle multicollinearity among independent variables in regression analysis?

- a) Variance Inflation Factor (VIF)
- b) Confusion Matrix
- c) Principal Component Analysis (PCA)
- d) Entropy

Answer: a) Variance Inflation Factor (VIF)

26

. What is the primary objective of hierarchical clustering?

- a) Maximizing intra-cluster similarity
- b) Minimizing intra-cluster similarity
- c) Maximizing inter-cluster similarity
- d) Minimizing inter-cluster similarity

Answer: d) Minimizing inter-cluster similarity

27. Which of the following is not a step in the machine learning pipeline?

- a) Data Preprocessing
- b) Model Training
- c) Model Validation
- d) Model Presentation

Answer: d) Model Presentation

28. Which method is used to handle multicollinearity in regression analysis?

- a) PCA
- b) VIF

- c) Entropy
- d) K-means clustering

Answer: b) VIF

29. Which algorithm is used for density estimation and clustering?

- a) DBSCAN
- b) K-means clustering
- c) Linear Regression
- d) Decision Tree

Answer: a) DBSCAN

30. Which method is used to handle missing values in a dataset?

- a) Deleting rows with missing values
- b) Imputation
- c) Feature scaling
- d) All of the above

Answer: d) All of the above

31. Which of the following is not a type of ensemble learning technique?

- a) Bagging
- b) Boosting
- c) Stacking
- d) Ridge Regression

Answer: d) Ridge Regression

32. Which algorithm is used for density-based clustering?

- a) K-means clustering
- b) DBSCAN
- c) Hierarchical clustering
- d) Spectral clustering

Answer: b) DBSCAN

33. Which method is used to handle missing values in a dataset?

- a) Dropping rows with missing values
- b) Imputation
- c) Feature scaling
- d) All of the above

Answer: d) All of the above

34. What is the primary purpose of feature scaling?

- a) To increase the interpretability of the model
- b) To reduce the computational time
- c) To bring features to a similar scale
- d) To improve the model accuracy

Answer: c) To bring features to a similar scale

35. Which of the following is not a classification algorithm?

- a) Logistic Regression
- b) Decision Tree
- c) K-means clustering
- d) Naive Bayes

Answer: c) K-means clustering

36. Which method is used to assess multicollinearity among independent variables in regression analysis?

- a) Variance Inflation Factor (VIF)
- b) Confusion Matrix
- c) Principal Component Analysis (PCA)
- d) Entropy

Answer: a) Variance Inflation Factor (VIF)

37. What is the primary objective of hierarchical clustering?

- a) Maximizing intra-cluster similarity
- b) Minimizing intra-cluster similarity
- c) Maximizing inter-cluster similarity
- d) Minimizing inter-cluster similarity

Answer: d) Minimizing inter-cluster similarity

38. Which algorithm is used for time series forecasting?

- a) ARIMA
- b) K-means clustering
- c) Decision Tree
- d) Logistic Regression

Answer: a) ARIMA

39. Which method is used to split a dataset into multiple subsets for training and testing?

- a) Holdout validation
- b) K-fold Cross Validation
- c) Leave-One-Out Cross Validation
- d) Ridge Regression

Answer: b) K-fold Cross Validation

40. Which library is used for creating heatmaps in Python?

- a) Matplotlib
- b) Seaborn
- c) Plotly
- d) Pandas

Answer: b) Seaborn

41. Which of the following is a supervised learning algorithm?

- a) K-means clustering



- b) K-nearest Neighbors
- c) Hierarchical clustering
- d) DBSCAN

Answer: b) K-nearest Neighbors

42. What is the primary objective of hierarchical clustering?

- a) Maximizing intra-cluster similarity
- b) Minimizing intra-cluster similarity
- c) Maximizing inter-cluster similarity
- d) Minimizing inter-cluster similarity

Answer: d) Minimizing inter-cluster similarity

43. Which of the following is not a step in the machine learning pipeline?

- a) Model Training
- b) Model Testing
- c) Model Evaluation
- d) Model Deployment

Answer: b) Model Testing

44. Which method is used to evaluate the performance of a regression model?

- a) Confusion Matrix
- b) R-squared
- c) Precision and Recall
- d) F1-score

Answer: b) R-squared

45. Which algorithm is used for anomaly detection?

- a) Linear Regression
- b) SVM
- c) K-means clustering

d) DBSCAN

Answer: d) DBSCAN

46. Which method is used to select the most important features in a machine learning model?

a) Recursive Feature Elimination

b) PCA

c) VIF

d) All of the above

Answer: a) Recursive Feature Elimination

47. What is the main objective of hyperparameter tuning?

a) To select the optimal features for a model

b) To select the optimal parameters for a model

c) To evaluate the performance of a model

d) To interpret the results of a model

Answer: b) To select the optimal parameters for a model

48. Which algorithm is used for density estimation and clustering?

a) DBSCAN

b) K-means clustering

c) Linear Regression

d) Decision Tree

Answer: a) DBSCAN

49. Which of the following is not a step in the machine learning pipeline?

a) Model Training

b) Model Testing

c) Model Evaluation

d) Model Deployment

Answer: b) Model Testing

50. Which method is used to handle multicollinearity among independent variables in regression analysis?

- a) Variance Inflation Factor (VIF)
- b) Confusion Matrix
- c) Principal Component Analysis (PCA)
- d) Entropy

Answer: a) Variance Inflation Factor (VIF)

51. Machine Learning is a subset of which broader field?

- A. Data Mining
  - B. Artificial Intelligence
  - C. Software Engineering
  - D. Computer Graphics
- \*\*Answer:\*\* B

### Overview of Popular ML Applications (Lectures 4-8)

52. Which of the following is an example of a machine learning application in healthcare?

- A. Virtual Reality
  - B. Predictive diagnostics
  - C. Online advertising
  - D. Video streaming
- \*\*Answer:\*\* B

53. Which machine learning application is used in finance for assessing loan eligibility?

- A. Customer segmentation
  - B. Fraud detection
  - C. Credit scoring
  - D. Portfolio management
- \*\*Answer:\*\* C

54. Which of these applications uses machine learning for personalized content recommendations?

- A. Email filtering
- B. Search engines
- C. Social media platforms
- D. E-commerce websites
- \*\*Answer:\*\* D

### ### Python Recap and Essential Libraries (Lectures 4-8)

55. Which of the following is not a core library in Python for data analysis?

- A. NumPy
- B. Pandas
- C. TensorFlow
- D. SciPy
- \*\*Answer:\*\* C

56. What is the primary data structure used by the NumPy library?

- A. List
- B. Series
- C. DataFrame
- D. ndarray
- \*\*Answer:\*\* D

57. Which library in Python is essential for data manipulation and analysis?

- A. Pandas
- B. NumPy
- C. Matplotlib
- D. Seaborn
- \*\*Answer:\*\* A

### ### Data Manipulation with Pandas (Lectures 9-11)

58. What is the primary data structure used by Pandas for tabular data?

- A. ndarray
- B. Series
- C. DataFrame
- D. List
- **\*\*Answer:\*\* C**

59. Which function is used to create a DataFrame in Pandas?

- A. DataFrame()
- B. array()
- C. table()
- D. matrix()
- **\*\*Answer:\*\* A**

60. Which of the following methods can be used to view the first few rows of a DataFrame?

- A. head()
- B. tail()
- C. show()
- D. display()
- **\*\*Answer:\*\* A**

### ### Reading and Writing Data (Lectures 12-15)

61. Which function in Pandas is used to read a CSV file?

- A. read\_excel()
- B. read\_csv()
- C. read\_sql()
- D. read\_table()
- **\*\*Answer:\*\* B**

62. How do you write a DataFrame to a CSV file in Pandas?

- A. to\_csv()
- B. write\_csv()
- C. save\_csv()
- D. export\_csv()
- **\*\*Answer:\*\* A**

63. Which method is used to read an Excel file into a DataFrame?

- A. read\_table()
- B. read\_excel()
- C. read\_sql()
- D. read\_file()
- **\*\*Answer:\*\* B**

### Data Cleaning and Preprocessing (Lectures 16-19)

64. Which of the following is not a data cleaning technique?

- A. Removing duplicates
- B. Filling missing values
- C. Data visualization
- D. Encoding categorical variables
- **\*\*Answer:\*\* C**

65. What method is used in Pandas to remove duplicate rows?

- A. dropna()
- B. drop\_duplicates()
- C. remove\_duplicates()
- D. clean\_duplicates()
- **\*\*Answer:\*\* B**

66. How do you fill missing values in a DataFrame with the mean of the column?

- A. fillna(mean())

- B. `replace_na(mean())`
- C. `fillna(DataFrame.mean())`
- D. `fillna(df.mean())`
- **Answer:** D

### ### Descriptive Statistics with Python (Lectures 19-22)

67. Which of the following is a measure of central tendency?

- A. Variance
- B. Standard Deviation
- C. Mean
- D. Range
- **Answer:** C

68. What function in Pandas can be used to compute summary statistics?

- A. `summary()`
- B. `describe()`
- C. `statistics()`
- D. `info()`
- **Answer:** B

69. Which measure is used to describe the spread of data around the mean?

- A. Median
- B. Mode
- C. Standard Deviation
- D. Skewness
- **Answer:** C

### ### Exploratory Data Analysis (Lectures 23-26)

70. What is the primary goal of exploratory data analysis (EDA)?

- A. To build machine learning models

- B. To summarize the main characteristics of the data
- C. To clean the data
- D. To visualize data only
- **Answer:** B

71. Which plot is used to show the distribution of a single variable?

- A. Bar plot
- B. Scatter plot
- C. Histogram
- D. Line plot
- **Answer:** C

72. Which method in Pandas is used to compute pairwise correlation of columns?

- A. correlate()
- B. corr()
- C. pairwise\_corr()
- D. cov()
- **Answer:** B

### Visualization Libraries in Python (Lectures 27-30)

73. Which Python library is known for its simplicity and efficiency in creating basic plots?

- A. Seaborn
- B. Matplotlib
- C. plotly
- D. Bokeh
- **Answer:** B

74. Which library is built on top of Matplotlib and provides a high-level interface for drawing attractive statistical graphics?

- A. Seaborn
- B. plotly



- C. ggplot
- D. pandas
- **\*\*Answer:\*\* A**

75. What is a key feature of plotly?

- A. Static plots
- B. Interactive plots
- C. Basic plotting capabilities
- D. Text editing
- **\*\*Answer:\*\* B**

1. Which of the following libraries is not used for data manipulation in Python?

- a) NumPy
- b) Pandas
- c) Matplotlib
- d) Seaborn

Answer: c) Matplotlib

2. What is the output of the following code snippet?

```
```python
import numpy as np
arr = np.array([1, 2, 3, 4, 5])
print(arr.mean())
```
```

- a) 1
- b) 2
- c) 3
- d) 3.0

Answer: d) 3.0

3. In Pandas, which method is used to drop rows with missing values?

- a) dropna()
- b) fillna()
- c) remove()
- d) delete()

Answer: a) dropna()

4. What is the median of the following list of numbers?

`[2, 4, 6, 8, 10]`

- a) 5
- b) 6
- c) 7
- d) 8

Answer: b) 6

5. Which of the following methods is used to create scatter plots in Matplotlib?

- a) plot()
- b) scatter()
- c) line()
- d) points()

Answer: b) scatter()

6. What is the primary purpose of using Seaborn in Python?

- a) Data Manipulation
- b) Machine Learning
- c) Statistical Visualization
- d) Mathematical Modeling

Answer: c) Statistical Visualization

7. Which of the following is a correct syntax to import the Seaborn library in Python?

- a) ``import seaborn as sns``
- b) ``import sns.seaborn``
- c) ``from seaborn import sns``
- d) ``import seaborn``

Answer: a) ``import seaborn as sns``

8. Which statistical plot is used to visualize the distribution of a single variable in Seaborn?

- a) Scatter plot
- b) Histogram
- c) Box plot
- d) Bar plot

Answer: b) Histogram

9. Which of the following is a correct way to calculate the standard deviation of a dataset in NumPy?

- a) ``np.stdev()``
- b) ``np.std_dev()``
- c) ``np.std()``
- d) ``np.standard_deviation()``

Answer: c) ``np.std()``

10. What is the output of the following code snippet?

```
```python
import numpy as np
arr = np.array([[1, 2], [3, 4]])
print(np.linalg.det(arr))
```
```

- a) 0
- b) 1
- c) 2
- d) 3

Answer: a) 0

11. Which of the following statements about linear regression is true?

- a) It is used for classification tasks.
- b) It models the relationship between a dependent variable and one or more independent variables.
- c) It is a clustering algorithm.
- d) It is also known as logistic regression.

Answer: b) It models the relationship between a dependent variable and one or more independent variables.

12. What is the purpose of regularization in machine learning?

- a) To penalize large coefficients in the model.
- b) To increase model complexity.
- c) To remove outliers from the dataset.
- d) To reduce bias in the model.

Answer: a) To penalize large coefficients in the model.

13. Which of the following is an advantage of using support vector machines (SVM)?

- a) It is not suitable for high-dimensional data.
- b) It is not effective when the number of features is much greater than the number of samples.
- c) It works well with both linearly separable and non-linearly separable data.
- d) It is computationally less efficient.

Answer: c) It works well with both linearly separable and non-linearly separable data.

14. Which method is used to find the optimal parameters for a machine learning model by exhaustively searching through a specified parameter grid?

- a) Grid Search
- b) Random Search
- c) Cross-Validation
- d) Regularization

Answer: a) Grid Search

15. What is the primary objective of PCA (Principal Component Analysis)?

- a) To increase model complexity
- b) To reduce the dimensionality of the data
- c) To remove outliers from the dataset
- d) To perform feature selection

Answer: b) To reduce the dimensionality of the data

16. Which of the following statements about K-means clustering is true?

- a) It requires the number of clusters to be specified in advance.
- b) It is a hierarchical clustering algorithm.
- c) It works well with non-linearly separable data.
- d) It is a supervised learning algorithm.

Answer: a) It requires the number of clusters to be specified in advance.

17. What is the output of the following code snippet?

```
```python
from sklearn.preprocessing import MinMaxScaler
data = [[-1, 2], [-0.5, 6], [0, 10], [1, 18]]
scaler = MinMaxScaler()
print(scaler.fit_transform(data))
```
```

- a) [[0.0, 0.0], [0.25, 0.25], [0.5, 0.5], [1.0, 1.0]]
- b) [[0.0, 0.0], [0.5, 0.25], [1.0, 0.5], [2.0, 1.0]]
- c) [[-1.0, 2.0], [-0.5, 6.0], [0.0, 10.0], [1.0, 18.0]]
- d)

) [[0.0, 0.0], [0.5, 0.66666667], [1.0, 1.0], [2.0, 2.0]]

Answer: a) [[0.0, 0.0], [0.25, 0.25], [0.5, 0.5], [1.0, 1.0]]

18. Which of the following statements is true about Seaborn's pairplot() function?

- a) It creates a grid of pair-wise plots for numerical columns in a DataFrame
- b) It creates a correlation matrix plot
- c) It is used for 3D plotting
- d) It creates a box plot for each numerical column in a DataFrame

Answer: a) It creates a grid of pair-wise plots for numerical columns in a DataFrame

19. Which method is used to evaluate the performance of a regression model?

- a) Confusion Matrix
- b) R-squared
- c) Precision and Recall
- d) F1-score

Answer: b) R-squared

20. What does the log\_scale parameter in Plotly's scatter() function control?

- a) The scale of the x-axis
- b) The scale of the y-axis
- c) The scale of both x-axis and y-axis
- d) The color scale of the markers

Answer: c) The scale of both x-axis and y-axis

21. What is the primary objective of hierarchical clustering?

- a) Maximizing intra-cluster similarity
- b) Minimizing intra-cluster similarity
- c) Maximizing inter-cluster similarity
- d) Minimizing inter-cluster similarity

Answer: d) Minimizing inter-cluster similarity

22. Which of the following is not a step in the machine learning pipeline?

- a) Model Training
- b) Model Testing
- c) Model Evaluation
- d) Model Deployment

Answer: b) Model Testing

23. Which method is used to handle multicollinearity among independent variables in regression analysis?

- a) Variance Inflation Factor (VIF)
- b) Confusion Matrix
- c) Principal Component Analysis (PCA)
- d) Entropy

Answer: a) Variance Inflation Factor (VIF)

24. What assumption does Linear Regression make about the relationship between the independent and dependent variables?

- a) Linearity
- b) Normality
- c) Homoscedasticity
- d) All of the above

Answer: a) Linearity

25. What does the intercept term represent in logistic regression?

- a) The slope of the decision boundary
- b) The threshold for classification
- c) The value of the dependent variable when all independent variables are zero
- d) The variance in the dependent variable

Answer: b) The threshold for classification

26. What is the main objective of hyperparameter tuning?

- a) To select the optimal features for a model

- b) To select the optimal parameters for a model
- c) To evaluate the performance of a model
- d) To interpret the results of a model

Answer: b) To select the optimal parameters for a model

27. Which algorithm is used for density estimation and clustering?

- a) DBSCAN
- b) K-means clustering
- c) Linear Regression
- d) Decision Tree

Answer: a) DBSCAN

28. Which of the following is not a step in the machine learning pipeline?

- a) Model Training
- b) Model Testing
- c) Model Evaluation
- d) Model Deployment

Answer: b) Model Testing

29. What is the primary objective of hierarchical clustering?

- a) Maximizing intra-cluster similarity
- b) Minimizing intra-cluster similarity
- c) Maximizing inter-cluster similarity
- d) Minimizing inter-cluster similarity

Answer: d) Minimizing inter-cluster similarity

30. Which of the following is not a step in the machine learning pipeline?

- a) Data Preprocessing
- b) Model Training
- c) Model Validation



d) Model Presentation

Answer: d) Model Presentation

31. Which method is used to measure the spread of data points in a dataset?

a) Mean

b) Median

c) Variance

d) Mode

Answer: c) Variance

32. Which algorithm is used for regression tasks with multiple independent variables?

a) Simple Linear Regression

b) Multiple Linear Regression

c) Logistic Regression

d) Polynomial Regression

Answer: b) Multiple Linear Regression

33. Which library is used for creating heatmaps in Python?

a) Matplotlib

b) Seaborn

c) Plotly

d) Pandas

Answer: b) Seaborn

34. Which of the following is not a common activation function used in neural networks?

a) ReLU

b) Sigmoid

c) Softmax

d) MSE

Answer: d) MSE

35. Which method is used to handle multicollinearity in regression analysis?

- a) PCA
- b) VIF
- c) Entropy
- d) K-means clustering

Answer: b) VIF

36. Which algorithm is used for density estimation and clustering?

- a) DBSCAN
- b) K-means clustering
- c) Linear Regression
- d) Decision Tree

Answer: a) DBSCAN

37. Which method is used to handle outliers in a dataset?

- a) Deleting outliers
- b) Transforming outliers
- c) Imputing outliers
- d) All of the above

Answer: d) All of the above

38. Which of the following is not a type of regression algorithm?

- a) Linear Regression
- b) Logistic Regression
- c) Ridge Regression

d) K-means Regression

Answer: d) K-means Regression

39. Which method is used to evaluate the performance of a regression model?

a) Confusion Matrix

b) R-squared

c) Precision and Recall

d) F1-score

Answer: b) R-squared

40. Which algorithm is used for anomaly detection?

a) Linear Regression

b) SVM

c) K-means clustering

d) DBSCAN

Answer: d) DBSCAN

41. You have a dataset with missing values in some of the features. Which preprocessing technique would be most appropriate to handle this issue?

a) Mean imputation

b) Median imputation

c) Removing samples with missing values

d) Interpolation

Answer: d) Interpolation

42. What is the main objective of hyperparameter tuning?

a) To select the optimal features for a model

b) To select the optimal parameters for a model

c) To evaluate the performance of a model

d) To interpret the results of a model

Answer: b) To select the optimal parameters for a model

43. Which algorithm is used for feature extraction in deep learning?

a) CNN

b) RNN

c) LSTM

d) GRU

Answer: a) CNN

44. You are training a neural network model and notice that the training loss keeps decreasing, but the validation loss starts increasing after a certain number of epochs. What is this phenomenon called?

a) Overfitting

b) Underfitting

c) Model saturation

d) Learning rate decay

Answer: a) Overfitting

45. Which of the following is not a metric used to evaluate the performance of a classification model?

a) Accuracy

b) Mean Squared Error

c) Precision

d) Recall

Answer: b) Mean Squared Error

46. Which algorithm is used for natural language processing tasks?

a) K-means clustering

b) Naive Bayes

c) Decision Tree

d) Random Forest

Answer: b) Naive Bayes

47. Which method is used to select the optimal number of clusters in K-means clustering?

a) Elbow method

b) Silhouette method

c) Gap statistic

d) All of the above

Answer: d) All of the above

48. You have a linear regression model with a coefficient of determination ( $R^2$ ) of 0.95. What does this indicate about the model's performance?

a) The model explains 95% of the variance in the dependent variable

b) The model is overfitting the data

c) The model is underfitting the data

d) The model has a high bias

Answer: a) The model explains 95% of the variance in the dependent variable

49. Which method is used to handle missing values in a dataset?

a) Dropping rows with missing values

b) Imputation

c) Feature scaling

d) All of the above

Answer: d) All of the above

Section - B(2 marks 25 questions)

50. If you increase the number of hidden layers in a neural network model, what is likely to happen to the model's complexity?

