

# Quiz

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\* Indicates required question

## Quiz

Q1. Which of the following is TRUE about Perceptron? \*

- ☐ Perceptron can only solve non-linear problems
- ☐ The weight of the bias in Perceptron can be represented using negative threshold
- ☐ It is an unsupervised learning algorithm
- ☒ Step function should be used when the input is in bipolar

Q2. Which of the following is NOT a non-linear activation function? \*

- ☐ Sigmoid function
- ☐ Hyperbolic tangent function
- ☐ Rectified Linear Unit
- ☒ Sign function



Q3. Which of the following is NOT a hyperparameter? \*

- ☒ Weight
- ☐ Learning rate
- ☐ Maximum depth in decision tree
- ☐ Number of neighbors in K-Nearest Neighbor

Q4. Given a sign language recognition dataset that contains 4080 samples of 34 different categories of sign language images. Each sample is 50 x 50 dimension. If all pixels are considered as features, how many input neurons are needed for a multilayer perceptron? \*

- ☐ By experiment
- ☐ 4080
- ☐ 34
- ☒ 2500

Q5. Given a sign language recognition dataset that contains 4080 samples of 34 different categories of sign language images. Each sample is 50 x 50 dimension. If all pixels are considered as features, how many hidden layer neurons are needed for a multilayer perceptron? \*

- ☒ By experiment
- ☐ 4080
- ☐ 34
- ☐ 2500



Q6. Given a sign language recognition dataset that contains 4080 samples of 34 \* different categories of sign language images. Each sample is 50 x 50 dimension. If all pixels are considered as features, how many output layer neurons are needed for a multilayer perceptron?

- ☐ By experiment
- ☐ 4080
- ☒ 34
- ☐ 2500

Q7. Which of the following algorithms DO NOT need to perform feature scaling \* on the data before training?

- ☐ K-Means
- ☐ K Nearest Neighbors
- ☐ Neural Networks
- ☒ Decision Tree

Q8. Ensemble learning provides a way to combine classifiers. Which of the \* following is NOT applicable for bagging approaches?

- ☐ Use different error function for different classifiers.
- ☐ Use same subset of data for different classifiers.
- ☐ Use different subsets of data for different classifiers.
- ☒ Use different subsets of attribute for different classifiers.



Q9. Which of the following is TRUE about ensemble learning? \*

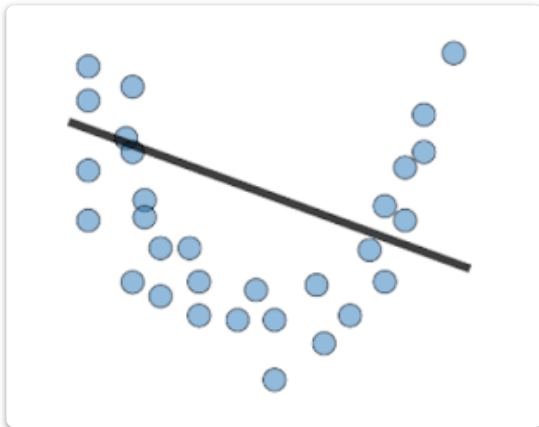
- ☐ Boosting can reduce the variance
- ☐ Bagging can reduce the bias
- ☒ Random forest is a bagging approach
- ☐ Boosting use a subset of data for each classifier

Q10. Say that you trained a polynomial regression model and found that it was overfitted to the training samples. What can you do to solve this problem? \*

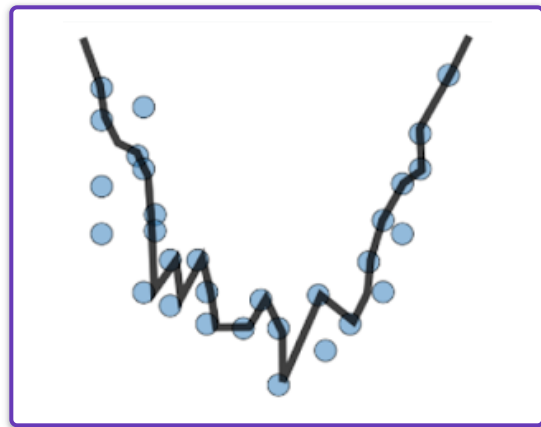
- ☒ Use ridge regression
- ☒ Use lasso regression
- ☒ Use elastic net
- ☐ Increase the polynomial degree



