

Module 8 and 9

1. Correlation:

a) Which of the following correlation coefficients indicates the strongest linear relationship between two variables?

- i) 0.2
- ii) -0.8
- iii) 0
- iv) 0.6

b) If the correlation coefficient between two variables is -0.9, what does this indicate about their relationship?

- i) Strong positive correlation
- ii) No correlation
- iii) Strong negative correlation
- iv) Weak negative correlation

2. Basics of Regression Models:

a) What is the primary goal of regression analysis?

- i) To predict categorical outcomes
- ii) To predict continuous outcomes
- iii) To classify data points into clusters
- iv) To analyze variance in a dataset

b) In simple linear regression, how many independent variables are used to predict the dependent variable?

- i) One
- ii) Two
- iii) Three
- iv) It depends on the dataset

3. Ordinary Least Squares (OLS):

a) What is the main principle behind Ordinary Least Squares regression?

- i) Minimizing the sum of squared errors
- ii) Maximizing the sum of squared errors
- iii) Minimizing the sum of absolute errors
- iv) Maximizing the sum of absolute errors

b) What does the intercept term represent in the OLS regression equation?

- i) The slope of the regression line
- ii) The value of the dependent variable when all independent variables are zero
- iii) The average value of the independent variable
- iv) The variance of the residuals

4. Simple Linear Regression:

a) In simple linear regression, what is the role of the independent variable?

- i) It is the variable being predicted

- ii) It is the variable being predicted from
 - iii) It is the variable being controlled
 - iv) It is not used in simple linear regression
- b) How is the best-fit line determined in simple linear regression?
- i) By minimizing the sum of squared residuals
 - ii) By maximizing the sum of squared residuals
 - iii) By minimizing the correlation coefficient
 - iv) By maximizing the correlation coefficient

5. Random Forests:

- a) What is a key characteristic of random forests?
- i) They consist of a single decision tree
 - ii) They rely on boosting techniques
 - iii) They are an ensemble learning method
 - iv) They are a type of unsupervised learning algorithm
- b) How does a random forest model prevent overfitting?
- i) By using a single decision tree
 - ii) By averaging predictions from multiple decision trees
 - iii) By increasing the complexity of each decision tree
 - iv) By decreasing the number of decision trees in the forest

6. Model Diagnostics:

- a) What is a residual plot used for in regression analysis?
- i) To visualize the relationship between independent and dependent variables
 - ii) To identify outliers and patterns in the residuals
 - iii) To determine the correlation coefficient
 - iv) To assess multicollinearity among independent variables
- b) In regression analysis, what does it mean if the residuals are normally distributed?
- i) The model is biased
 - ii) The model is unbiased
 - iii) The model is overfit
 - iv) The model is underfit

7. Logistic Regression:

- a) What type of outcome variable does logistic regression predict?
- i) Continuous
 - ii) Categorical
 - iii) Ordinal
 - iv) Nominal
- b) How is the logistic function used in logistic regression?
- i) To calculate probabilities of class membership
 - ii) To calculate mean squared error
 - iii) To calculate the slope of the regression line
 - iv) To calculate the intercept of the regression line

8. K Nearest Neighbors (KNN):

- a) What does the 'K' represent in K Nearest Neighbors algorithm?
 - i) The number of clusters
 - ii) The number of nearest neighbors to consider
 - iii) The number of features
 - iv) The number of iterations
- b) How does KNN classify a new data point?
 - i) By calculating the average of its nearest neighbors
 - ii) By assigning it to the most common class among its nearest neighbors
 - iii) By using gradient descent
 - iv) By minimizing the Euclidean distance between data points

9. K-Means Clustering:

- a) What is the objective of K-Means clustering?
 - i) To maximize intra-cluster similarity and minimize inter-cluster similarity
 - ii) To maximize inter-cluster similarity and minimize intra-cluster similarity
 - iii) To minimize the number of clusters
 - iv) To maximize the number of clusters
- b) How is the initial centroid position chosen in K-Means clustering?
 - i) Randomly
 - ii) Based on the mean of all data points
 - iii) Based on the median of all data points
 - iv) Based on the mode of all data points