- a) Increase
- b) Decrease
- c) Remain unchanged
- d) Depends on the activation function used

Answer: a) Increase

51. Which algorithm is used for density-based clustering?

- a) K-means clustering
- b) DBSCAN
- c) Hierarchical clustering
- d) Spectral clustering

Answer: b) DBSCAN

52. Which method is used to handle missing values in a dataset?

- a) Dropping rows with missing values
- b) Imputation
- c) Feature scaling
- d) All of the above

Answer: d) All of the above

53. What is the primary purpose of feature scaling?

- a) To increase the interpretability of the model
- b) To reduce the computational time
- c) To bring features to a similar scale
- d) To improve the model accuracy

Answer: c) To bring features to a similar scale

54. Which of the following is not a classification algorithm?

- a) Logistic Regression
- b) Decision Tree

c) K-means clustering

d) Naive Bayes

Answer: c) K-means clustering

55. You have a dataset with highly imbalanced classes, where class 1 has 90% of the samples and class 0 has only 10%. Which evaluation metric would be most appropriate to assess model performance?

a) Accuracy

b) Precision

c) F1-score

d) AUC-ROC score

Answer: c) F1-score

56. What is the primary objective of hierarchical clustering?

a) Maximizing intra-cluster similarity

b) Minimizing intra-cluster similarity

c) Maximizing inter-cluster similarity

d) Minimizing inter-cluster similarity

Answer: d) Minimizing inter-cluster similarity

57. You have a dataset with 1000 samples and you split it into 80% training and 20% testing data. How many samples will be in the testing dataset?

a) 200

b) 800

c) 100

d) 250

Answer: a) 200

58. Which method is used to split a dataset into multiple subsets for training and testing?

a) Holdout validation

- b) K-fold Cross Validation
- c) Leave-One-Out Cross Validation
- d) Ridge Regression

Answer: b) K-fold Cross Validation

59. Which library is used for creating heatmaps in Python?

- a) Matplotlib
- b) Seaborn
- c) Plotly
- d) Pandas

Answer: b) Seaborn

60. Which of the following is a supervised learning algorithm?

- a) K-means clustering
- b) K-nearest Neighbors
- c) Hierarchical clustering
- d) DBSCAN

Answer: b) K-nearest Neighbors

61. \*\*Which type of neural network is primarily used for sequence modeling?\*\*

- A) Convolutional Neural Network (CNN)
- B) Recurrent Neural Network (RNN)
- C) Feedforward Neural Network (FNN)
- D) Radial Basis Function Network (RBFN)
- \*\*Answer: B\*\*

62. \*\*Which concept in ML is defined as the trade-off between bias and variance?\*\*

- A) Overfitting
- B) Underfitting
- C) Bias-Variance Tradeoff



- D) Regularization

- \*\*Answer: C\*\*

63. \*\*Which type of learning algorithm uses labeled and unlabeled data for training?\*\*

- A) Supervised Learning

- B) Unsupervised Learning

- C) Semi-Supervised Learning

- D) Reinforcement Learning

- \*\*Answer: C\*\*

### ### Advanced Overview of Popular ML Applications

64. \*\*What is the purpose of the 'dropout' technique in neural networks?\*\*

- A) To improve computation speed

- B) To reduce overfitting

- C) To enhance feature extraction

- D) To increase the model's capacity

- \*\*Answer: B\*\*

65. \*\*Which technique is used to handle imbalanced datasets in classification problems?\*\*

- A) Regularization

- B) Data Augmentation

- C) SMOTE (Synthetic Minority Over-sampling Technique)

- D) Feature Scaling

- \*\*Answer: C\*\*

66. \*\*What is 'transfer learning' in the context of neural networks?\*\*

- A) Training a model from scratch

- B) Using pre-trained models on similar tasks

- C) Cross-validation technique

- D) Ensemble learning technique
- \*\*Answer: B\*\*

### ### Advanced Data Manipulation with Pandas

67. \*\*Which method in Pandas is used to merge DataFrames on a key and allows for a SQL-style join?\*\*

- A) join()
- B) concat()
- C) merge()
- D) combine()
- \*\*Answer: C\*\*

68. \*\*How do you apply a function along the axis of a DataFrame in Pandas?\*\*

- A) apply()
- B) map()
- C) applymap()
- D) transform()
- \*\*Answer: A\*\*

69. \*\*What does the 'pivot\_table()' function do in Pandas?\*\*

- A) It reshapes data into a pivot table format
- B) It groups data based on a column
- C) It merges two DataFrames
- D) It creates a cross-tabulation of two or more factors
- \*\*Answer: A\*\*

### ### Advanced Reading and Writing Data

70. \*\*Which parameter in 'read\_csv()' allows for parsing dates?\*\*

- A) parse\_dates

- B) dates
- C) date\_format
- D) datetime
- \*\*Answer: A\*\*

71. \*\*How can you specify the sheet name when reading an Excel file into a Pandas DataFrame?\*\*

- A) sheet
- B) sheet\_name
- C) sheet\_label
- D) sheet\_num
- \*\*Answer: B\*\*

72. \*\*Which function in Pandas allows you to write a DataFrame to a JSON file?\*\*

- A) to\_json()
- B) write\_json()
- C) save\_json()
- D) export\_json()
- \*\*Answer: A\*\*

### ### Advanced Data Cleaning and Preprocessing

73. \*\*What does the method 'interpolate()' do in Pandas?\*\*

- A) It fills missing values using interpolation
- B) It removes rows with missing values
- C) It replaces missing values with a fixed value
- D) It splits data into train and test sets
- \*\*Answer: A\*\*

74. \*\*Which method in Pandas can be used to change the order of columns in a DataFrame?\*\*

- A) `reindex()`
- B) `rearrange()`
- C) `set_index()`
- D) `sort_index()`
- **\*\*Answer: A\*\***

75. **\*\*What is the effect of 'normalize=True' in the `value_counts()` method in Pandas?\*\***

- A) It returns the absolute frequencies
- B) It returns the relative frequencies as percentages
- C) It sorts the values in descending order
- D) It fills missing values before counting
- **\*\*Answer: B\*\***

1. **\*\*What does AI stand for?\*\***

- A) Artificial Implementation
- B) Artificial Intelligence
- C) Automated Intelligence
- D) Augmented Intelligence
- **\*\*Answer: B\*\***

2. **\*\*Which of the following is a subset of AI focused on statistical techniques?\*\***

- A) Deep Learning
- B) Machine Learning
- C) Neural Networks
- D) Data Mining
- **\*\*Answer: B\*\***

3. **\*\*Who is known as the father of Artificial Intelligence?\*\***

- A) Alan Turing
- B) John McCarthy

- C) Marvin Minsky
- D) Andrew Ng
- \*\*Answer: B\*\*

### ### Overview of Popular ML Applications

4. \*\*Which of the following is a common application of Machine Learning?\*\*

- A) Email Filtering
- B) Weather Forecasting
- C) Autonomous Vehicles
- D) All of the above
- \*\*Answer: D\*\*

5. \*\*Which library is commonly used for numerical computations in Python?\*\*

- A) Pandas
- B) Matplotlib
- C) NumPy
- D) Seaborn
- \*\*Answer: C\*\*

6. \*\*Which of the following is not a basic data structure in Python?\*\*

- A) List
- B) Dictionary
- C) DataFrame
- D) Tuple
- \*\*Answer: C\*\*

### ### Data Manipulation with Pandas

7. \*\*What is a Series in Pandas?\*\*

- A) A one-dimensional array
- B) A two-dimensional table
- C) A multi-dimensional matrix
- D) None of the above
- \*\*Answer: A\*\*

8. \*\*How do you create a DataFrame in Pandas?\*\*

- A) `pd.DataFrame()`
- B) `pd.Series()`
- C) `pd.Array()`
- D) `pd.Matrix()`
- \*\*Answer: A\*\*

9. \*\*Which of the following methods is used to read a CSV file into a Pandas DataFrame?\*\*

- A) `pd.read_csv()`
- B) `pd.read_excel()`
- C) `pd.read_sql()`
- D) `pd.read_table()`
- \*\*Answer: A\*\*

### ### Reading and Writing Data

10. \*\*Which function is used to write a DataFrame to a CSV file in Pandas?\*\*

- A) `to_csv()`
- B) `to_excel()`
- C) `to_sql()`
- D) `to_table()`
- \*\*Answer: A\*\*

11. \*\*What argument is used in `pd.read_csv()` to specify the delimiter?

- A) delimiter
- B) sep
- C) split
- D) separate
- **\*\*Answer: B\*\***

12. **\*\*Which method is used to read data from an SQL database into a DataFrame?\*\***

- A) read\_csv()
- B) read\_sql()
- C) read\_excel()
- D) read\_table()
- **\*\*Answer: B\*\***

### ### Data Cleaning and Preprocessing

13. **\*\*Which function is used to handle missing data in Pandas?\*\***

- A) fillna()
- B) dropna()
- C) isnull()
- D) Both A and B
- **\*\*Answer: D\*\***

14. **\*\*How can you remove duplicate rows in a DataFrame?\*\***

- A) remove\_duplicates()
- B) drop\_duplicates()
- C) delete\_duplicates()
- D) eliminate\_duplicates()
- **\*\*Answer: B\*\***

15. **\*\*Which method is used for changing the data type of a column in Pandas?\*\***

- A) astype()
- B) change\_type()
- C) convert\_type()
- D) set\_type()
- \*\*Answer: A\*\*

### ### Descriptive Statistics with Python

16. \*\*Which function calculates the mean in Pandas?\*\*

- A) mean()
- B) average()
- C) mid()
- D) median()
- \*\*Answer: A\*\*

17. \*\*How do you find the median of a DataFrame column?\*\*

- A) df.column.median()
- B) df.column.mean()
- C) df.column.mode()
- D) df.column.variance()
- \*\*Answer: A\*\*

18. \*\*Which of the following calculates the standard deviation of a DataFrame column?\*\*

- A) std()
- B) var()
- C) stdev()
- D) deviation()
- \*\*Answer: A\*\*

### ### Exploratory Data Analysis (EDA)



19. **What is the primary goal of EDA?**

- A) To clean data
- B) To summarize the main characteristics of the data
- C) To model data
- D) To visualize data
- **Answer: B**

20. **Which library is not commonly used for data visualization in Python?**

- A) Matplotlib
- B) Seaborn
- C) NumPy
- D) Plotly
- **Answer: C**

21. **What is a histogram used for?**

- A) Showing the frequency distribution of a set of continuous data
- B) Displaying the relationship between two variables
- C) Representing categorical data
- D) None of the above
- **Answer: A**

### Visualization Libraries in Python

22. **Which function is used to create a line plot in Matplotlib?**

- A) plot()
- B) line()
- C) graph()
- D) show()
- **Answer: A**

23. **What does the sns.barplot() function in Seaborn do?**

- A) Creates bar plots
- B) Creates scatter plots
- C) Creates line plots
- D) Creates box plots
- **Answer: A**

24. **Which library allows for interactive visualizations in Python?**

- A) Matplotlib
- B) Seaborn
- C) Plotly
- D) NumPy
- **Answer: C**

### Machine Learning Basics

25. **What is the primary difference between supervised and unsupervised learning?**

- A) Supervised learning requires labeled data, unsupervised learning does not.
- B) Unsupervised learning requires labeled data, supervised learning does not.
- C) Supervised learning is more complex than unsupervised learning.
- D) There is no difference.
- **Answer: A**

26. **In ML, what is a 'feature'?**

- A) The output of the model
- B) An individual measurable property or characteristic of a phenomenon being observed
- C) The algorithm used
- D) The training process
- **Answer: B**

27. **\*\*Which library is commonly used for machine learning in Python?\*\***

- A) NumPy
- B) Pandas
- C) scikit-learn
- D) Seaborn
- **\*\*Answer: C\*\***

### ### Linear and Logistic Regression

28. **\*\*What is the goal of linear regression?\*\***

- A) To predict categorical outcomes
- B) To find the relationship between variables
- C) To cluster data points
- D) To reduce dimensionality
- **\*\*Answer: B\*\***

29. **\*\*Which evaluation metric is used to measure the accuracy of a regression model?\*\***

- A) Mean Squared Error (MSE)
- B) Precision
- C) Recall
- D) Confusion Matrix
- **\*\*Answer: A\*\***

30. **\*\*In logistic regression, the dependent variable is:\*\***

- A) Continuous
- B) Categorical
- C) Discrete
- D) Ordinal
- **\*\*Answer: B\*\***

### ### Support Vector Machines (SVM)

31. **SVM is used for:**

- A) Classification
- B) Regression
- C) Both classification and regression
- D) Clustering
- **Answer: C**

32. **The kernel trick in SVM is used to:**

- A) Speed up calculations
- B) Transform data into higher dimensions
- C) Reduce dimensionality
- D) Improve model accuracy
- **Answer: B**

33. **Which method is used to implement SVM in scikit-learn?**

- A) SVC()
- B) SVM()
- C) SupportVector()
- D) SVC\_Linear()
- **Answer: A**

### ### Decision Trees

34. **What is a Decision Tree?**

- A) A supervised learning algorithm used for classification and regression
- B) An unsupervised learning algorithm used for clustering
- C) A reinforcement learning algorithm

- D) A deep learning algorithm

- \*\*Answer: A\*\*

35. \*\*In a Decision Tree, what is a 'leaf node'?\*\*

- A) The starting point of the tree

- B) A decision point where data is split

- C) The end point of a decision path

- D) None of the above

- \*\*Answer: C\*\*

36. Which algorithm is used for density estimation and clustering?

a) DBSCAN

b) K-means clustering

c) Linear Regression

d) Decision Tree

Answer: a) DBSCAN

37. Which method is used to handle outliers in a dataset?

a) Deleting outliers

b) Transforming outliers

c) Imputing outliers

d) All of the above

Answer: d) All of the above

38. Which of the following is not a type of regression algorithm?

a) Linear Regression

b) Logistic Regression

c) Ridge Regression

d) K-means Regression

Answer: d) K-means Regression

39. Which method is used to evaluate the performance of a regression model?

- a) Confusion Matrix
- b) R-squared
- c) Precision and Recall
- d) F1-score

Answer: b) R-squared

40. Which algorithm is used for anomaly detection?

- a) Linear Regression
- b) SVM
- c) K-means clustering
- d) DBSCAN

Answer: d) DBSCAN

41. Which method is used to select the most important features in a machine learning model?

- a) Recursive Feature Elimination
- b) PCA
- c) VIF
- d) All of the above

Answer: a) Recursive Feature Elimination

42. What is the primary objective of hyperparameter tuning?

- a) To select the optimal features for a model
- b) To select the optimal parameters for a model
- c) To evaluate the performance of a model
- d) To interpret the results of a model

Answer: b) To select the optimal parameters for a model

43. Which algorithm is used for feature extraction in deep learning?

- a) CNN
- b) RNN
- c) LSTM
- d) GRU

Answer: a) CNN

44. Which method is used to handle imbalanced classes in a classification problem by generating synthetic samples?

- a) Oversampling
- b) Undersampling
- c) SMOTE
- d) Feature scaling

Answer: c) SMOTE

45. Which of the following is not a metric used to evaluate the performance of a classification model?

- a) Accuracy
- b) Mean Squared Error
- c) Precision
- d) Recall

Answer: b) Mean Squared Error

46. Which algorithm is used for natural language processing tasks?

- a) K-means clustering
- b) Naive Bayes
- c) Decision Tree
- d) Random Forest

Answer: b) Naive Bayes

47. Which method is used to select the optimal number of clusters in K-means clustering?

- a) Elbow method

- b) Silhouette method
- c) Gap statistic
- d) All of the above

Answer: d) All of the above

48. Which algorithm is used for density estimation and clustering?

- a) DBSCAN
- b) K-means clustering
- c) Linear Regression
- d) Decision Tree

Answer: a) DBSCAN

49. Which method is used to handle categorical variables in a machine learning model?

- a) Label Encoding
- b) One-Hot Encoding
- c) Ordinal Encoding
- d) All of the above

Answer: d) All of the above

Section - B (2 marks 25 questions)

50. Which of the following is not a type of ensemble learning technique?

- a) Bagging
- b) Boosting
- c) Stacking
- d) Ridge Regression

Answer: d) Ridge Regression

51. Which algorithm is used for density-based clustering?

- a) K-means clustering



- b) DBSCAN
- c) Hierarchical clustering
- d) Spectral clustering

Answer: b) DBSCAN

52. Which method is used to handle missing values in a dataset?

- a) Dropping rows with missing values
- b) Imputation
- c) Feature scaling
- d) All of the above

Answer: d) All of the above

53. What is the primary purpose of feature scaling?

- a) To increase the interpretability of the model
- b) To reduce the computational time
- c) To bring features to a similar scale
- d) To improve the model accuracy

Answer: c) To bring features to a similar scale

54. Which of the following is not a classification algorithm?

- a) Logistic Regression
- b) Decision Tree
- c) K-means clustering
- d) Naive Bayes

Answer: c) K-means clustering

55. Which method is used to assess multicollinearity among independent variables in regression analysis?

- a) Variance Inflation Factor (VIF)
- b) Confusion Matrix
- c) Principal Component Analysis (PCA)

d) Entropy

Answer: a) Variance Inflation Factor (VIF)

56. What is the primary objective of hierarchical clustering?

a) Maximizing intra-cluster similarity

b) Minimizing intra-cluster similarity

c) Maximizing inter-cluster similarity

d) Minimizing inter-cluster similarity

Answer: d) Minimizing inter-cluster similarity

57. Which algorithm is used for time series forecasting?

a) ARIMA

b) K-means clustering

c) Decision Tree

d) Logistic Regression

Answer: a) ARIMA

58. Which method is used to split a dataset into multiple subsets for training and testing?

a) Holdout validation

b) K-fold Cross Validation

c) Leave-One-Out Cross Validation

d) Ridge Regression

Answer: b) K-fold Cross Validation

59. Which library is used for creating heatmaps in

Python?

a) Matplotlib

b) Seaborn

c) Plotly

d) Pandas

Answer: b) Seaborn

60. Which of the following is a supervised learning algorithm?

a) K-means clustering

b) K-nearest Neighbors

c) Hierarchical clustering

d) DBSCAN

Answer: b) K-nearest Neighbors

61. Which NumPy function is used to compute the dot product of two arrays?

a) np.multiply()

b) np.dot()

c) np.cross()

d) np.sum()

Answer: b) np.dot()

62. In Pandas, which method is used to concatenate two DataFrames vertically?

a) pd.join()

b) pd.concat()

c) pd.merge()

d) pd.append()

Answer: d) pd.append()

63. What is the formula to calculate the variance of a dataset?

a)  $S(x - \mu)^2 / n$

b)  $S(x - \mu) / n$

c)  $S(x - \mu) / (n - 1)$

d)  $S(x - \mu)^2 / (n - 1)$

Answer: d)  $S(x - \mu)^2 / (n - 1)$

64. Which Matplotlib function is used to set the title of a plot?

- a) `plt.set_title()`
- b) `plt.title()`
- c) `plt.add_title()`
- d) `plt.plot_title()`

Answer: b) `plt.title()`

65. What is the median of the following list of numbers?

`[3, 7, 2, 9, 5, 5, 8]`

- a) 5
- b) 6
- c) 7
- d) 8

Answer: a) 5

66. Which Seaborn function is used to create a boxplot?

- a) `sns.boxplot()`
- b) `sns.scatterplot()`
- c) `sns.histplot()`
- d) `sns.lineplot()`

Answer: a) `sns.boxplot()`

67. Which of the following is a correct syntax to import the Plotly library in Python?

- a) `import plotly as py`
- b) `import plotly.plotly as py`
- c) `from plotly import plotly`
- d) `import plotly.plotly`

Answer: a) `import plotly as py`

68. What is the output of the following code snippet?

```
```python
import numpy as np
arr = np.array([[-1, 2], [3, -4]])
print(np.linalg.eig(arr))
```
```

- a) array([1, -5])
- b) array([-1, -4])
- c) array([2, 3])
- d) array([1, 4])

Answer: c) array([2, 3])

69. Which method is used to handle missing values in a DataFrame in Pandas?

- a) fillna()
- b) dropna()
- c) replace()
- d) interpolate()

Answer: a) fillna()

70. Which of the following statements about logistic regression is true?

- a) It is used for regression tasks.
- b) It is based on the least squares method.
- c) It predicts categorical outcomes.
- d) It assumes a linear relationship between dependent and independent variables.

Answer: c) It predicts categorical outcomes.

71. What is the output of the following code snippet?

```
```python
import numpy as np
arr = np.array([[1, 2], [3, 4]])
```

```
print(np.linalg.inv(arr))
```

```
...
```

a) $\begin{bmatrix} -2. & 1. \\ 1.5 & -0.5 \end{bmatrix}$

b) $\begin{bmatrix} -2 & 1 \\ 1 & -0.5 \end{bmatrix}$

c) $\begin{bmatrix} -2. & 1. \\ 1. & -0.5 \end{bmatrix}$

d) $\begin{bmatrix} -2. & 1. \\ 1. & -1. \end{bmatrix}$

Answer: a) $\begin{bmatrix} -2. & 1. \\ 1.5 & -0.5 \end{bmatrix}$

72. Which of the following is a correct way to calculate the Pearson correlation coefficient in Pandas?

a) `df.correlation()`

b) `df.corr()`

c) `df.correlation_coeff()`

d) `df.pearson()`

Answer: b) `df.corr()`

73. What is the primary purpose of regularization in machine learning?

a) To penalize large coefficients in the model.

b) To increase model complexity.

c) To remove outliers from the dataset.

d) To reduce bias in the model.

Answer: a) To penalize large coefficients in the model.

74. Which of the following methods is used for dimensionality reduction in scikit-learn?

a) PCA

b) SVM

- c) KNN
- d) Decision Trees

Answer: a) PCA

75. What is the output of the following code snippet?

```
```python
import numpy as np
arr = np.array([[1, 2], [3, 4]])
print(np.linalg.det(arr))
```
```

- a) 0
- b) 1
- c) 2
- d) 3

Answer: b) 1

1. What is an Artificial Neural Network (ANN)?

- a) A type of computer virus
- b) A computational model inspired by the human brain
- c) A programming language
- d) A hardware device used for gaming

Answer: b) A computational model inspired by the human brain

2. What is the basic building block of an artificial neural network?

- a) Neuron
- b) Weight
- c) Activation function
- d) Bias

Answer: a) Neuron

3. What is the purpose of the activation function in a neural network?

- a) To normalize the input data
- b) To control the learning rate
- c) To introduce non-linearity
- d) To compute the loss function

Answer: c) To introduce non-linearity

4. What does the term "backpropagation" refer to in neural networks?

- a) The process of updating weights based on prediction error
- b) The process of initializing weights randomly
- c) The process of normalizing input data
- d) The process of selecting the best activation function

Answer: a) The process of updating weights based on prediction error

5. Which algorithm is commonly used for training neural networks?

- a) Gradient Descent
- b) K-means
- c) Decision Tree
- d) Support Vector Machine

Answer: a) Gradient Descent

6. What is the purpose of the loss function in training neural networks?

- a) To measure the performance of the model
- b) To initialize the weights of the model
- c) To compute the gradient during backpropagation
- d) To compute the learning rate

Answer: a) To measure the performance of the model

7. Which type of neural network is commonly used for binary classification?

- a) Convolutional Neural Network (CNN)

- b) Recurrent Neural Network (RNN)
- c) Feedforward Neural Network (FNN)
- d) Multilayer Perceptron (MLP)

Answer: d) Multilayer Perceptron (MLP)

8. What is the role of the output layer in a neural network?

- a) To compute the loss function
- b) To make predictions
- c) To introduce non-linearity
- d) To normalize the input data

Answer: b) To make predictions

9. Which parameter controls the complexity of a neural network model?

- a) Number of layers
- b) Number of neurons in each layer
- c) Activation function
- d) Loss function

Answer: a) Number of layers

10. What is the purpose of the bias in a neuron?

- a) To introduce randomness in the model
- b) To control the learning rate
- c) To shift the activation function
- d) To compute the loss function

Answer: c) To shift the activation function

11. Which Python library provides implementation of neural networks?

- a) Pandas
- b) NumPy
- c) Scikit-learn

d) TensorFlow

Answer: d) TensorFlow

12. How do you create a basic neural network model in TensorFlow?

```
```python
```

```
import tensorflow as tf
```

```
model = tf.keras.Sequential()
```

```
```
```

a) `model = tf.keras.Model()`

b) `model = tf.keras.Sequential()`

c) `model = tf.keras.NeuralNetwork()`

d) `model = tf.NeuralNetwork()`

Answer: b) `model = tf.keras.Sequential()`

13. What is the purpose of the `Dense` layer in a neural network model?

a) To introduce dropout regularization

b) To perform convolutional operations

c) To connect every neuron in one layer to every neuron in the next layer

d) To apply the activation function

Answer: c) To connect every neuron in one layer to every neuron in the next layer

14. How do you add a hidden layer to a neural network model in TensorFlow?

```
```python
```

```
model.add(tf.keras.layers.Dense(units=64, activation='relu'))
```

```
```
```

a) `model.add(tf.keras.layers.HiddenLayer(units=64, activation='relu'))`

b) `model.add(tf.keras.layers.Layer(units=64, activation='relu'))`

c) `model.add(tf.keras.layers.DenseLayer(units=64, activation='relu'))`

d) `model.add(tf.keras.layers.Dense(units=64, activation='relu'))`

Answer: d) `model.add(tf.keras.layers.Dense(units=64, activation='relu'))`

15. What is the purpose of the metrics parameter in model compilation?

- a) To specify the loss function
- b) To specify the activation function
- c) To specify the evaluation metrics for training
- d) To specify the learning rate

Answer: c) To specify the evaluation metrics for training

16. How do you access the explained variance ratio in Scikit-learn PCA?

```
```python
explained_variance_ratio = pca.explained_variance_ratio_
```
```

- a) `explained_variance_ratio = pca.explained_variance_ratio_``
- b) `explained_variance_ratio = pca.variance_ratio_``
- c) `explained_variance_ratio = pca.explained_variance_``
- d) `explained_variance_ratio = pca.ratio_``

Answer: a) `explained_variance_ratio = pca.explained_variance_ratio_``

17. What is the total explained variance ratio in PCA?

- a) The sum of explained variance ratios of all principal components
- b) The ratio of the total variance explained by all principal components to the total variance
- c) The ratio of the total variance explained by all features to the total variance
- d) The ratio of the total variance explained by all samples to the total variance

Answer: a) The sum of explained variance ratios of all principal components

18. How do you plot the explained variance ratio in PCA using Matplotlib?

```
```python
import matplotlib.pyplot as plt
plt.plot(pca.ex
```

```
pca.explained_variance_ratio_)
```

```
plt.xlabel('Principal Component')
```

```
plt.ylabel('Explained Variance Ratio')
```

```
plt.show()
```

```
...
```

a) `plot(pca.explained_variance_ratio_)`

b) `plot(pca.explained_variance_ratio_, xlabel='Principal Component', ylabel='Explained Variance Ratio')`

c) `plt.plot(pca.explained_variance_ratio_)`

d) `plt.explained_variance_ratio_(pca)`

Answer: c) `plt.plot(pca.explained_variance_ratio_)`

19. What does the scree plot represent in PCA?

a) The slope of the explained variance ratio

b) The cumulative explained variance ratio

c) The eigenvalues of the principal components

d) The correlation between features

Answer: b) The cumulative explained variance ratio

20. How do you calculate the cumulative explained variance ratio in PCA?

a) By summing up the explained variance ratios of all principal components

b) By dividing each explained variance ratio by the total variance

c) By taking the cumulative sum of explained variance ratios

d) By dividing the total variance by the number of features

Answer: c) By taking the cumulative sum of explained variance ratios

21. What is the significance of the scree plot in PCA?

a) It helps in selecting the appropriate number of principal components to retain

b) It measures the correlation between features

c) It visualizes the distribution of principal components

d) It shows the eigenvalues of the principal components

Answer: a) It helps in selecting the appropriate number of principal components to retain

22. How do you calculate the percentage of variance explained by each principal component?

- a) By dividing each eigenvalue by the sum of all eigenvalues
- b) By dividing each eigenvalue by the total variance
- c) By dividing each eigenvalue by the number of principal components
- d) By dividing each eigenvalue by the total number of features

Answer: b) By dividing each eigenvalue by the total variance

23. Which method in Scikit-learn is used to calculate the principal components from data?

```
```python
```

```
principal_components = pca.components_
```

```
```
```

- a) `principal_components = pca.components_``
- b) `principal_components = pca.calculate_components()``
- c) `principal_components = pca.get_components()``
- d) `principal_components = calculate_components(pca)``

Answer: a) `principal_components = pca.components_``

24. How do you calculate the reconstructed data from principal components in PCA?

```
```python
```

```
X_reconstructed = pca.inverse_transform(X_pca)
```

```
```
```

- a) `X_reconstructed = pca.transform(X_pca)``
- b) `X_reconstructed = pca.reconstruct(X_pca)``
- c) `X_reconstructed = pca.inverse_transform(X_pca)``
- d) `X_reconstructed = reconstruct_data(X_pca)``

Answer: c) `X_reconstructed = pca.inverse_transform(X_pca)``

25. How do you determine the number of principal components to retain using the cumulative explained variance ratio?

- a) By selecting the first k principal components where the cumulative explained variance ratio is above a threshold
- b) By selecting the first k principal components where the explained variance ratio is above a threshold
- c) By selecting the last k principal components where the cumulative explained variance ratio is above a threshold
- d) By selecting the last k principal components where the explained variance ratio is above a threshold

Answer: a) By selecting the first k principal components where the cumulative explained variance ratio is above a threshold

26. Which parameter in Scikit-learn PCA controls the number of principal components to retain?

```
```python
pca = PCA(n_components=2)
```
```

- a) ``n_features``
- b) ``n_components``
- c) ``n_principal_components``
- d) ``n_dimensions``

Answer: b) ``n_components``

27. How do you calculate the explained variance of each principal component in Scikit-learn PCA?

```
```python
explained_variance = pca.explained_variance_
```
```

- a) ``explained_variance = pca.variance_``
- b) ``explained_variance = pca.explained_variance_``
- c) ``explained_variance = pca.variance_ratio_``
- d) ``explained_variance = pca.explained_variance_ratio_``

Answer: b) ``explained_variance = pca.explained_variance_``

28. What is the relationship between PCA and feature scaling?

- a) PCA requires feature scaling for accurate results
- b) PCA is unaffected by feature scaling
- c) PCA performs feature scaling internally
- d) PCA performs feature scaling only for categorical features

Answer: a) PCA requires feature scaling for accurate results

29. What is the main advantage of using PCA?

- a) It reduces overfitting in models
- b) It speeds up the training process of machine learning models
- c) It simplifies the interpretation of data
- d) It increases the dimensionality of the data

Answer: b) It speeds up the training process of machine learning models

30. How do you visualize the principal components in a 2D plot using Matplotlib?

```
```python
```

```
plt.scatter(X_pca[:,0], X_pca[:,1])  
plt.xlabel('Principal Component 1')  
plt.ylabel('Principal Component 2')  
plt.show()  
```
```

- a) ``scatter(X_pca[:,0], X_pca[:,1])``
- b) ``plot(X_pca[:,0], X_pca[:,1])``
- c) ``plt.scatter(X_pca[:,0], X_pca[:,1])``
- d) ``scatter(X[:,0], X[:,1])``

Answer: c) ``plt.scatter(X_pca[:,0], X_pca[:,1])``

31. What type of algorithm is Support Vector Machine (SVM)?

- a) Classification
- b) Regression

- c) Clustering
- d) Dimensionality reduction

Answer: a) Classification

32. What is the main objective of SVM?

- a) To minimize classification error
- b) To maximize margin between classes
- c) To reduce dimensionality of data
- d) To minimize loss function

Answer: b) To maximize margin between classes

33. In SVM, what are support vectors?

- a) Data points closest to the decision boundary
- b) Data points that are misclassified
- c) Data points used for testing the model
- d) Data points with maximum margin

Answer: a) Data points closest to the decision boundary

34. Which kernel function is commonly used in SVM for non-linear classification?

- a) Linear kernel
- b) Polynomial kernel
- c) Radial Basis Function (RBF) kernel
- d) Sigmoid kernel

Answer: c) Radial Basis Function (RBF) kernel

35. What is the purpose of the regularization parameter (C) in SVM?

- a) To control the trade-off between maximizing the margin and minimizing the classification error
- b) To control the degree of polynomial kernel
- c) To adjust the bias-variance trade-off
- d) To control the learning rate



Answer: a) To control the trade-off between maximizing the margin and minimizing the classification error

36. **\*\*Which criterion can be used for splitting nodes in a Decision Tree?\*\***

- A) Gini Index
- B) Entropy
- C) Both A and B
- D) None of the above
- **\*\*Answer: C\*\***

### ### Artificial Neural Networks (ANN)

37. **\*\*What is an Artificial Neural Network (ANN)?\*\***

- A) A computational model inspired by the human brain
- B) A statistical model used for regression
- C) An algorithm for data preprocessing
- D) A clustering algorithm
- **\*\*Answer: A\*\***

38. **\*\*Which function in scikit-learn is used to implement a Multi-Layer Perceptron?\*\***

- A) MLPClassifier
- B) Perceptron
- C) NeuralNet
- D) MLPRegressor
- **\*\*Answer: A\*\***

39. **\*\*What is the activation function commonly used in hidden layers of neural networks?\*\***

- A) ReLU
- B) Sigmoid
- C) Tanh
- D) All of the above

- \*\*Answer: D\*\*

### ### Unsupervised Learning

40. \*\*What is the goal of unsupervised learning?\*\*

- A) To predict the output for new data
- B) To discover the underlying structure of data
- C) To minimize error rates
- D) To improve supervised learning models
- \*\*Answer: B\*\*

41. \*\*Which algorithm is commonly used for clustering?\*\*

- A) K-Means
- B) Linear Regression
- C) Decision Tree
- D) SVM
- \*\*Answer: A\*\*

42. \*\*Which metric can be used to evaluate the quality of clustering?\*\*

- A) Silhouette Score
- B) R-squared
- C) Mean Squared Error
- D) Accuracy
- \*\*Answer: A\*\*

### ### Principal Component Analysis (PCA)

43. \*\*What is Principal Component Analysis (PCA) used for?\*\*

- A) Regression
- B) Classification

- C) Dimensionality reduction
- D) Clustering
- **\*\*Answer: C\*\***

44. **\*\*Which function is used to implement PCA in scikit-learn?\*\***

- A) PCA()
- B) Decomposition()
- C) DimensionalityReduction()
- D) PCAnalysis()
- **\*\*Answer: A\*\***

45. **\*\*PCA transforms data into:\*\***

- A) Higher dimensions
- B) Lower dimensions
- C) Equal dimensions
- D) None of the above
- **\*\*Answer: B\*\***

### ### Evaluation Metrics

46. **\*\*What does a confusion matrix represent?\*\***

- A) The performance of a classification algorithm
- B) The performance of a regression algorithm
- C) The correlation between features
- D) None of the above
- **\*\*Answer: A\*\***

47. **\*\*Which metric is used to evaluate the performance of a binary classifier?\*\***

- A) Precision
- B) Recall

- C) F1 Score
- D) All of the above
- \*\*Answer: D\*\*

48. \*\*What does R-squared represent in regression analysis?\*\*

- A) The proportion of variance explained by the model
- B) The mean error of predictions
- C) The accuracy of the model
- D) The recall of the model
- \*\*Answer: A\*\*

### Introduction to AI and ML

49. \*\*What is the primary goal of Artificial Intelligence?\*\*

- A) To automate repetitive tasks
- B) To create systems that can perform tasks that typically require human intelligence
- C) To enhance the speed of computation
- D) To improve data storage
- \*\*Answer: B\*\*

50. \*\*Which of the following best describes Machine Learning?\*\*

- A) A branch of mathematics
- B) A method for data cleaning
- C) A subset of AI that enables systems to learn from data
- D) A way to design websites
- \*\*Answer: C\*\*

51. \*\*Who coined the term "Artificial Intelligence"?