10. PCA (Principal Component Analysis):

- a) What is the main goal of PCA?
 - i) To reduce the dimensionality of the data
 - ii) To increase the dimensionality of the data
 - iii) To classify data points into clusters
 - iv) To maximize the variance in the data
- b) How are principal components determined in PCA?
 - i) By maximizing the covariance between variables
 - ii) By minimizing the covariance between variables
 - iii) By using gradient descent
 - iv) By randomly selecting variables

Module-14

1. Padding:

- a) What is the purpose of padding in convolutional neural networks?
 - i) To reduce the size of feature maps
 - ii) To increase the size of feature maps
 - iii) To speed up the training process

- iv) To decrease the number of parameters in the network
- b) Which type of padding adds zeros around the input image or feature map?
 - i) Same padding
 - ii) Valid padding
 - iii) Full padding
 - iv) Zero padding

2. Strided Convolutions:

- a) What does the stride of a convolutional layer determine?
 - i) The size of the filter/kernel
 - ii) The number of filters/kernels
 - iii) The step size of the filter/kernel
 - iv) The activation function used
- b) How does increasing the stride in a convolutional layer affect the output size?
 - i) Increases the output size
 - ii) Decreases the output size
 - iii) Has no effect on the output size
 - iv) Depends on the padding used

3. Convolutions Over Volume:

- a) In a convolutional neural network, what does the depth of a filter/kernel represent?
 - i) The size of the filter
 - ii) The number of filters
 - iii) The number of input channels
 - iv) The number of output channels
- b) How are convolutions applied over volume in a CNN?
 - i) By using 3D filters/kernels
 - ii) By applying 2D filters/kernels independently to each channel
 - iii) By summing the convolutions across channels
 - iv) By using pooling layers

4. One Layer of a Convolutional Network:

- a) In a convolutional layer, what is the purpose of the activation function?
 - i) To normalize the output values
 - ii) To introduce non-linearity
 - iii) To reduce the dimensionality of the input
 - iv) To increase the interpretability of the model
- b) What are the learnable parameters in a convolutional layer?
 - i) Filter/kernel weights and biases
 - ii) Activation function parameters
 - iii) Input data
 - iv) Output feature maps

5. Simple Convolutional Network Example:

- a) What is the typical architecture of a simple convolutional neural network?
 - i) Multiple convolutional layers followed by pooling layers and fully connected layers
 - ii) Only convolutional layers with no pooling layers
 - iii) Only pooling layers with no convolutional layers
 - iv) Only fully connected layers with no convolutional layers
- b) What is the purpose of the final fully connected layers in a CNN?
 - i) To reduce the dimensionality of the output
 - ii) To increase the interpretability of the output
 - iii) To make predictions based on the features learned by convolutional layers
 - iv) To apply regularization to the model

6. Pooling Layers:

- a) What is the main purpose of pooling layers in CNNs?
 - i) To increase the number of parameters in the network
 - ii) To reduce the size of feature maps
 - iii) To introduce non-linearity
 - iv) To increase the depth of feature maps
- b) Which of the following pooling operations takes the maximum value from each window?
 - i) Max pooling
 - ii) Average pooling
 - iii) Global pooling
 - iv) Min pooling

7. CNN Example:

- a) Which of the following tasks is typically performed using convolutional neural networks?
 - i) Time series forecasting
 - ii) Image classification
 - iii) Text generation
 - iv) Sentiment analysis
- b) In a CNN architecture, what is the role of the feature extraction layers?
 - i) To preprocess the input data
 - ii) To extract relevant features from the input data
 - iii) To make final predictions
 - iv) To apply regularization to the model