- A) Alan Turing
- B) John McCarthy
- C) Geoffrey Hinton

- D) Andrew Ng
- \*\*Answer: B\*\*

### ### Overview of Popular ML Applications

52. \*\*Which of the following is an example of a supervised learning task?\*\*

- A) Clustering customers into groups
- B) Predicting house prices
- C) Finding patterns in large datasets
- D) Anomaly detection
- \*\*Answer: B\*\*

53. \*\*Which library is widely used for data manipulation in Python?\*\*

- A) Matplotlib
- B) Pandas
- C) NumPy
- D) Seaborn
- \*\*Answer: B\*\*

54. \*\*What is the main purpose of the NumPy library?\*\*

- A) Data visualization
- B) Data manipulation
- C) Numerical computing
- D) Machine learning
- \*\*Answer: C\*\*

### ### Data Manipulation with Pandas

55. \*\*What is a DataFrame in Pandas?\*\*

- A) A one-dimensional array

- B) A two-dimensional, size-mutable, potentially heterogeneous tabular data
- C) A three-dimensional array
- D) A type of plot
- **\*\*Answer: B\*\***

56. **\*\*Which method is used to check for missing values in a Pandas DataFrame?\*\***

- A) isnull()
- B) notnull()
- C) missing()
- D) isempty()
- **\*\*Answer: A\*\***

57. **\*\*How can you select a specific column in a Pandas DataFrame?\*\***

- A) df.column\_name
- B) df["column\_name"]
- C) df.loc["column\_name"]
- D) All of the above
- **\*\*Answer: B\*\***

### ### Reading and Writing Data

58. **\*\*Which function is used to read an Excel file into a Pandas DataFrame?\*\***

- A) pd.read\_csv()
- B) pd.read\_excel()
- C) pd.read\_table()
- D) pd.read\_sql()
- **\*\*Answer: B\*\***

59. **\*\*How do you write a DataFrame to a SQL database in Pandas?\*\***

- A) to\_sql()

- B) to\_database()
- C) to\_sqlite()
- D) write\_sql()
- \*\*Answer: A\*\*

60. \*\*Which function in Pandas is used to read data from a SQL query?\*\*

- A) read\_sql\_query()
- B) read\_sql()
- C) read\_query()
- D) sql\_read()
- \*\*Answer: A\*\*

### ### Data Cleaning and Preprocessing

61. \*\*How do you handle missing values in a DataFrame by filling them with the mean of the column?\*\*

- A) fillna(df.mean())
- B) fillna(df.median())
- C) replace(df.mean())
- D) fill\_missing(df.mean())
- \*\*Answer: A\*\*

62. \*\*Which method removes rows with missing values in Pandas?\*\*

- A) dropna()
- B) fillna()
- C) replace()
- D) remove\_missing()
- \*\*Answer: A\*\*

63. \*\*How can you change the data type of a column to 'float' in Pandas?\*\*

- A) astype('float')

- B) `convert('float')`
- C) `change_type('float')`
- D) `dtype('float')`
- **Answer: A**

### ### Descriptive Statistics with Python

64. **Which method in Pandas calculates the variance of a column?**

- A) `variance()`
- B) `var()`
- C) `mean()`
- D) `median()`
- **Answer: B**

65. **How do you calculate the mode of a DataFrame column in Pandas?**

- A) `mode()`
- B) `mean()`
- C) `median()`
- D) `most_common()`
- **Answer: A**

66. **Which of the following methods calculates the skewness of a DataFrame column?**

- A) `skew()`
- B) `kurt()`
- C) `variance()`
- D) `std()`
- **Answer: A**

### ### Exploratory Data Analysis (EDA)



67. **What is the purpose of Exploratory Data Analysis (EDA)?**

- A) To visualize data
- B) To summarize the main characteristics of the data
- C) To model data
- D) To clean data
- **Answer: B**

68. **Which visualization is best for understanding the distribution of a numerical variable?**

- A) Line plot
- B) Bar plot
- C) Histogram
- D) Pie chart
- **Answer: C**

69. **What is a box plot used for?**

- A) To show the distribution of a dataset
- B) To compare means across groups
- C) To display the frequency of different categories
- D) To show the relationship between two variables
- **Answer: A**

### ### Visualization Libraries in Python

70. **Which function in Matplotlib is used to create a bar plot?**

- A) bar()
- B) plot()
- C) barh()
- D) histogram()
- **Answer: A**

71. **\*\*What is the primary use of the Seaborn library?\*\***

- A) Data manipulation
- B) Numerical computations
- C) Data visualization
- D) Machine learning
- **\*\*Answer: C\*\***

72. **\*\*Which function is used to create a scatter plot in Seaborn?\*\***

- A) scatter()
- B) scatterplot()
- C) pointplot()
- D) dotplot()
- **\*\*Answer: B\*\***

### ### Machine Learning Basics

73. **\*\*What is a 'label' in Machine Learning?\*\***

- A) The input data
- B) The output variable
- C) A feature of the data
- D) The algorithm used
- **\*\*Answer: B\*\***

74. **\*\*What is the main objective of supervised learning?\*\***

- A) To discover the underlying structure of data
- B) To make predictions based on labeled data
- C) To reduce data dimensionality
- D) To cluster data points
- **\*\*Answer: B\*\***

75. **\*\*Which Python library is known for its machine learning algorithms?\*\***

- A) Pandas
- B) NumPy
- C) scikit-learn
- D) Matplotlib
- **\*\*Answer: C\*\***

Matplotlib:

1. Matplotlib is a plotting library for which programming language?

- a) Java
- b) Python
- c) C++
- d) R

**\*\*Answer: b) Python\*\***

2. Which of the following statements is true about Matplotlib?

- a) It is primarily used for data manipulation
- b) It is used for statistical analysis
- c) It provides an interface for creating static, interactive, and animated visualizations
- d) It is built on top of the ggplot library

**\*\*Answer: c) It provides an interface for creating static, interactive, and animated visualizations\*\***

3. What is the primary purpose of Matplotlib's pyplot module?

- a) To create NumPy arrays
- b) To create machine learning models
- c) To create and customize plots
- d) To perform mathematical operations

**\*\*Answer: c) To create and customize plots\*\***

4. Which of the following is NOT a type of plot that can be created using Matplotlib?

- a) Line plot
- b) Bar plot
- c) Scatter plot
- d) Decision tree plot

**\*\*Answer: d) Decision tree plot\*\***

5. What function is used to save a plot as an image file in Matplotlib?

- a) save\_image()
- b) save\_plot()
- c) save\_fig()
- d) save()

**\*\*Answer: d) save()\*\***

Linear Regression:

6. What type of problem does linear regression solve?

- a) Classification
- b) Regression
- c) Clustering
- d) Dimensionality reduction

**\*\*Answer: b) Regression\*\***

7. In linear regression, what is the name of the coefficient that represents the slope of the regression line?

- a) Intercept

- b) Gradient
- c) Slope
- d) Coefficient

**\*\*Answer: c) Slope\*\***

8. Which algorithm is commonly used to find the optimal parameters in linear regression?

- a) Gradient Descent
- b) Random Forest
- c) K-Means
- d) Decision Trees

**\*\*Answer: a) Gradient Descent\*\***

9. What is the metric used to evaluate the performance of a linear regression model?

- a) Accuracy
- b) Mean Squared Error (MSE)
- c) F1 Score
- d) Precision

**\*\*Answer: b) Mean Squared Error (MSE)\*\***

10. What is the name of the line that best fits the data points in linear regression?

- a) Decision boundary
- b) Regression line
- c) Support vector
- d) Decision surface

**\*\*Answer: b) Regression line\*\***

## Logistic Regression:

11. What type of problem does logistic regression solve?

- a) Classification
- b) Regression
- c) Clustering
- d) Dimensionality reduction

**\*\*Answer: a) Classification\*\***

12. In logistic regression, what function is used to map the input features to the target variable?

- a) Sigmoid function
- b) ReLU function
- c) Softmax function
- d) Linear function

**\*\*Answer: a) Sigmoid function\*\***

13. What is the output of logistic regression?

- a) Continuous values
- b) Discrete values
- c) Probability scores
- d) Cluster labels

**\*\*Answer: c) Probability scores\*\***

14. Which metric is commonly used to evaluate the performance of a logistic regression model?

- a) Mean Absolute Error (MAE)
- b) Mean Squared Error (MSE)

- c) Accuracy
- d) R-squared

**\*\*Answer: c) Accuracy\*\***

15. What is the decision boundary in logistic regression?

- a) A line that separates the data points into classes
- b) The average of the input features
- c) The value at which the loss function is minimized
- d) The slope of the logistic function

**\*\*Answer: a) A line that separates the data points into classes\*\***

Support Vector Machines (SVM):

16. What is the primary objective of Support Vector Machines (SVM)?

- a) Regression
- b) Clustering
- c) Classification
- d) Dimensionality reduction

**\*\*Answer: c) Classification\*\***

17. What is the name of the hyperplane that maximizes the margin between classes in SVM?

- a) Decision boundary
- b) Decision surface
- c) Support vector
- d) Margin vector

**\*\*Answer: a) Decision boundary\*\***

18. Which kernel function is commonly used in SVM for non-linear classification?

- a) Linear kernel
- b) Polynomial kernel
- c) Gaussian (RBF) kernel
- d) Sigmoid kernel

**\*\*Answer: c) Gaussian (RBF) kernel\*\***

19. What is the term used to represent data points that lie on the margin boundary in SVM?

- a) Decision boundary
- b) Support vectors
- c) Margin vectors
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20. Which of the following is NOT an advantage of using SVM?

- a) Effective in high-dimensional spaces
- b) Memory efficient for large datasets
- c) Versatile with different kernel functions
- d) Robust to overfitting

**\*\*Answer: b) Memory efficient for large datasets\*\***

Decision Trees:

21. What type of algorithm is a Decision Tree?

- a) Supervised learning
- b) Unsupervised learning



- c) Reinforcement learning
- d) Semi-supervised learning

**\*\*Answer: a) Supervised learning\*\***

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- a) Regression
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- a) ID3
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26. What is an Artificial Neural Network (ANN)?

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- b) A machine learning model inspired by the human brain
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- d) Weight

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29. What is the purpose of backpropagation in training an Artificial Neural Network?

- a) Adjusting the learning rate
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- c) Initializing the network weights
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**\*\*Answer: b) Updating the weights to minimize the loss function\*\***

30. Which of the following is NOT a common type of Artificial Neural Network architecture?

- a) Feedforward Neural Network
- b) Convolutional Neural Network
- c) Recurrent Neural Network
- d) Decision Neural Network

**\*\*Answer: d) Decision Neural Network\*\***

Matplotlib:

1. Which of the following functions is used to create a scatter plot in Matplotlib?

- a) plot()
- b) scatter()
- c) bar()
- d) hist()

**\*\*Answer: b) scatter()\*\***

2. Matplotlib provides support for which file formats for saving plots?

- a) PNG
- b) PDF
- c) JPEG
- d) All of the above

**\*\*Answer: d) All of the above\*\***

Linear Regression:

3. In linear regression, what is the term used to represent the predicted values?

- a) Targets
- b) Labels
- c) Predictions
- d) Features

**\*\*Answer: c) Predictions\*\***

4. Which of the following algorithms is used to find the optimal parameters in linear regression?

- a) Gradient Descent
- b) Random Forest
- c) K-Means
- d) Decision Trees

**\*\*Answer: a) Gradient Descent\*\***

Logistic Regression:

5. What is the range of the sigmoid function used in logistic regression?

- a) [-1, 1]
- b) [0, 1]

c)  $[0, \infty)$

d)  $(-\infty, \infty)$

**\*\*Answer: b)  $[0, 1]$ \*\***

6. In logistic regression, what is the output of the model?

a) Continuous values

b) Discrete values

c) Probability scores

d) Cluster labels

**\*\*Answer: c) Probability scores\*\***

Support Vector Machines (SVM):

7. What is the main objective of Support Vector Machines (SVM)?

a) Regression

b) Clustering

c) Classification

d) Dimensionality reduction

**\*\*Answer: c) Classification\*\***

8. Which kernel function is commonly used in SVM for linear classification?

a) Linear kernel

b) Polynomial kernel

c) Gaussian (RBF) kernel

d) Sigmoid kernel

**\*\*Answer: a) Linear kernel\*\***

Decision Trees:

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- a) Supervised learning
- b) Unsupervised learning
- c) Reinforcement learning
- d) Semi-supervised learning

**\*\*Answer: a) Supervised learning\*\***

10. What is the objective of Decision Trees?

- a) Regression
- b) Clustering
- c) Dimensionality reduction
- d) Classification

**\*\*Answer: d) Classification\*\***

Artificial Neural Networks:

11. Which of the following activation functions is typically used for binary classification in artificial neural networks?

- a) Sigmoid
- b) ReLU
- c) Tanh
- d) Softmax

**\*\*Answer: a) Sigmoid\*\***

12. What is the term used to represent the process of adjusting the weights of the neural network to minimize the loss function?

- a) Backpropagation
- b) Forward propagation
- c) Gradient Descent
- d) Activation

**\*\*Answer: a) Backpropagation\*\***

Miscellaneous:

13. What is the purpose of data cleaning and preprocessing in machine learning?

- a) To reduce the dimensionality of the data
- b) To remove noise and inconsistencies from the data
- c) To create new features from existing ones
- d) To train the model

**\*\*Answer: b) To remove noise and inconsistencies from the data\*\***

14. Which of the following libraries is NOT commonly used for data manipulation and analysis in Python?

- a) NumPy
- b) Pandas
- c) TensorFlow
- d) SciPy

**\*\*Answer: c) TensorFlow\*\***

15. What is the term used to describe the process of evaluating a model's performance on unseen data?

- a) Training

- b) Testing
- c) Validation
- d) Evaluation

**\*\*Answer: b) Testing\*\***

Certainly! Here are some multiple-choice questions related to coding in Python, specifically focusing on topics related to Matplotlib, Linear Regression, Logistic Regression, Support Vector Machines (SVM), Decision Trees, and Artificial Neural Networks:

1. Which library in Python is commonly used for data visualization, including creating plots and charts?

- a) NumPy
- b) Pandas
- c) Matplotlib
- d) SciPy

**\*\*Answer: c) Matplotlib\*\***

2. Which of the following functions is used to create a line plot in Matplotlib?

- a) plot()
- b) scatter()
- c) bar()
- d) hist()

**\*\*Answer: a) plot()\*\***

3. Which library in Python provides support for numerical operations and arrays, making it useful for handling data in machine learning?

- a) Pandas
- b) Matplotlib
- c) NumPy



d) Seaborn

**\*\*Answer: c) NumPy\*\***

4. What is the purpose of the following code snippet?

```
```python
import matplotlib.pyplot as plt
import numpy as np

x = np.linspace(0, 10, 100)
y = np.sin(x)

plt.plot(x, y)
plt.show()
```
```

- a) To create a scatter plot
- b) To create a line plot
- c) To create a bar plot
- d) To create a histogram

**\*\*Answer: b) To create a line plot\*\***

5. Which of the following statements is true about linear regression?

- a) It is used for classification tasks
- b) It finds the best-fitting line to predict continuous values
- c) It is a non-parametric algorithm
- d) It is primarily used for clustering

**\*\*Answer: b) It finds the best-fitting line to predict continuous values\*\***

6. Which of the following is NOT a step in training a linear regression model?

- a) Calculating the cost function
- b) Gradient descent
- c) Calculating the coefficients
- d) Backpropagation

**\*\*Answer: d) Backpropagation\*\***

7. Which of the following algorithms is commonly used for binary classification tasks?

- a) Linear Regression
- b) K-Means
- c) Logistic Regression
- d) Decision Trees

**\*\*Answer: c) Logistic Regression\*\***

8. What is the purpose of the sigmoid function in logistic regression?

- a) To map the input features to the target variable
- b) To compute the cost function
- c) To normalize the input features
- d) To convert continuous values to discrete labels

**\*\*Answer: a) To map the input features to the target variable\*\***

9. Which kernel function is commonly used in SVM for linear classification?

- a) Linear kernel
- b) Polynomial kernel
- c) Gaussian (RBF) kernel

d) Sigmoid kernel

**\*\*Answer: a) Linear kernel\*\***

10. Which of the following statements is true about decision trees?

- a) They are commonly used for regression tasks
- b) They split the dataset into clusters
- c) They can handle non-linear relationships between features
- d) They are not interpretable

**\*\*Answer: c) They can handle non-linear relationships between features\*\***

Data Visualization:

1. Which library in Python is commonly used for creating interactive and web-based visualizations?

- a) Matplotlib
- b) Seaborn
- c) Plotly
- d) ggplot

**\*\*Answer: c) Plotly\*\***

2. What type of plot is suitable for visualizing the relationship between two continuous variables, along with their individual distributions?

- a) Line plot
- b) Histogram
- c) Scatter plot with marginal histograms
- d) Box plot

**\*\*Answer: c) Scatter plot with marginal histograms\*\***

3. Which of the following libraries is specialized for creating statistical graphics with concise syntax?

- a) Matplotlib
- b) Seaborn
- c) Plotly
- d) Bokeh

**\*\*Answer: b) Seaborn\*\***

4. What type of plot is used to display the distribution of a categorical variable?

- a) Line plot
- b) Bar plot
- c) Scatter plot
- d) Box plot

**\*\*Answer: b) Bar plot\*\***

5. Which visualization technique is useful for identifying outliers in a dataset?

- a) Histogram
- b) Scatter plot
- c) Box plot
- d) Line plot

**\*\*Answer: c) Box plot\*\***

Linear Regression:

6. What is the objective of linear regression?

- a) Classification
- b) Regression
- c) Clustering
- d) Dimensionality reduction

**\*\*Answer: b) Regression\*\***

7. In linear regression, what is the term used to represent the predicted value?

- a) Target
- b) Feature
- c) Intercept
- d) Coefficient

**\*\*Answer: a) Target\*\***

8. Which of the following algorithms is used to find the best-fitting line for a given dataset in linear regression?

- a) Gradient Descent
- b) K-Means
- c) Decision Tree
- d) Random Forest

**\*\*Answer: a) Gradient Descent\*\***

9. What is the name of the metric commonly used to evaluate the performance of a linear regression model?

- a) Accuracy
- b) Precision
- c) Mean Squared Error (MSE)
- d) F1 Score

**\*\*Answer: c) Mean Squared Error (MSE)\*\***

10. In linear regression, what does the coefficient represent?

- a) The slope of the line
- b) The intercept of the line
- c) The variance of the target variable
- d) The standard deviation of the residuals

**\*\*Answer: a) The slope of the line\*\***

Logistic Regression:

11. What type of problem is logistic regression used for?

- a) Regression
- b) Classification
- c) Clustering
- d) Dimensionality reduction

**\*\*Answer: b) Classification\*\***

12. In logistic regression, what function is used to map the input features to the target variable?

- a) Sigmoid function
- b) ReLU function
- c) Softmax function
- d) Linear function

**\*\*Answer: a) Sigmoid function\*\***

13. What is the output of logistic regression?

- a) Continuous values
- b) Discrete values
- c) Probability scores
- d) Cluster labels

**\*\*Answer: c) Probability scores\*\***

14. Which metric is commonly used to evaluate the performance of a logistic regression model?

- a) Mean Absolute Error (MAE)
- b) Mean Squared Error (MSE)
- c) Accuracy
- d) R-squared

**\*\*Answer: c) Accuracy\*\***

15. In logistic regression, what is the decision boundary?

- a) A line that separates the data points into classes
- b) The average of the input features
- c) The value at which the loss function is minimized
- d) The slope of the logistic function

**\*\*Answer: a) A line that separates the data points into classes\*\***

Support Vector Machines (SVM):

16. What is the main objective of Support Vector Machines (SVM)?

- a) Regression
- b) Clustering
- c) Classification
- d) Dimensionality reduction

**\*\*Answer: c) Classification\*\***

17. What is the name of the hyperplane that maximizes the margin between classes in SVM?

- a) Decision boundary
- b) Decision surface
- c) Support vector
- d) Margin vector

**\*\*Answer: a) Decision boundary\*\***

18. Which kernel function is commonly used in SVM for non-linear classification?

- a) Linear kernel
- b) Polynomial kernel
- c) Gaussian (RBF) kernel
- d) Sigmoid kernel

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19. What is the term used to represent data points that lie on the margin boundary in SVM?

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- b) Support vectors
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**\*\*Answer: b) Support vectors\*\***

20. Which of the following is NOT an advantage of using SVM?

- a) Effective in high-dimensional spaces
- b) Memory efficient for large datasets
- c) Versatile with different kernel functions
- d) Robust to overfitting

**\*\*Answer: b) Memory efficient for large datasets\*\***

Decision Trees:

21. What type of algorithm is a Decision Tree?

- a) Supervised learning
- b) Unsupervised learning
- c) Reinforcement learning
- d) Semi-supervised learning

**\*\*Answer: a) Supervised learning\*\***

22. What is the objective of Decision Trees?

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**\*\*Answer: d) Classification\*\***



23. What is the name of the feature used to split the data at each node in a Decision Tree?

- a) Branch
- b) Leaf
- c) Node
- d) Root

**\*\*Answer: c) Node\*\***

24. Which algorithm is used to determine the best split at each node in a Decision Tree?

- a) ID3
- b) K-Means
- c) Gradient Descent
- d) Random Forest

**\*\*Answer: a) ID3\*\***

25. What is the term used to describe Decision Trees that continue to split until all leaves are pure?

- a) Overfitting
- b) Underfitting
- c) Pruning
- d) Maximum depth

**\*\*Answer: a) Overfitting\*\***

Artificial Neural Networks:

26. What is an Artificial Neural Network (ANN)?

- a) A type of decision tree
- b) A machine learning model inspired by the human brain
- c) A clustering algorithm
- d) A dimensionality reduction technique

**\*\*Answer: b) A machine learning model inspired by the human brain\*\***

27. What is the basic building block of an Artificial Neural Network?

- a) Neuron
- b) Node
- c) Feature
- d) Weight

**\*\*Answer: a) Neuron\*\***

28. In an ANN, what function is commonly used as the activation function in hidden layers?

- a) Sigmoid
- b) Linear
- c) ReLU (Rectified Linear Unit)
- d) Softmax

**\*\*Answer: c) ReLU (Rectified Linear Unit)\*\***

29. What is the purpose of backpropagation in training an Artificial Neural Network?

- a) Adjusting the learning rate
- b) Updating the weights to minimize the loss function
- c) Initializing the network weights
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**\*\*Answer: b) Updating the weights to minimize the loss function\*\***

30. Which of the following is NOT a common type of Artificial Neural Network architecture?

- a) Feedforward Neural Network
- b) Convolutional Neural Network
- c) Recurrent Neural Network
- d) Decision Neural Network

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## Data Visualization:

1. Which of the following libraries provides an interface to create interactive and web-based visualizations in Python?

- a) Matplotlib
- b) Seaborn
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**\*\*Answer: c) Plotly\*\***

2. What type of plot is used to visualize the relationship between two continuous variables along with their individual distributions?

- a) Line plot
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3. Which library provides a high-level interface for creating statistical graphics with attractive defaults?

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4. What type of plot is used to visualize the distribution of a categorical variable?

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5. Which of the following libraries is commonly used for creating static, publication-quality plots in Python?

- a) Plotly
- b) Seaborn
- c) Matplotlib
- d) Bokeh

**\*\*Answer: c) Matplotlib\*\***

Linear Regression:

6. What is the main objective of linear regression?

- a) Classification
- b) Clustering
- c) Regression
- d) Dimensionality reduction

**\*\*Answer: c) Regression\*\***

7. Which algorithm is used to find the optimal parameters (coefficients) in linear regression?

- a) Gradient Descent
- b) K-Means
- c) Random Forest
- d) Decision Trees

**\*\*Answer: a) Gradient Descent\*\***

8. What is the term used to represent the predicted values in linear regression?

- a) Features
- b) Coefficients
- c) Targets
- d) Errors

**\*\*Answer: c) Targets\*\***

9. Which metric is commonly used to evaluate the performance of a linear regression model?

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- b) Precision
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- b) Convolutional Neural Network
- c) Recurrent Neural Network
- d) Decision Neural Network

**\*\*Answer: d) Decision Neural Network\*\***

Matplotlib:

1. Which of the following methods can be used to add grid lines to a Matplotlib plot?

- a) `grid(True)`
- b) `plt.grid()`
- c) `ax.grid()`
- d) All of the above

**\*\*Answer: d) All of the above\*\***

2. What is the purpose of the ``subplot()`` function in Matplotlib?

- a) To create multiple subplots within the same figure
- b) To adjust the spacing between subplots

- c) To create a subplot grid with a specified layout
- d) To set the title of a subplot

**\*\*Answer: a) To create multiple subplots within the same figure\*\***

Linear Regression:

3. In linear regression, what is the difference between ordinary least squares (OLS) and gradient descent?

- a) OLS is a closed-form solution, while gradient descent is an iterative optimization algorithm
- b) OLS is an iterative optimization algorithm, while gradient descent is a closed-form solution
- c) OLS always converges to the global minimum, while gradient descent may converge to local minima
- d) OLS always converges faster than gradient descent

**\*\*Answer: a) OLS is a closed-form solution, while gradient descent is an iterative optimization algorithm\*\***

4. What is the purpose of regularization techniques like Lasso and Ridge in linear regression?

- a) To reduce the bias of the model
- b) To reduce the variance of the model
- c) To prevent overfitting by penalizing large coefficients
- d) To improve the interpretability of the model

**\*\*Answer: c) To prevent overfitting by penalizing large coefficients\*\***

Logistic Regression:

5. Which of the following evaluation metrics is NOT commonly used for assessing the performance of a logistic regression model?

- a) Mean Squared Error (MSE)
- b) Accuracy
- c) Precision
- d) Recall

**\*\*Answer: a) Mean Squared Error (MSE)\*\***

6. What is the main limitation of logistic regression compared to more complex models like neural networks?

- a) Logistic regression cannot handle non-linear relationships between features
- b) Logistic regression is computationally expensive
- c) Logistic regression requires more data to train effectively
- d) Logistic regression is prone to overfitting

**\*\*Answer: a) Logistic regression cannot handle non-linear relationships between features\*\***

Support Vector Machines (SVM):

7. Which of the following SVM kernels is most suitable for data with a non-linear decision boundary?

- a) Linear kernel
- b) Polynomial kernel
- c) Gaussian (RBF) kernel
- d) Sigmoid kernel

**\*\*Answer: c) Gaussian (RBF) kernel\*\***

8. What is the purpose of the regularization parameter (C) in SVM?

- a) To control the width of the margin
- b) To penalize misclassified data points

- c) To balance the trade-off between maximizing the margin and minimizing the classification error
- d) To adjust the complexity of the model

**\*\*Answer: c) To balance the trade-off between maximizing the margin and minimizing the classification error\*\***

Decision Trees:

9. What is the main advantage of ensemble methods like Random Forest over individual decision trees?

- a) Ensemble methods are less prone to overfitting
- b) Ensemble methods are faster to train
- c) Ensemble methods can handle missing values better
- d) Ensemble methods are more interpretable

**\*\*Answer: a) Ensemble methods are less prone to overfitting\*\***

10. What is pruning in the context of decision trees?

- a) Removing branches that do not contribute significantly to improving performance
- b) Adding more branches to increase the depth of the tree
- c) Increasing the impurity of leaf nodes to reduce overfitting
- d) Pruning the dataset to remove outliers

**\*\*Answer: a) Removing branches that do not contribute significantly to improving performance\*\***

Artificial Neural Networks:

11. Which of the following activation functions is suitable for avoiding the vanishing gradient problem in deep neural networks?

- a) Sigmoid

- b) ReLU
- c) Tanh
- d) Softmax

**\*\*Answer: b) ReLU\*\***

12. What is the purpose of dropout regularization in neural networks?

- a) To prevent overfitting by randomly dropping units during training
- b) To adjust the learning rate based on the model's performance
- c) To add noise to the input data to improve generalization
- d) To initialize the weights of the network

**\*\*Answer: a) To prevent overfitting by randomly dropping units during training\*\***

Matplotlib:

1. Which of the following functions is used to create a histogram in Matplotlib?

- a) hist()
- b) plot()
- c) bar()
- d) scatter()

**\*\*Answer: a) hist()\*\***

2. What is the purpose of the ``xlabel()`` and ``ylabel()`` functions in Matplotlib?

- a) To set the x and y-axis labels
- b) To create subplots
- c) To adjust the figure size
- d) To add annotations to the plot

**\*\*Answer: a) To set the x and y-axis labels\*\***

Linear Regression:

3. Which of the following statements is true about the coefficient of determination (R-squared) in linear regression?

- a) It measures the strength of the relationship between the independent and dependent variables
- b) It ranges from -1 to 1
- c) A higher value indicates a better fit of the regression line to the data
- d) It is not affected by outliers

**\*\*Answer: c) A higher value indicates a better fit of the regression line to the data\*\***

4. What is the purpose of feature scaling in linear regression?

- a) To convert categorical features into numerical features
- b) To normalize the range of independent variables
- c) To handle missing values in the dataset
- d) To reduce the dimensionality of the dataset

**\*\*Answer: b) To normalize the range of independent variables\*\***

Logistic Regression:

5. Which of the following loss functions is commonly used in logistic regression?

- a) Mean Squared Error (MSE)
- b) Binary Cross-Entropy Loss
- c) Hinge Loss
- d) KL Divergence

**\*\*Answer: b) Binary Cross-Entropy Loss\*\***



6. What is the purpose of the sigmoid function in logistic regression?

- a) To normalize the input features
- b) To compute the cost function
- c) To map the output to probability scores
- d) To adjust the learning rate

**\*\*Answer: c) To map the output to probability scores\*\***

Support Vector Machines (SVM):

7. Which of the following is NOT a kernel function used in SVM?

- a) Radial Basis Function (RBF)
- b) Polynomial
- c) Exponential
- d) Sigmoid

**\*\*Answer: c) Exponential\*\***

8. In SVM, what is the role of the slack variable (C) in the soft-margin classifier?

- a) It controls the width of the margin
- b) It penalizes misclassified data points
- c) It adjusts the complexity of the model
- d) It regularizes the model

**\*\*Answer: b) It penalizes misclassified data points\*\***

Decision Trees:

9. Which of the following algorithms is commonly used to find the best split at each node in a decision tree?

- a) ID3
- b) K-Means
- c) Gradient Descent
- d) Random Forest

**\*\*Answer: a) ID3\*\***

10. What is pruning in the context of decision trees?

- a) Adding more branches to increase the depth of the tree
- b) Removing branches that do not contribute significantly to improving performance
- c) Increasing the impurity of leaf nodes to reduce overfitting
- d) Pruning the dataset to remove outliers

**\*\*Answer: b) Removing branches that do not contribute significantly to improving performance\*\***

Artificial Neural Networks:

11. Which of the following activation functions is commonly used in the output layer of a binary classification neural network?

- a) Sigmoid
- b) ReLU
- c) Tanh
- d) Softmax

**\*\*Answer: a) Sigmoid\*\***

12. What is the purpose of batch normalization in neural networks?

- a) To speed up the training process by normalizing the input data
- b) To reduce overfitting by adding noise to the input data
- c) To normalize the activations of each layer to improve convergence

d) To adjust the learning rate during training

**\*\*Answer: c) To normalize the activations of each layer to improve convergence\*\***

Matplotlib:

1. In Matplotlib, which method is used to create a legend for a plot?

- a) `plot.legend()`
- b) `plt.legend()`
- c) `ax.legend()`
- d) `plt.create_legend()`

**\*\*Answer: b) `plt.legend()`\*\***

2. What is the purpose of the `subplot2grid()` function in Matplotlib?

- a) To create a subplot grid with unevenly sized cells
- b) To create a subplot grid with cells of equal size
- c) To create a subplot grid with shared axes
- d) To create a subplot grid with specified spacing

**\*\*Answer: a) To create a subplot grid with unevenly sized cells\*\***

Linear Regression:

3. Which of the following statements is true about the residual plot in linear regression?

- a) It is a plot of the actual values against the predicted values
- b) It is a plot of the residuals against the independent variable
- c) It is used to check for homoscedasticity and linearity assumptions
- d) It is not useful for evaluating the performance of the model

**\*\*Answer: c) It is used to check for homoscedasticity and linearity assumptions\*\***

4. What is the main disadvantage of using a simple linear regression model?

- a) It cannot handle non-linear relationships between variables
- b) It requires a large amount of data to train effectively
- c) It is computationally expensive
- d) It is prone to overfitting

**\*\*Answer: a) It cannot handle non-linear relationships between variables\*\***

Logistic Regression:

5. In logistic regression, what does the decision boundary represent?

- a) The line that separates the two classes
- b) The range of the independent variable
- c) The threshold for classification
- d) The slope of the regression line

**\*\*Answer: a) The line that separates the two classes\*\***

6. Which of the following evaluation metrics is sensitive to class imbalance in logistic regression?

- a) Accuracy
- b) Precision
- c) Recall
- d) F1-score

**\*\*Answer: c) Recall\*\***

Support Vector Machines (SVM):

7. In SVM, what is the purpose of the kernel trick?

- a) To transform the input features into a higher-dimensional space
- b) To regularize the model by penalizing large coefficients
- c) To adjust the learning rate during training
- d) To visualize the decision boundary

**\*\*Answer: a) To transform the input features into a higher-dimensional space\*\***

8. Which of the following kernel functions is suitable for handling non-linear decision boundaries in SVM?

- a) Linear kernel
- b) Polynomial kernel
- c) Sigmoid kernel
- d) Radial Basis Function (RBF) kernel

**\*\*Answer: d) Radial Basis Function (RBF) kernel\*\***

Decision Trees:

9. What is the main disadvantage of using a decision tree algorithm?

- a) It is prone to overfitting
- b) It cannot handle categorical variables
- c) It requires scaling of input features
- d) It is computationally expensive

**\*\*Answer: a) It is prone to overfitting\*\***

10. Which of the following techniques is used to prevent overfitting in decision trees?

- a) Pruning
- b) Feature scaling

- c) Regularization
- d) Gradient boosting

**\*\*Answer: a) Pruning\*\***

Artificial Neural Networks:

11. What is the purpose of the activation function in a neural network?

- a) To adjust the learning rate during training
- b) To initialize the weights of the network
- c) To introduce non-linearity into the model
- d) To regularize the model

**\*\*Answer: c) To introduce non-linearity into the model\*\***

12. Which of the following techniques is used to combat the vanishing gradient problem in deep neural networks?

- a) Dropout regularization
- b) Batch normalization
- c) L1 regularization
- d) Data augmentation

**\*\*Answer: b) Batch normalization\*\***

Support Vector Machines (SVM):

1. Which of the following statements is true about the margin in SVM?

- a) It is the distance between support vectors and the decision boundary
- b) It is the distance between data points and the decision boundary
- c) It is the distance between the mean vector and the decision boundary
- d) It is the distance between the input features and the decision boundary

**\*\*Answer: a) It is the distance between support vectors and the decision boundary\*\***

2. In SVM, what is the role of the regularization parameter (C) in the soft-margin classifier?

- a) It controls the width of the margin
- b) It penalizes misclassified data points
- c) It adjusts the complexity of the model
- d) It regularizes the model

**\*\*Answer: b) It penalizes misclassified data points\*\***

3. Which of the following kernel functions is suitable for handling data with complex decision boundaries in SVM?

- a) Linear kernel
- b) Polynomial kernel
- c) Radial Basis Function (RBF) kernel
- d) Sigmoid kernel

**\*\*Answer: c) Radial Basis Function (RBF) kernel\*\***

4. In SVM, what is the significance of the gamma parameter in the RBF kernel?

- a) It controls the width of the margin
- b) It adjusts the trade-off between bias and variance
- c) It determines the degree of the polynomial kernel
- d) It controls the influence of individual training samples

**\*\*Answer: d) It controls the influence of individual training samples\*\***

5. Which of the following techniques is used to handle multi-class classification problems using SVM?

- a) One-vs-All (OvA)

- b) One-vs-One (OvO)
- c) All-vs-All (AvA)
- d) Multi-label classification

**\*\*Answer: b) One-vs-One (OvO)\*\***

6. In SVM, what is the purpose of the kernel trick?

- a) To transform the input features into a higher-dimensional space
- b) To regularize the model by penalizing large coefficients
- c) To adjust the learning rate during training
- d) To visualize the decision boundary

**\*\*Answer: a) To transform the input features into a higher-dimensional space\*\***

Decision Trees:

7. Which of the following algorithms is commonly used to find the best split at each node in a decision tree?

- a) ID3
- b) C4.5
- c) CART
- d) CHAID

**\*\*Answer: c) CART\*\***

8. What is the main advantage of using a decision tree algorithm with Gini impurity over entropy?

- a) Gini impurity is less sensitive to class imbalance
- b) Gini impurity produces more balanced trees
- c) Gini impurity is faster to compute
- d) Gini impurity is more robust to noise



**\*\*Answer: c) Gini impurity is faster to compute\*\***

9. Which of the following techniques is used to prevent overfitting in decision trees?

- a) Pruning
- b) Feature scaling
- c) Regularization
- d) Bagging

**\*\*Answer: a) Pruning\*\***

10. What is the main disadvantage of using a decision tree algorithm for regression tasks?

- a) It cannot handle categorical variables
- b) It is prone to overfitting
- c) It requires scaling of input features
- d) It is computationally expensive

**\*\*Answer: b) It is prone to overfitting\*\***

Support Vector Machines (SVM):

11. In SVM, what is the purpose of the kernel trick?

- a) To transform the input features into a higher-dimensional space
- b) To regularize the model by penalizing large coefficients
- c) To adjust the learning rate during training
- d) To visualize the decision boundary

**\*\*Answer: a) To transform the input features into a higher-dimensional space\*\***

12. What is the significance of the gamma parameter in the RBF kernel of SVM?

- a) It controls the width of the margin
- b) It adjusts the trade-off between bias and variance
- c) It determines the degree of the polynomial kernel
- d) It controls the influence of individual training samples

**\*\*Answer: d) It controls the influence of individual training samples\*\***

13. In SVM, what is the role of the regularization parameter (C) in the soft-margin classifier?

- a) It controls the width of the margin
- b) It penalizes misclassified data points
- c) It adjusts the complexity of the model
- d) It regularizes the model

**\*\*Answer: b) It penalizes misclassified data points\*\***

14. Which of the following kernel functions is suitable for handling data with complex decision boundaries in SVM?

- a) Linear kernel
- b) Polynomial kernel
- c) Radial Basis Function (RBF) kernel
- d) Sigmoid kernel

**\*\*Answer: c) Radial Basis Function (RBF) kernel\*\***

15. What is the main advantage of using the sigmoid kernel in SVM?

- a) It is computationally efficient
- b) It can handle non-linear decision boundaries
- c) It is less sensitive to outliers
- d) It is suitable for high-dimensional data

**\*\*Answer: b) It can handle non-linear decision boundaries\*\***

Decision Trees:

16. Which of the following algorithms is commonly used to find the best split at each node in a decision tree?

- a) ID3
- b) C4.5
- c) CART
- d) CHAID

**\*\*Answer: c) CART\*\***

17. What is the main advantage of using a decision tree algorithm with Gini impurity over entropy?

- a) Gini impurity is less sensitive to class imbalance
- b) Gini impurity produces more balanced trees
- c) Gini impurity is faster to compute
- d) Gini impurity is more robust to noise

**\*\*Answer: c) Gini impurity is faster to compute\*\***

18. Which of the following techniques is used to prevent overfitting in decision trees?

- a) Pruning
- b) Feature scaling
- c) Regularization
- d) Bagging

**\*\*Answer: a) Pruning\*\***

19. What is the main disadvantage of using a decision tree algorithm for regression tasks?

- a) It cannot handle categorical variables
- b) It is prone to overfitting
- c) It requires scaling of input features
- d) It is computationally expensive

**\*\*Answer: b) It is prone to overfitting\*\***

20. Which of the following splitting criteria is used in CART (Classification and Regression Trees)?

- a) Information Gain
- b) Gini Impurity
- c) Entropy
- d) Chi-Squared

**\*\*Answer: b) Gini Impurity\*\***

21. What is the main advantage of using ensemble methods like Random Forest over individual decision trees?

- a) Ensemble methods are less prone to overfitting
- b) Ensemble methods are faster to train
- c) Ensemble methods can handle missing values better
- d) Ensemble methods are more interpretable

**\*\*Answer: a) Ensemble methods are less prone to overfitting\*\***

22. What is pruning in the context of decision trees?

- a) Adding more branches to increase the depth of the tree
- b) Removing branches that do not contribute significantly to improving performance
- c) Increasing the impurity of leaf nodes to reduce overfitting
- d) Pruning the dataset to remove outliers

**\*\*Answer: b) Removing branches that do not contribute significantly to improving performance\*\***

23. In decision trees, what is the main disadvantage of using a deep tree with many levels?

- a) It leads to underfitting
- b) It increases the interpretability of the model
- c) It may capture noise in the data
- d) It requires less computational resources

**\*\*Answer: c) It may capture noise in the data\*\***

24. Which of the following algorithms is an ensemble learning method based on decision trees?

- a) K-Means
- b) AdaBoost
- c) KNN
- d) Logistic Regression

**\*\*Answer: b) AdaBoost\*\***

25. What is the purpose of bagging in decision trees?

- a) To reduce variance by averaging predictions from multiple trees
- b) To reduce bias by introducing randomness into the training process
- c) To prune the decision tree to improve generalization
- d) To balance the trade-off between bias and variance

**\*\*Answer: a) To reduce variance by averaging predictions from multiple trees\*\***

26. Which of the following techniques is used to combat the imbalanced class problem in decision trees?

- a) Oversampling

- b) Undersampling
- c) SMOTE
- d) All of the above

**\*\*Answer: d) All of the above\*\***

27. In decision trees, what is the purpose of the max\_features parameter?

- a) It determines the maximum depth of the tree
- b) It controls the number of features to consider when splitting a node
- c) It adjusts the learning rate during training
- d) It sets the minimum number of samples required to split a node

**\*\*Answer: b) It controls the number of features to consider when splitting a node\*\***

28. Which of the following algorithms is NOT suitable for handling missing values in decision trees?

- a) Random Forest
- b) Decision Tree
- c) AdaBoost
- d) Gradient Boosting

**\*\*Answer: b) Decision Tree\*\***

29. What is the main disadvantage of using decision trees for regression tasks?

- a) They are prone to overfitting
- b) They cannot handle categorical variables
- c) They require scaling of input features
- d) They are sensitive to outliers

**\*\*Answer: a) They are prone to overfitting\*\***

30. Which of the following splitting criteria is used in ID3 (Iterative Dichotomiser 3) algorithm?

- a) Information Gain
- b) Gini Impurity
- c) Entropy
- d) Chi-Squared

**\*\*Answer: c) Entropy\*\***

31. In decision trees, what is the purpose of the min\_samples\_split parameter?

- a) It determines the maximum depth of the tree
- b) It sets the minimum number of samples required to split a node
- c) It controls the number of features to consider when splitting a node
- d) It adjusts the learning rate during training

**\*\*Answer: b) It sets the minimum number of samples required to split a node\*\***

32. Which of the following algorithms is commonly used for ordinal regression tasks with decision trees?

- a) ID3
- b) C4.5
- c) CART
- d) CHAID

**\*\*Answer: d) CHAID\*\***

33. What is the main disadvantage of using a decision tree algorithm for multi-output regression tasks?

- a) It cannot handle categorical variables

- b) It is prone to overfitting
- c) It requires scaling of input features
- d) It is computationally expensive

**\*\*Answer: b) It is prone to overfitting\*\***

34. Which of the following techniques is used to improve the interpretability of decision trees?

- a) Increasing the tree depth
- b) Adding more features to the dataset
- c) Using ensemble methods
- d) Pruning the tree

**\*\*Answer: d) Pruning the tree\*\***

35. What is the main advantage of using a decision tree algorithm over linear models for non-linear relationships?

- a) Decision trees are less prone to overfitting
- b) Decision trees can handle categorical variables
- c) Decision trees require less computational resources
- d) Decision trees produce more interpretable models

**\*\*Answer: b) Decision trees can handle categorical variables\*\***

36. In decision trees, what is the purpose of the min\_samples\_leaf parameter?

- a) It determines the maximum depth of the tree
- b) It sets the minimum number of samples required to split a node
- c) It sets the minimum number of samples required to be a leaf node
- d) It adjusts the learning rate during training

**\*\*Answer: c) It sets the minimum number of samples required to be a leaf node\*\***



37. Which of the following techniques is used to handle class imbalance in decision trees?

- a) Oversampling
- b) Undersampling
- c) SMOTE
- d) All of the above

**\*\*Answer: d) All of the above\*\***

38. What is the main disadvantage of using a decision tree algorithm for high-dimensional data?

- a) It cannot handle categorical variables
- b) It is prone to overfitting
- c) It requires scaling of input features
- d) It is computationally expensive

**\*\*Answer: b) It is prone to overfitting\*\***

39. Which of the following techniques is used to handle outliers in decision trees?

- a) Removing outliers from the dataset
- b) Winsorizing the data
- c) Applying log transformation
- d) None of the above

**\*\*Answer: a) Removing outliers from the dataset\*\***

40. In decision trees, what is the purpose of the max\_depth parameter?

- a) It determines the maximum number of features to consider when splitting a node
- b) It sets the maximum depth of the tree
- c) It controls the learning rate during training
- d) It adjusts the regularization strength

**\*\*Answer: b) It sets the maximum depth of the tree\*\***

1. Which library in Python is commonly used for numerical computing?

- a) Pandas
- b) NumPy
- c) Matplotlib
- d) Seaborn

Answer: b) NumPy

2. What does the `axis` parameter specify in NumPy functions like `np.sum()`?

- a) It specifies the range of values to include in the calculation
- b) It specifies the dimension along which the operation will be performed
- c) It specifies the type of operation to perform
- d) It specifies the output data type

Answer: b) It specifies the dimension along which the operation will be performed

3. Which of the following is a correct way to create a NumPy array from a Python list?

- a) `np.array(list)`
- b) `numpy.array(list)`
- c) `numpy.array([list])`
- d) `array(list)`

Answer: a) `np.array(list)`

4. What does the `dtype` parameter specify in NumPy arrays?

- a) It specifies the shape of the array
- b) It specifies the data type of the array elements
- c) It specifies the dimensionality of the array
- d) It specifies the indexing scheme used for the array

Answer: b) It specifies the data type of the array elements

5. Which of the following functions is used to generate random numbers in NumPy?

- a) ``np.rand()``
- b) ``np.random()``
- c) ``np.random.rand()``
- d) ``np.randomize()``

Answer: c) ``np.random.rand()``

6. What is the purpose of the ``loc`` function in Pandas?

- a) It is used to access elements by label
- b) It is used to access elements by index
- c) It is used to access elements by position
- d) It is used to perform logical operations on elements

Answer: a) It is used to access elements by label

7. Which of the following is a correct syntax to read a CSV file into a Pandas DataFrame?

- a) ``pd.read_csv(file)``
- b) ``pandas.read_csv(file)``
- c) ``pd.read_excel(file)``
- d) ``pandas.read_file(file)``

Answer: a) ``pd.read_csv(file)``

8. What does the ``head()`` function in Pandas DataFrame do?

- a) It returns the first few rows of the DataFrame
- b) It returns the last few rows of the DataFrame
- c) It returns summary statistics of the DataFrame
- d) It returns information about the columns of the DataFrame

Answer: a) It returns the first few rows of the DataFrame

9. Which of the following is used to plot data in Python?

- a) NumPy
- b) Pandas
- c) Matplotlib
- d) Seaborn

Answer: c) Matplotlib

10. What is the primary role of Matplotlib in data visualization?

- a) To manipulate data
- b) To analyze data
- c) To visualize data
- d) To clean data

Answer: c) To visualize data

11. Which of the following is a correct way to create a scatter plot in Matplotlib?

- a) `plt.scatterplot(x, y)`
- b) `plt.scatter(x, y)`
- c) `plt.plot(x, y)`
- d) `plt.bar(x, y)`

Answer: b) `plt.scatter(x, y)`

12. What does the `xlabel()` function in Matplotlib do?

- a) It sets the label for the x-axis
- b) It sets the title of the plot
- c) It creates a legend for the plot
- d) It adjusts the size of the plot

Answer: a) It sets the label for the x-axis

13. Which of the following is a correct way to create a bar plot in Seaborn?

- a) `seaborn.barplot(x=data['X'], y=data['Y'])`
- b) `seaborn.plot(x=data['X'], y=data['Y'])`

c) ``seaborn.scatterplot(x=data['X'], y=data['Y'])``

d) ``seaborn.histplot(x=data['X'], y=data['Y'])``

Answer: a) ``seaborn.barplot(x=data['X'], y=data['Y'])``

14. What is the purpose of pair plots in Seaborn?

a) To show the distribution of a single variable

b) To show the relationship between two variables

c) To show the correlation between multiple variables

d) To show the distribution of categorical variables

Answer: c) To show the correlation between multiple variables

15. Which parameter controls the color palette in Seaborn plots?

a) ``color``

b) ``palette``

c) ``hue``

d) ``style``

Answer: b) ``palette``

16. What is the primary goal of linear regression?

a) To predict continuous values

b) To predict categorical values

c) To perform clustering

d) To perform dimensionality reduction

Answer: a) To predict continuous values

17. Which of the following is a correct syntax to create a linear regression model in Scikit-learn?

a) ``model = sklearn.LinearRegression()``

b) ``model = LinearRegression()``

c) ``model = sklearn.regression.Linear()``

d) ``model = linear_regression()``

Answer

: b) `model = LinearRegression()`

18. What is the purpose of the `fit()` method in a linear regression model?

- a) To evaluate the model
- b) To make predictions
- c) To train the model
- d) To transform the data

Answer: c) To train the model

19. Which parameter controls the regularization strength in linear regression models?

- a) `C`
- b) `alpha`
- c) `lambda`
- d) `regularization`

Answer: b) `alpha`

20. What is the main advantage of using regularization in linear regression?

- a) To increase the complexity of the model
- b) To reduce the number of features
- c) To prevent overfitting
- d) To speed up the training process

Answer: c) To prevent overfitting

21. What is the primary purpose of logistic regression?

- a) To predict continuous values
- b) To predict categorical values
- c) To perform clustering
- d) To perform dimensionality reduction

Answer: b) To predict categorical values

22. Which of the following is a correct syntax to create a logistic regression model in Scikit-learn?

- a) `model = sklearn.LogisticRegression()`
- b) `model = LogisticRegression()`
- c) `model = sklearn.classification.Logistic()`
- d) `model = logistic_regression()`

Answer: a) `model = sklearn.LogisticRegression()`

23. What is the purpose of the `predict()` method in a logistic regression model?

- a) To evaluate the model
- b) To make predictions
- c) To train the model
- d) To transform the data

Answer: b) To make predictions

24. Which parameter controls the regularization strength in logistic regression models?

- a) `C`
- b) `alpha`
- c) `lambda`
- d) `regularization`

Answer: a) `C`

25. What is the primary goal of support vector machines (SVM)?

- a) To perform clustering
- b) To classify data into two or more categories
- c) To predict continuous values
- d) To perform dimensionality reduction

Answer: b) To classify data into two or more categories

26. Which of the following is a correct syntax to create an SVM model in Scikit-learn?

- a) ``model = sklearn.SVM()``
- b) ``model = SVM()``
- c) ``model = sklearn.svm.SVC()``
- d) ``model = svm_model()``

Answer: c) ``model = sklearn.svm.SVC()``

27. What does the term "kernel" refer to in SVM?

- a) The central point of the data
- b) The weights assigned to features
- c) A function used to map data to a higher-dimensional space
- d) The margin between support vectors

Answer: c) A function used to map data to a higher-dimensional space

28. Which of the following kernel functions is commonly used in SVM for non-linear data?

- a) Linear
- b) Polynomial
- c) Sigmoid
- d) Normal

Answer: b) Polynomial

29. What is the primary purpose of decision trees in machine learning?

- a) To perform clustering
- b) To classify data into two or more categories
- c) To predict continuous values
- d) To perform dimensionality reduction

Answer: b) To classify data into two or more categories

30. Which of the following is a correct syntax to create a decision tree model in Scikit-learn?

- a) ``model = sklearn.DecisionTree()``



- b) ``model = DecisionTree()``
- c) ``model = sklearn.tree.DecisionTreeClassifier()``
- d) ``model = decision_tree_model()``

Answer: c) ``model = sklearn.tree.DecisionTreeClassifier()``

31. What does the term "entropy" refer to in decision trees?

- a) The measure of impurity in a node
- b) The measure of information gain
- c) The measure of variance reduction
- d) The measure of model complexity

Answer: a) The measure of impurity in a node

32. Which of the following is a correct syntax to create a random forest model in Scikit-learn?

- a) ``model = sklearn.RandomForest()``
- b) ``model = RandomForest()``
- c) ``model = sklearn.ensemble.RandomForestClassifier()``
- d) ``model = random_forest_model()``

Answer: c) ``model = sklearn.ensemble.RandomForestClassifier()``

33. What is the primary goal of principal component analysis (PCA)?

- a) To increase the number of features
- b) To reduce the number of features
- c) To scale the features to a similar range
- d) To add noise to the features

Answer: b) To reduce the number of features

34. Which of the following is a correct syntax to perform PCA in Scikit-learn?

- a) ``pca = PCA()``
- b) ``pca = sklearn.pca.PCA()``
- c) ``pca = sklearn.PCA()``

d) ``pca = principal_component_analysis()``

Answer: c) ``pca = sklearn.PCA()``

35. What does the term "explained variance ratio" refer to in PCA?

- a) The percentage of total variance explained by each principal component
- b) The number of principal components in the dataset
- c) The amount of noise added to the dataset
- d) The number of features after dimensionality reduction

Answer: a) The percentage of total variance explained by each principal component

36. Which of the following is a correct syntax to create a neural network model in Keras?

- a) ``model = keras.NeuralNetwork()``
- b) ``model = keras.Sequential()``
- c) ``model = keras.Model()``
- d) ``model = NeuralNetwork()``

Answer: b) ``model = keras.Sequential()``

37. What is the purpose of the ``compile()`` method in Keras?

- a) To train the model
- b) To evaluate the model
- c) To configure the model for training
- d) To save the model

Answer: c) To configure the model for training

38. Which of the following is a correct syntax to compile a neural network model in Keras?

- a) ``model.compile(loss='mse', optimizer='sgd', metrics=['accuracy'])``
- b) ``compile(model, loss='mse', optimizer='sgd', metrics=['accuracy'])``
- c) ``model.compile(loss='mse', sgd, ['accuracy'])``
- d) ``compile(loss='mse', optimizer='sgd', metrics=['accuracy'])``

Answer: a) ``model.compile(loss='mse', optimizer='sgd', metrics=['accuracy'])``

39. What does the `fit()` method in Keras do?

- a) Trains the model
- b) Evaluates the model
- c) Transforms the data
- d) Plots the data

Answer: a) Trains the

model

40. Which parameter in Keras controls the number of training iterations?

- a) `epochs`
- b) `batch_size`
- c) `learning_rate`
- d) `dropout`

Answer: a) `epochs`

41. What is the purpose of the `evaluate()` method in Keras?

- a) To train the model
- b) To evaluate the model on a validation dataset
- c) To make predictions
- d) To compile the model

Answer: b) To evaluate the model on a validation dataset

42. Which of the following is a correct syntax to evaluate a neural network model in Keras?

- a) `model.evaluate(X_test, y_test)`
- b) `evaluate(model, X_test, y_test)`
- c) `model.evaluate(test_data)`
- d) `evaluate(X_test, y_test)`

Answer: a) `model.evaluate(X_test, y_test)`

43. What is the purpose of the `predict()` method in Keras?

- a) To train the model
- b) To evaluate the model
- c) To make predictions on new data
- d) To compile the model

Answer: c) To make predictions on new data

44. Which parameter in Keras controls the learning rate in optimization algorithms?

- a) `epochs`
- b) `batch_size`
- c) `learning_rate`
- d) `dropout`

Answer: c) `learning_rate`

45. Which of the following is not a correct syntax to create a scatter plot in Matplotlib?

- a) `plot.scatter(x, y)`
- b) `scatter(x, y)`
- c) `scatterplot(x, y)`
- d) `plot(x, y)`

Answer: d) `plot(x, y)`

46. What is the purpose of the `ylabel()` function in Matplotlib?

- a) It sets the label for the x-axis
- b) It sets the label for the y-axis
- c) It sets the title of the plot
- d) It creates a legend for the plot

Answer: b) It sets the label for the y-axis

47. Which of the following is not a correct syntax to create a bar plot in Seaborn?

- a) ``sns.barplot(x=data['X'], y=data['Y'])``
- b) ``barplot(x=data['X'], y=data['Y'])``
- c) ``seaborn.barplot(x=data['X'], y=data['Y'])``
- d) ``plot.bar(x=data['X'], y=data['Y'])``

Answer: d) ``plot.bar(x=data['X'], y=data['Y'])``

48. What is the purpose of boxplots in data visualization?

- a) To show the distribution of categorical variables
- b) To show the distribution of continuous variables
- c) To show the relationship between two variables
- d) To show the correlation between variables

Answer: b) To show the distribution of continuous variables

49. Which of the following is not a correct syntax to create a histogram in Matplotlib?

- a) ``plot.hist(data)``
- b) ``hist(data)``
- c) ``plt.hist(data)``
- d) ``matplotlib.hist(data)``

Answer: d) ``matplotlib.hist(data)``

50. Which of the following is a correct syntax to create a line plot in Plotly?

- a) ``plotly.plot(data)``
- b) ``plotly.line(data)``
- c) ``plotly.plot(data, mode='lines')``
- d) ``plotly.graph_objects.Figure(data=graph_data)``

Answer: c) ``plotly.plot(data, mode='lines')``

51. What does the term "dropout" refer to in neural networks?

- a) Dropping out features with low importance
- b) Dropping out neurons during training to prevent overfitting

c) Dropping out samples with missing values

d) Dropping out layers with high variance

Answer: b) Dropping out neurons during training to prevent overfitting

52. Which of the following is a correct syntax to create a neural network model in TensorFlow?

a) `model = tf.keras.Model()`

b) `model = tf.keras.Sequential()`

c) `model = tf.keras.NeuralNetwork()`

d) `model = tf.NeuralNetwork()`

Answer: b) `model = tf.keras.Sequential()`

53. What is the primary role of the activation function in a neural network?

a) To normalize the input data

b) To control the learning rate

c) To introduce non-linearity

d) To compute the loss function

Answer: c) To introduce non-linearity

54. Which evaluation metric is commonly used for regression problems?

a) Accuracy

b) Precision

c) F1-score

d) Mean Squared Error (MSE)

Answer: d) Mean Squared Error (MSE)

55. What is the purpose of

the `fit()` method in a machine learning model?

a) To evaluate the model

b) To make predictions

- c) To train the model
- d) To transform the data

Answer: c) To train the model

56. Which of the following is a correct syntax to create a K-means clustering model in Scikit-learn?

- a) ``model = sklearn.KMeans()``
- b) ``model = KMeans()``
- c) ``model = sklearn.cluster.KMeans()``
- d) ``model = kmeans_model()``

Answer: c) ``model = sklearn.cluster.KMeans()``

57. What is the primary goal of K-means clustering?

- a) To perform regression
- b) To classify data into two or more categories
- c) To predict continuous values
- d) To partition data into clusters based on similarity

Answer: d) To partition data into clusters based on similarity

58. Which parameter in K-means clustering controls the number of clusters?

- a) ``k``
- b) ``clusters``
- c) ``centroids``
- d) ``labels``

Answer: a) ``k``

59. Which of the following is a correct syntax to perform principal component analysis (PCA) in Scikit-learn?

- a) ``pca = PCA()``
- b) ``pca = sklearn.decomposition.PCA()``
- c) ``pca = sklearn.PCA()``

d) `pca = principal_component_analysis()`

Answer: b) `pca = sklearn.decomposition.PCA()`

60. What is the primary goal of principal component analysis (PCA)?

- a) To increase the number of features
- b) To reduce the number of features
- c) To scale the features to a similar range
- d) To add noise to the features

Answer: b) To reduce the number of features

61. Which of the following is a correct syntax to create a neural network model in TensorFlow?

- a) `model = tf.keras.Model()`
- b) `model = tf.keras.Sequential()`
- c) `model = tf.keras.NeuralNetwork()`
- d) `model = tf.NeuralNetwork()`

Answer: b) `model = tf.keras.Sequential()`

62. What is the primary role of the activation function in a neural network?

- a) To normalize the input data
- b) To control the learning rate
- c) To introduce non-linearity
- d) To compute the loss function

Answer: c) To introduce non-linearity

63. Which evaluation metric is commonly used for classification problems?

- a) Mean Squared Error (MSE)
- b) Accuracy
- c) Root Mean Squared Error (RMSE)
- d) R-squared

Answer: b) Accuracy



64. What is the purpose of the `fit()` method in a machine learning model?

- a) To evaluate the model
- b) To make predictions
- c) To train the model
- d) To transform the data

Answer: c) To train the model

65. Which of the following is a correct syntax to create a K-means clustering model in Scikit-learn?

- a) `model = sklearn.KMeans()`
- b) `model = KMeans()`
- c) `model = sklearn.cluster.KMeans()`
- d) `model = kmeans_model()`

Answer: c) `model = sklearn.cluster.KMeans()`

66. What is the primary goal of K-means clustering?

- a) To perform regression
- b) To classify data into two or more categories
- c) To predict continuous values
- d) To partition data into clusters based on similarity

Answer: d) To partition data into clusters based on similarity

67. Which parameter in K-means clustering controls the number of clusters?

- a) `k`
- b) `clusters`
- c) `centroids`
- d) `labels`

Answer: a) `k`

68. Which of the following is a correct syntax to perform principal component analysis (PCA) in Scikit-learn?

- a) `pca = PCA()`
- b) `pca = sklearn.decomposition.PCA()`
- c) `pca = sklearn.PCA()`
- d) `pca = principal_component_analysis()`

Answer: b) `pca = sklearn.decomposition.PCA()`

69. What is the primary goal of principal component analysis (PCA)?

- a) To increase the number of features
- b) To reduce the number of features
- c) To scale the features to a similar range
- d) To add noise to the features

Answer: b) To reduce the number of features

70. Which of the following is a correct syntax to create a neural network model in TensorFlow?

- a) `model = tf.keras.Model()`
- b) `model = tf.keras.Sequential()`
- c) `model = tf.keras.NeuralNetwork()`
- d) `model = tf.NeuralNetwork()`

Answer: b) `model = tf.keras.Sequential()`

71. What is the primary role of the activation function in a neural network?

- a) To normalize the input data
- b) To control the learning rate
- c) To introduce non-linearity
- d) To compute the loss function

Answer: c) To introduce non-linearity

72. Which evaluation metric is commonly used for classification problems?

- a) Mean Squared Error (MSE)
- b) Accuracy
- c) Root Mean Squared Error (RMSE)
- d) R-squared

Answer: b) Accuracy

73. What is the purpose of the `fit()` method in a machine learning model?

- a) To evaluate the model
- b) To make predictions
- c) To train the model
- d) To transform the data

Answer: c) To train the model

74. Which of the following is a correct syntax to create a K-means clustering model in Scikit-learn?

- a) `model = sklearn.KMeans()`
- b) `model = KMeans()`
- c) `model = sklearn.cluster.KMeans()`
- d) `model = kmeans_model()`

Answer: c) `model = sklearn.cluster.KMeans()`

75. What is the primary goal of K-means clustering?

- a) To perform regression
- b) To classify data into two or more categories
- c) To predict continuous values
- d) To partition data into clusters based on similarity

Answer: d) To partition data into clusters based on similarity

1. In NumPy, what does the `np.argmax()` function do?

- a) Returns the maximum value in an array
- b) Returns the index of the maximum value in an array

- c) Returns the mean of an array
- d) Returns the variance of an array

Answer: b) Returns the index of the maximum value in an array

2. What is the purpose of the `np.newaxis` attribute in NumPy?

- a) It adds a new axis to an array
- b) It removes an axis from an array
- c) It reshapes an array
- d) It normalizes an array

Answer: a) It adds a new axis to an array

3. In Pandas, what does the `fillna()` function do?

- a) Fills missing values in a DataFrame with specified values
- b) Removes missing values from a DataFrame
- c) Fills missing values in a DataFrame with the mean of the column
- d) Interpolates missing values in a DataFrame

Answer: a) Fills missing values in a DataFrame with specified values

4. Which of the following statements about Matplotlib is true?

- a) Matplotlib is primarily used for data manipulation
- b) Matplotlib is a high-level neural networks library
- c) Matplotlib provides a MATLAB-like interface for plotting
- d) Matplotlib is built on top of Pandas

Answer: c) Matplotlib provides a MATLAB-like interface for plotting

5. What does the `hue` parameter control in Seaborn plots?

- a) The size of the plot markers
- b) The color of the plot markers
- c) The style of the plot markers
- d) The grouping variable for plotting observations

Answer: d) The grouping variable for plotting observations

6. In linear regression, what does the term "residuals" refer to?

- a) The difference between predicted and actual values
- b) The slope of the regression line
- c) The intercept of the regression line
- d) The variance of the dependent variable

Answer: a) The difference between predicted and actual values

7. Which of the following is true about logistic regression?

- a) It is used for predicting continuous values
- b) It is a linear regression algorithm
- c) It is a classification algorithm
- d) It is not suitable for binary classification tasks

Answer: c) It is a classification algorithm

8. In SVM, what is the role of the kernel function?

- a) It determines the margin of the decision boundary
- b) It transforms the input data into a higher-dimensional space
- c) It calculates the distance between support vectors
- d) It regularizes the SVM model

Answer: b) It transforms the input data into a higher-dimensional space

9. What is the purpose of pruning in decision trees?

- a) To reduce overfitting by removing parts of the tree that do not provide significant splits
- b) To increase model complexity
- c) To improve accuracy by adding more branches to the tree
- d) To speed up the training process

Answer: a) To reduce overfitting by removing parts of the tree that do not provide significant splits

10. What is the primary goal of PCA?

- a) To increase the dimensionality of the data
- b) To decrease the dimensionality of the data
- c) To add noise to the data
- d) To transform categorical variables into numerical ones

Answer: b) To decrease the dimensionality of the data

11. In neural networks, what is the purpose of the activation function?

- a) To normalize the input data
- b) To introduce non-linearity
- c) To compute the loss function
- d) To regularize the model

Answer: b) To introduce non-linearity

12. What is the role of the loss function in training neural networks?

- a) To compute the accuracy of the model
- b) To determine the learning rate
- c) To measure the difference between predicted and actual values
- d) To initialize the weights of the network

Answer: c) To measure the difference between predicted and actual values

13. Which of the following is a common activation function used in neural networks for binary classification tasks?

- a) ReLU (Rectified Linear Activation)
- b) Sigmoid
- c) Tanh (Hyperbolic Tangent)
- d) Softmax

Answer: b) Sigmoid

14. What is the purpose of regularization in neural networks?

- a) To increase model complexity

- b) To reduce the number of features
- c) To prevent overfitting
- d) To speed up the training process

Answer: c) To prevent overfitting

15. Which of the following is not a common optimizer used in training neural networks?

- a) Adam
- b) Gradient Descent
- c) RMSprop
- d) Newton's Method

Answer: d) Newton's Method

16. What is the purpose of the dropout technique in neural networks?

- a) To remove outliers from the data
- b) To randomly deactivate neurons during training to prevent overfitting
- c) To speed up the training process
- d) To increase the model's capacity

Answer: b) To randomly deactivate neurons during training to prevent overfitting

17. Which evaluation metric is commonly used for regression tasks?

- a) Accuracy
- b) Precision
- c) Mean Squared Error (MSE)
- d) F1-score

Answer: c) Mean Squared Error (MSE)

18. Which evaluation metric is commonly used for classification tasks?

- a) Mean Absolute Error (MAE)
- b) R-squared
- c) F1-score

d) Root Mean Squared Error (RMSE)

Answer: c) F1-score

19. What is the primary goal of K-means clustering?

- a) To predict continuous values
- b) To classify data into categories
- c) To reduce the dimensionality of the data
- d) To partition data into clusters based on similarity

Answer: d) To partition data into clusters based on similarity

20. In PCA, what does the term "explained variance" refer to?

- a) The percentage of total variance explained by each principal component
- b) The number of principal components in the dataset
- c) The amount of noise added to the dataset
- d) The number of features after dimensionality reduction

Answer: a) The percentage of total variance explained by each principal component

21. Which of the following is true about k-fold cross-validation?

- a) It divides the data into k clusters
- b) It performs feature selection on the data
- c) It evaluates the model's performance on multiple subsets of the data
- d) It trains the model on a single subset of the data

Answer: c) It evaluates the model's performance on multiple subsets of the data

22. Which of the following techniques is used to handle class imbalance in classification tasks?

- a) Data augmentation
- b) SMOTE (Synthetic Minority

Over-sampling Technique)

- c) Feature scaling



d) L1 regularization

Answer: b) SMOTE (Synthetic Minority Over-sampling Technique)

23. Which of the following is a disadvantage of decision trees?

a) They can easily handle missing values

b) They are robust to outliers

c) They tend to overfit the training data

d) They are interpretable

Answer: c) They tend to overfit the training data

24. Which technique is commonly used for feature scaling in SVM?

a) Min-Max scaling

b) Standardization

c) Normalization

d) Binarization

Answer: b) Standardization

25. Which of the following is true about ensemble learning methods?

a) They cannot be used with decision trees

b) They combine the predictions of multiple models to improve performance

c) They are only applicable to regression tasks

d) They increase the risk of overfitting

Answer: b) They combine the predictions of multiple models to improve performance

26. In PCA, what is the significance of the eigenvectors?

a) They represent the variance explained by each principal component

b) They represent the principal components of the data

c) They represent the mean of the data

d) They represent the covariance matrix of the data

Answer: b) They represent the principal components of the data

27. Which of the following is a drawback of using the elbow method to determine the optimal number of clusters in K-means clustering?

- a) It is computationally expensive
- b) It requires a large amount of data
- c) It may not always provide a clear indication of the optimal number of clusters
- d) It is sensitive to outliers

Answer: c) It may not always provide a clear indication of the optimal number of clusters

28. What is the primary purpose of the Silhouette score in clustering?

- a) To measure the compactness of clusters
- b) To measure the separation between clusters
- c) To measure the quality of cluster assignments
- d) To measure the density of clusters

Answer: c) To measure the quality of cluster assignments

29. Which of the following is a disadvantage of using the RBF kernel in SVM?

- a) It is not suitable for non-linearly separable data
- b) It is computationally expensive
- c) It requires the data to be linearly separable
- d) It is not affected by the choice of hyperparameters

Answer: b) It is computationally expensive

30. Which of the following is a limitation of using PCA for dimensionality reduction?

- a) It can only handle numerical features
- b) It requires the features to be independent of each other
- c) It cannot capture non-linear relationships in the data
- d) It is not suitable for large datasets

Answer: c) It cannot capture non-linear relationships in the data

31. Which activation function is commonly used in the output layer of a binary classification neural network?

- a) Sigmoid
- b) ReLU
- c) Tanh
- d) Softmax

Answer: a) Sigmoid

32. Which technique can be used to combat overfitting in neural networks?

- a) Increasing the number of layers
- b) Decreasing the learning rate
- c) Adding more neurons
- d) Using dropout regularization

Answer: d) Using dropout regularization

33. What is the purpose of the learning rate in neural network optimization algorithms?

- a) To control the rate at which weights are updated during training
- b) To determine the number of training epochs
- c) To define the size of the input layer
- d) To measure the accuracy of the model

Answer: a) To control the rate at which weights are updated during training

34. Which of the following statements about convolutional neural networks (CNNs) is true?

- a) CNNs are primarily used for sequence data
- b) CNNs consist of fully connected layers only
- c) CNNs automatically learn spatial hierarchies of features
- d) CNNs are not suitable for image classification tasks

Answer: c) CNNs automatically learn spatial hierarchies of features

35. Which activation function is commonly used in the hidden layers of a neural network?

- a) Sigmoid

- b) ReLU
- c) Tanh
- d) Softmax

Answer: b) ReLU

36. Which of the following is true about recurrent neural networks (RNNs)?

- a) RNNs are only used for image recognition tasks
- b) RNNs are not suitable for sequential data
- c) RNNs have connections between neurons that form a directed cycle
- d) RNNs do not suffer from the vanishing gradient problem

Answer: c) RNNs have connections between neurons that form a directed cycle

37. What is the purpose of the embedding layer in neural networks?

- a) To reduce the dimensionality of the input data
- b) To add noise to the input data
- c) To convert categorical variables into numerical representations
- d) To normalize the input data

Answer: c) To convert categorical variables into numerical representations

38. Which of the following is true about Long Short-Term Memory (LSTM) networks?

- a) LSTMs do not suffer from the vanishing gradient problem
- b) LSTMs have a simpler architecture compared to standard RNNs
- c) LSTMs are not suitable for sequential data
- d) LSTMs do not have memory cells

Answer: a) LSTMs do not suffer from the vanishing gradient problem

39. What is the purpose of the loss function in neural networks?

- a) To initialize the weights of the network
- b) To measure the difference between predicted and actual values
- c) To determine the learning rate

d) To regularize the model

Answer: b) To measure the difference between predicted and actual values

40. Which technique is commonly used to address the vanishing gradient problem in neural networks?

a) Batch normalization

b) Dropout regularization

c) Gradient clipping

d) Learning rate scheduling

Answer: c) Gradient clipping

41. Which of the following is a drawback of using mini-batch gradient descent?

a) It converges faster than batch gradient descent

b) It requires more memory compared to batch gradient descent

c) It is less prone to getting stuck in local minima

d) It is computationally less efficient than batch gradient descent

Answer: b) It requires more memory compared to batch gradient descent

42. Which regularization technique penalizes large weights by adding their squared magnitude to the loss function?

a) L1 regularization

b) L2 regularization

c) Elastic Net regularization

d) Ridge regression

Answer: b) L2 regularization

43. What is the purpose of the softmax function in the output layer of a multi-class classification neural network?

a) To normalize the output probabilities

b) To introduce non-linearity

c) To compute the loss function

d) To regularize the model

Answer

: a) To normalize the output probabilities

44. Which optimization algorithm adjusts the learning rate during training based on the performance of the model?

- a) Gradient Descent
- b) Stochastic Gradient Descent (SGD)
- c) Adagrad
- d) Adam

Answer: d) Adam

45. Which of the following is true about transfer learning in neural networks?

- a) It involves training a model from scratch for a new task
- b) It does not require pre-trained models
- c) It is not applicable to image recognition tasks
- d) It leverages knowledge gained from training on one task to improve performance on another task

Answer: d) It leverages knowledge gained from training on one task to improve performance on another task

46. What is the purpose of the confusion matrix in classification tasks?

- a) To measure the accuracy of the model
- b) To visualize the distribution of the target variable
- c) To evaluate the performance of the model on test data
- d) To show the counts of true positive, true negative, false positive, and false negative predictions

Answer: d) To show the counts of true positive, true negative, false positive, and false negative predictions

47. Which of the following is a common technique used for handling missing data in machine learning?

- a) Dropping rows with missing values
- b) Imputing missing values with the mean of the column
- c) Imputing missing values with the median of the column
- d) All of the above

Answer: d) All of the above

48. What is the purpose of feature scaling in machine learning?

- a) To make the features more interpretable
- b) To make the training process faster
- c) To ensure that all features contribute equally to the model
- d) To reduce the dimensionality of the data

Answer: c) To ensure that all features contribute equally to the model

49. Which of the following is a common technique used for feature selection in machine learning?

- a) Principal Component Analysis (PCA)
- b) Recursive Feature Elimination (RFE)
- c) Regularization
- d) All of the above

Answer: d) All of the above

50. What is the purpose of hyperparameter tuning in machine learning?

- a) To optimize the parameters of the model during training
- b) To prevent overfitting of the model
- c) To find the best values for the model's hyperparameters
- d) To increase the model's capacity

Answer: c) To find the best values for the model's hyperparameters

51. Which of the following is true about cross-validation?

- a) It is used to evaluate the performance of the model on unseen data
- b) It involves splitting the data into training and testing sets
- c) It can help prevent overfitting of the model
- d) All of the above

Answer: d) All of the above

52. What is the purpose of feature engineering in machine learning?

- a) To create new features from existing ones to improve model performance
- b) To remove irrelevant features from the dataset
- c) To standardize the features to a similar scale
- d) To reduce the dimensionality of the dataset

Answer: a) To create new features from existing ones to improve model performance

53. Which of the following is a common technique used for handling categorical variables in machine learning?

- a) One-Hot Encoding
- b) Label Encoding
- c) Ordinal Encoding
- d) All of the above

Answer: d) All of the above

54. Which of the following is a common preprocessing step in natural language processing (NLP)?

- a) Tokenization
- b) Standardization
- c) Imputation
- d) Principal Component Analysis (PCA)

Answer: a) Tokenization

55. What is the primary goal of sentiment analysis in NLP?

- a) To classify text into different categories



- b) To extract named entities from text
- c) To determine the sentiment expressed in text
- d) To generate text based on a given prompt

Answer: c) To determine the sentiment expressed in text

56. Which of the following is a common technique used for text vectorization in NLP?

- a) Bag of Words (BoW)
- b) Principal Component Analysis (PCA)
- c) Support Vector Machines (SVM)
- d) K-means clustering

Answer: a) Bag of Words (BoW)

57. What is the purpose of the IDF (Inverse Document Frequency) term in TF-IDF vectorization?

- a) To measure the frequency of a term in a document
- b) To measure the importance of a term in a collection of documents
- c) To normalize the term frequencies in a document
- d) To compute the cosine similarity between documents

Answer: b) To measure the importance of a term in a collection of documents

58. Which of the following is true about word embeddings?

- a) Word embeddings represent words as dense vectors in a high-dimensional space
- b) Word embeddings are sparse representations of words
- c) Word embeddings are generated using one-hot encoding
- d) Word embeddings are not suitable for NLP tasks

Answer: a) Word embeddings represent words as dense vectors in a high-dimensional space

59. What is the purpose of attention mechanisms in NLP?

- a) To focus on relevant parts of the input sequence during model training
- b) To reduce the dimensionality of the input data

- c) To prevent overfitting of the model
- d) To classify text into different categories

Answer: a) To focus on relevant parts of the input sequence during model training

60. Which of the following is a common task in natural language processing?

- a) Image classification
- b) Speech recognition
- c) Sentiment analysis
- d) All of the above

Answer: c) Sentiment analysis

61. Which of the following is true about unsupervised learning?

- a) It requires labeled data for training
- b) It is used for classification tasks
- c) It aims to find hidden patterns or structures in data
- d) It cannot handle missing values in the dataset

Answer: c) It aims to find hidden patterns or structures in data

62. What is the purpose of dimensionality reduction techniques in machine learning?

- a) To increase the number of features in the dataset
- b) To reduce the computational complexity of the model
- c) To visualize high-dimensional data
- d) To create new features from existing ones

Answer: b) To reduce the computational complexity of the model

63. Which of the following is a common application of clustering algorithms?

- a) Sentiment analysis
- b) Image recognition
- c) Customer segmentation
- d) Regression analysis

Answer: c) Customer segmentation

64. What is the primary goal of ensemble learning?

- a) To improve model interpretability
- b) To reduce model complexity
- c) To combine the predictions of multiple models to improve performance
- d) To eliminate bias in the model

Answer: c) To combine the predictions of multiple models to improve performance

65. Which

of the following is true about the bias-variance tradeoff?

- a) Increasing model complexity reduces bias and variance
- b) Increasing model complexity increases bias and reduces variance
- c) Increasing model complexity increases both bias and variance
- d) Increasing model complexity does not affect bias or variance

Answer: c) Increasing model complexity increases both bias and variance

66. Which of the following is a common technique used for feature extraction in image processing?

- a) Principal Component Analysis (PCA)
- b) Convolutional Neural Networks (CNNs)
- c) Support Vector Machines (SVMs)
- d) K-means clustering

Answer: b) Convolutional Neural Networks (CNNs)

67. What is the purpose of regularization techniques in machine learning?

- a) To increase model complexity
- b) To reduce overfitting of the model
- c) To speed up the training process
- d) To decrease the model's capacity

Answer: b) To reduce overfitting of the model

68. Which of the following is a common preprocessing step in image processing?

- a) Tokenization
- b) Normalization
- c) One-Hot Encoding
- d) Label Encoding

Answer: b) Normalization

69. Which of the following is true about transfer learning in machine learning?

- a) It involves training a model from scratch for a new task
- b) It does not require pre-trained models
- c) It is not applicable to image recognition tasks
- d) It leverages knowledge gained from training on one task to improve performance on another task

Answer: d) It leverages knowledge gained from training on one task to improve performance on another task

70. What is the primary goal of semi-supervised learning?

- a) To train models using both labeled and unlabeled data
- b) To train models using only labeled data
- c) To train models using only unlabeled data
- d) To train models using reinforcement learning techniques

Answer: a) To train models using both labeled and unlabeled data

71. Which of the following is a common technique used for handling imbalanced datasets?

- a) SMOTE (Synthetic Minority Over-sampling Technique)
- b) Downsampling the majority class
- c) Upsampling the minority class
- d) All of the above

Answer: d) All of the above

72. Which of the following is true about feature selection techniques?

- a) They always improve model performance
- b) They can reduce the computational complexity of the model
- c) They are only applicable to regression tasks
- d) They increase the risk of overfitting

Answer: b) They can reduce the computational complexity of the model

73. What is the purpose of cross-entropy loss in classification tasks?

- a) To measure the accuracy of the model
- b) To compute the difference between predicted and actual values
- c) To minimize the difference between predicted and actual distributions
- d) To regularize the model

Answer: c) To minimize the difference between predicted and actual distributions

74. Which of the following is a disadvantage of using linear regression?

- a) It cannot handle non-linear relationships between variables
- b) It is sensitive to outliers in the data
- c) It is computationally expensive
- d) It requires categorical variables as input

Answer: a) It cannot handle non-linear relationships between variables

75. What is the primary goal of data preprocessing in machine learning?

- a) To increase the dimensionality of the data
- b) To reduce the computational complexity of the model
- c) To prepare the data for training by cleaning, transforming, and organizing it
- d) To generate new features from existing ones

Answer: c) To prepare the data for training by cleaning, transforming, and organizing it

1. Which of the following is a correct syntax to import the `numpy` library in Python?

- a) ``import numpy as np``
- b) ``using numpy``
- c) ``import np as numpy``
- d) ``include numpy``

Answer: a) ``import numpy as np``

2. What does the ``matplotlib.pyplot`` module in Python primarily provide?

- a) Linear regression
- b) Data visualization
- c) Principal Component Analysis (PCA)
- d) Neural network training

Answer: b) Data visualization

3. Which of the following is not a valid data type in Python?

- a) List
- b) Array
- c) Dictionary
- d) Tuple

Answer: b) Array

4. Which Python library is commonly used for data manipulation and analysis?

- a) TensorFlow
- b) Pandas
- c) Matplotlib
- d) Scikit-learn

Answer: b) Pandas

5. What does the term "mean" refer to in statistics?

- a) The middle value in a dataset
- b) The most frequent value in a dataset

- c) The sum of all values divided by the number of values
- d) The difference between the largest and smallest values in a dataset

Answer: c) The sum of all values divided by the number of values

6. Which of the following is a supervised learning algorithm?

- a) K-means clustering
- b) Decision Tree
- c) K-nearest neighbors (KNN)
- d) PCA

Answer: b) Decision Tree

7. What does SVM stand for in machine learning?

- a) Support Vector Machine
- b) Supervised Validation Model
- c) Singular Value Manipulation
- d) Sequential Vectorization Method

Answer: a) Support Vector Machine

8. Which of the following is a classification algorithm?

- a) Linear Regression
- b) Logistic Regression
- c) K-means clustering
- d) Principal Component Analysis (PCA)

Answer: b) Logistic Regression

9. What does the `fit()` method in Scikit-learn do?

- a) Trains the model
- b) Evaluates the model
- c) Transforms the data
- d) Plots the data

Answer: a) Trains the model

10. What is the purpose of normalization in data preprocessing?

- a) To reduce the number of features
- b) To scale the features to a similar range
- c) To add noise to the data
- d) To remove outliers from the data

Answer: b) To scale the features to a similar range

11. Which Python library is commonly used for deep learning?

- a) NumPy
- b) Pandas
- c) TensorFlow
- d) Matplotlib

Answer: c) TensorFlow

12. What is the purpose of activation functions in neural networks?

- a) To normalize the input data
- b) To compute the loss function
- c) To introduce non-linearity
- d) To compute the gradient during backpropagation

Answer: c) To introduce non-linearity

13. Which of the following is not an activation function used in neural networks?

- a) ReLU
- b) Sigmoid
- c) Tanh
- d) Linear

Answer: d) Linear



14. What is the primary role of the output layer in a neural network?

- a) To compute the loss function
- b) To make predictions
- c) To introduce non-linearity
- d) To connect every neuron in one layer to every neuron in the next layer

Answer: b) To make predictions

15. Which parameter controls the learning rate in optimization algorithms?

- a) Epochs
- b) Batch size
- c) Dropout rate
- d) Learning\_rate

Answer: d) Learning\_rate

16. What does the term "batch size" refer to in neural networks?

- a) The number of layers in the neural network
- b) The number of epochs in training
- c) The number of samples processed before the model is updated
- d) The size of each neuron in the network

Answer: c) The number of samples processed before the model is updated

17. Which evaluation metric would you use for an imbalanced classification problem?

- a) Accuracy
- b) Precision
- c) F1-score
- d) Mean Squared Error (MSE)

Answer: c) F1-score

18. What is the primary goal of feature scaling in machine learning?

- a) To increase the number of features

- b) To reduce the number of features
- c) To scale the features to a similar range
- d) To remove outliers from the features

Answer: c) To scale the features to a similar range

Sure, let's create another set of 75 multiple-choice questions covering various topics including Python, machine learning, and neural networks:

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- c) ``import np as numpy``
- d) ``include numpy``

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- c) Principal Component Analysis (PCA)
- d) Neural network training

Answer: b) Data visualization

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- c) Matplotlib
- d) Scikit-learn

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- d) PCA

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- c) K-means clustering
- d) Principal Component Analysis (PCA)

Answer: b) Logistic Regression

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- c) Transforms the data
- d) Plots the data

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- c) Tanh
- d) Linear

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- a) To increase the number of features
- b) To reduce the number of features
- c) To scale the features to a similar range
- d) To remove outliers from the features

Answer: c) To scale the features to a similar range

19. What does the `fit_transform()` method do in Scikit

-learn?

- a) Fits the model to the data
- b) Transforms the data based on the model's parameters
- c) Fits the model to the data and transforms it
- d) Transforms the model based on the data

Answer: c) Fits the model to the data and transforms it

20. Which of the following is a dimensionality reduction technique?

- a) K-means clustering
- b) Linear Regression
- c) Principal Component Analysis (PCA)
- d) Gradient Boosting

Answer: c) Principal Component Analysis (PCA)

21. What is the main advantage of using PCA?

- a) It reduces overfitting in models

- b) It speeds up the training process of machine learning models
- c) It simplifies the interpretation of data
- d) It increases the dimensionality of the data

Answer: b) It speeds up the training process of machine learning models

22. What is the primary purpose of logistic regression?

- a) To predict continuous values
- b) To predict categorical values
- c) To perform clustering
- d) To perform dimensionality reduction

Answer: b) To predict categorical values

23. Which of the following is not a kernel function used in SVM?

- a) Linear
- b) Polynomial
- c) Sigmoid
- d) Normal

Answer: d) Normal

24. What does the term "hyperplane" refer to in SVM?

- a) The line that separates classes in the feature space
- b) The kernel function used for mapping data to a higher-dimensional space
- c) The weights assigned to features in the model
- d) The margin between support vectors

Answer: a) The line that separates classes in the feature space

25. Which parameter controls the complexity of a neural network model?

- a) Number of layers
- b) Number of neurons in each layer
- c) Activation function

d) Loss function

Answer: a) Number of layers

26. What does the term "dropout" refer to in neural networks?

- a) Dropping out features with low importance
- b) Dropping out neurons during training to prevent overfitting
- c) Dropping out samples with missing values
- d) Dropping out layers with high variance

Answer: b) Dropping out neurons during training to prevent overfitting

27. Which of the following is a correct syntax to create a neural network model in TensorFlow?

- a) `model = tf.keras.Model()`
- b) `model = tf.keras.Sequential()`
- c) `model = tf.keras.NeuralNetwork()`
- d) `model = tf.NeuralNetwork()`

Answer: b) `model = tf.keras.Sequential()`

28. What is the primary role of the activation function in a neural network?

- a) To normalize the input data
- b) To control the learning rate
- c) To introduce non-linearity
- d) To compute the loss function

Answer: c) To introduce non-linearity

29. Which evaluation metric is commonly used for regression problems?

- a) Accuracy
- b) Precision
- c) F1-score
- d) Mean Squared Error (MSE)

Answer: d) Mean Squared Error (MSE)



30. What is the purpose of the `predict()` method in machine learning models?

- a) To train the model
- b) To evaluate the model
- c) To make predictions on new data
- d) To visualize the data

Answer: c) To make predictions on new data

31. What is the primary goal of dimensionality reduction techniques?

- a) To increase the number of features
- b) To reduce the number of features
- c) To scale the features to a similar range
- d) To add noise to the features

Answer: b) To reduce the number of features

32. Which algorithm is commonly used for clustering?

- a) Linear Regression
- b) Logistic Regression
- c) K-means clustering
- d) Decision Tree

Answer: c) K-means clustering

33. Which of the following statements about outliers is true?

- a) Outliers always indicate errors in the data
- b) Outliers have no impact on machine learning models
- c) Outliers can significantly affect the performance of models
- d) Outliers are always removed from the dataset

Answer: c) Outliers can significantly affect the performance of models

34. Which Python library is commonly used for visualizing data?

- a) NumPy
- b) Pandas
- c) Matplotlib
- d) TensorFlow

Answer: c) Matplotlib

35. Which of the following is a correct syntax to import the `seaborn` library in Python?

- a) ``import sns``
- b) ``import seaborn as sns``
- c) ``include seaborn``
- d) ``using seaborn``

Answer: b) ``import seaborn as sns``

36. Which of the following is a correct syntax to create a scatter plot in Matplotlib?

- a) ``plot(x, y)``
- b) ``scatter(x, y)``
- c) ``scatterplot(x, y)``
- d) ``plot.scatter(x, y)``

Answer: b) ``scatter(x, y)``

37. What is the purpose of boxplots in data visualization?

- a) To show the distribution of categorical variables
- b) To show the distribution of continuous variables
- c) To show the relationship between two variables
- d) To show the correlation between variables

Answer: b) To show the distribution of continuous variables

38. Which of the following is not a correct syntax to create a histogram in Matplotlib?

- a) ``plot.hist(data)``
- b) ``hist(data)``

c) ``plt.hist(data)``

d) ``matplotlib.hist(data)``

Answer: d) ``matplotlib.hist(data)``

39. Which of the following is a correct syntax to create a bar plot in Seaborn?

a) ``sns.barplot(x=data['X'], y=data['Y'])``

b) ``barplot(x=data['X'], y=data['Y'])``

c) ``seaborn.barplot(x=data['X'], y=data['Y'])``

d) ``plot.bar(x=data['X'], y=data['Y'])``

Answer: a) ``sns.barplot(x=data['X'], y=data['Y'])``

40. What is the purpose of pair plots in Seaborn?

a) To show the distribution of a single variable

b) To show the relationship between two variables

c) To show the correlation between multiple variables

d) To show the distribution of categorical variables

Answer: c) To show the correlation between multiple variables

41. Which of the following is not a correct syntax to create a heatmap in Seaborn?

a) ``sns.heatmap(data)``

b) ``heatmap(data)``

c) ``seaborn.heatmap(data)``

d) ``sns.heatmap(data, annot=True)``

Answer: b) ``heatmap(data)``

42. Which of the following is not a correct syntax to create a line plot in Plotly?

a) ```

`plotly.plot(data)``

b) ``plotly.line(data)``

- c) ``plotly.plot(data, mode='lines')``
  - d) ``plotly.graph_objects.Figure(data=graph_data)``
- Answer: a) ``plotly.plot(data)``

43. Which parameter controls the color of markers in a scatter plot in Plotly?

- a) ``color``
- b) ``marker_color``
- c) ``markers``
- d) ``marker=dict(color=...)``

Answer: d) ``marker=dict(color=...)``

44. What is the purpose of the ``go.Scatter()`` function in Plotly?

- a) To create bar plots
- b) To create line plots
- c) To create pie charts
- d) To create scatter plots

Answer: d) To create scatter plots

45. Which parameter controls the title of a plot in Plotly?

- a) ``title``
- b) ``plot_title``
- c) ``layout_title``
- d) ``fig_title``

Answer: c) ``layout_title``

46. Which of the following is a correct syntax to create a bar plot in Plotly?

- a) ``plotly.bar(data)``
- b) ``plotly.bar_chart(data)``
- c) ``plotly.graph_objects.Bar(data)``
- d) ``plotly.create_bar(data)``

Answer: c) ``plotly.graph_objects.Bar(data)``

47. What does the term "linear regression" refer to in machine learning?

- a) A regression model that uses linear activation functions
- b) A regression model that assumes a linear relationship between input and output variables
- c) A regression model that uses logistic activation functions
- d) A regression model that performs dimensionality reduction

Answer: b) A regression model that assumes a linear relationship between input and output variables

48. Which evaluation metric is commonly used for regression problems to assess model performance?

- a) Accuracy
- b) Precision
- c) F1-score
- d) Mean Squared Error (MSE)

Answer: d) Mean Squared Error (MSE)

49. Which of the following is a correct syntax to create a linear regression model in Scikit-learn?

- a) ``model = sklearn.LinearRegression()``
- b) ``model = LinearRegression()``
- c) ``model = sklearn.regression.Linear()``
- d) ``model = linear_regression()``

Answer: b) ``model = LinearRegression()``

50. What is the purpose of the ``fit()`` method in a linear regression model?

- a) To evaluate the model
- b) To make predictions
- c) To train the model
- d) To transform the data

Answer: c) To train the model

51. Which parameter controls the regularization strength in linear regression models?

- a) ``C``
- b) ``alpha``
- c) ``lambda``
- d) ``regularization``

Answer: b) ``alpha``

52. What is the main advantage of using regularization in linear regression?

- a) To increase the complexity of the model
- b) To reduce the number of features
- c) To prevent overfitting
- d) To speed up the training process

Answer: c) To prevent overfitting

53. Which of the following is a correct syntax to create a logistic regression model in Scikit-learn?

- a) ``model = sklearn.LogisticRegression()``
- b) ``model = LogisticRegression()``
- c) ``model = sklearn.classification.Logistic()``
- d) ``model = logistic_regression()``

Answer: a) ``model = sklearn.LogisticRegression()``

54. What is the purpose of the ``predict()`` method in a logistic regression model?

- a) To evaluate the model
- b) To make predictions
- c) To train the model
- d) To transform the data

Answer: b) To make predictions

55. Which parameter controls the regularization strength in logistic regression models?

- a) `C`
- b) `alpha`
- c) `lambda`
- d) `regularization`

Answer: a) `C`

56. What is the primary goal of support vector machines (SVM)?

- a) To perform clustering
- b) To classify data into two or more categories
- c) To predict continuous values
- d) To perform dimensionality reduction

Answer: b) To classify data into two or more categories

57. Which of the following is a correct syntax to create an SVM model in Scikit-learn?

- a) `model = sklearn.SVM()`
- b) `model = SVM()`
- c) `model = sklearn.svm.SVC()`
- d) `model = svm_model()`

Answer: c) `model = sklearn.svm.SVC()`

58. What does the term "kernel" refer to in SVM?

- a) The central point of the data
- b) The weights assigned to features
- c) A function used to map data to a higher-dimensional space
- d) The margin between support vectors

Answer: c) A function used to map data to a higher-dimensional space

59. Which of the following kernel functions is commonly used in SVM for non-linear data?

- a) Linear

- b) Polynomial
- c) Sigmoid
- d) Normal

Answer: b) Polynomial

60. What is the primary purpose of decision trees in machine learning?

- a) To perform clustering
- b) To classify data into two or more categories
- c) To predict continuous values
- d) To perform dimensionality reduction

Answer: b) To classify data into two or more categories

61. Which of the following is a correct syntax to create a decision tree model in Scikit-learn?

- a) `model = sklearn.DecisionTree()`
- b) `model = DecisionTree()`
- c) `model = sklearn.tree.DecisionTreeClassifier()`
- d) `model = decision_tree_model()`

Answer: c) `model = sklearn.tree.DecisionTreeClassifier()`

62. What does the term "entropy" refer to in decision trees?

- a) The measure of impurity in a node
- b) The measure of information gain
- c) The measure of variance reduction
- d) The measure of model complexity

Answer: a) The measure of impurity in a node

63. Which of the following is a correct syntax to create a random forest model in Scikit-learn?

- a) `model = sklearn.RandomForest()`
- b) `model = RandomForest()`
- c) `model = sklearn.ensemble.RandomForestClassifier()`



d) ``model = random_forest_model()``

Answer: c) ``model = sklearn.ensemble.RandomForestClassifier()``

64. What is the primary goal of principal component analysis (PCA)?

- a) To increase the number of features
- b) To reduce the number of features
- c) To scale the features to a similar range
- d) To add noise to the features

Answer: b) To reduce the number of features

65. Which of the following is a correct syntax to perform PCA in Scikit-learn?

a) ``pca = PCA()``

b) ``pca = sklearn.pca.PCA()``

c) ``pca = sklearn.PCA()``

d) ``pca = principal_component_analysis()``

Answer: c) ``pca = sklearn.PCA()``

66. What does the term "explained variance ratio" refer to in PCA?

- a) The percentage of total variance explained by each principal component
- b) The number of principal components in the dataset
- c) The amount of noise added to the dataset
- d) The number of features after dimensionality reduction

Answer: a) The percentage of total variance explained by each principal component

67. Which of the following is a correct syntax to create a neural network model in Keras?

a) ``model = keras.NeuralNetwork()``

b) ``model = keras.Sequential()``

c) ``model = keras.Model()``

d) ``model = NeuralNetwork()``

Answer: b) ``model = keras.Sequential()``

68. What is the purpose of the ``compile()`` method in Keras?

- a) To train the model
- b) To evaluate the model
- c) To configure the model for training
- d) To save the model

Answer: c) To configure the model for training

69. Which of the following is a correct syntax to compile a neural network model in Keras?

- a) ``model.compile(loss='mse', optimizer='sgd', metrics=['accuracy'])``
- b) ``compile(model, loss='mse', optimizer='sgd', metrics=['accuracy'])``
- c) ``model.compile(loss='mse', sgd, ['accuracy'])``
- d) ``compile(loss='mse', optimizer='sgd', metrics=['accuracy'])``

Answer: a) ``model.compile(loss='mse', optimizer='sgd', metrics=['accuracy'])``

70. What does the ``fit()`` method in Keras do?

- a) Trains the model
- b) Evaluates the model
- c) Transforms the data
- d) Plots the data

Answer: a) Trains the model

71. Which parameter in Keras controls the number of training iterations?

- a) ``epochs``
- b) ``batch_size``
- c) ``learning_rate``
- d) ``dropout``

Answer: a) ``epochs``

72. What is the purpose of the `evaluate()` method in Keras?

- a) To train the model
- b) To evaluate the model on a validation dataset
- c) To make predictions
- d) To compile the model

Answer: b) To evaluate the model on a validation dataset

73. Which of the following is a correct syntax to evaluate a neural network model in Keras?

- a) `model.evaluate(X_test, y_test)`
- b) `evaluate(model, X_test, y_test)`
- c) `model.evaluate(test_data)`
- d) `evaluate(X_test, y_test)`

Answer: a) `model.evaluate(X_test, y_test)`

74. What is the purpose of the `predict()` method in Keras?

- a) To train the model
- b) To evaluate the model
- c) To make predictions on new data
- d) To compile the model

Answer: c) To make predictions on new data

75. Which parameter in Keras controls the learning rate in optimization algorithms?

- a) `epochs`
- b) `batch_size`
- c) `learning_rate`
- d) `dropout`

Answer: c) `learning_rate`