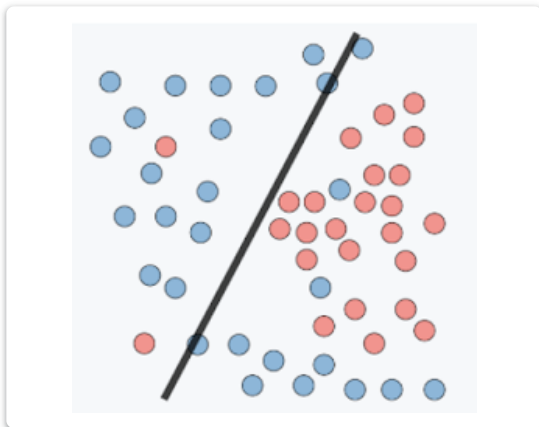
Q11. Which of the following is/are due to overfitting? \*



☐ Option 1



☒ Option 2



☐ Option 3



☒ Option 4

Q12. Which of the following is TRUE about unsupervised learning? \*

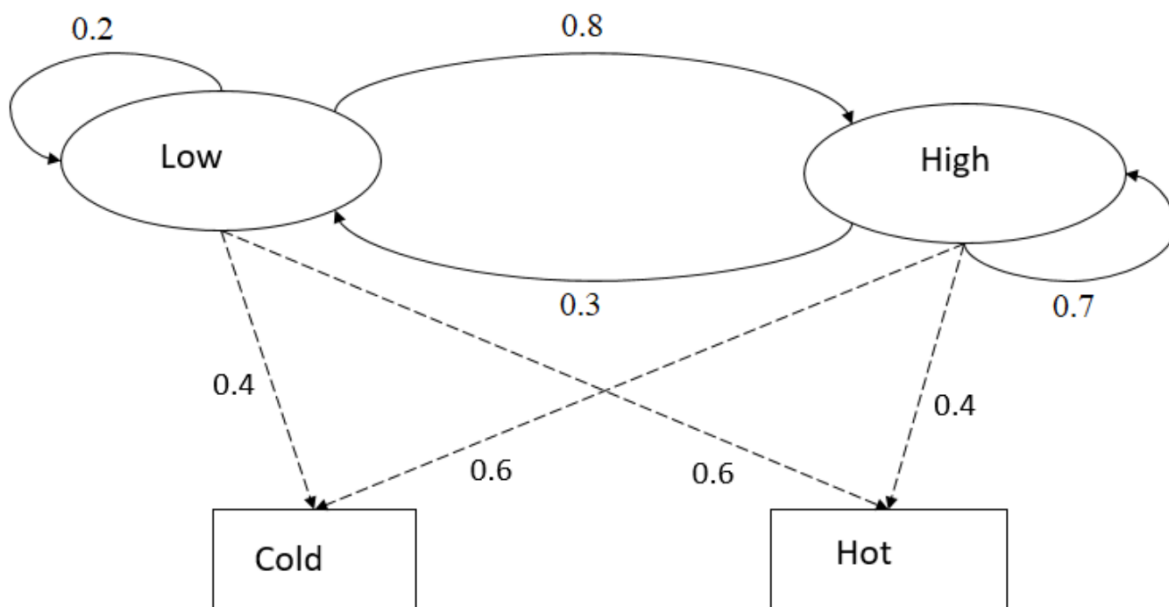
- ☒ Class labels of the data are unknown
- ☐ Class labels of the data are known
- ☐ Compute the error based on the difference between predicted label and actual label
- ☐ Use gradient descent to update the parameter



Q13. Which of the following is NOT TRUE about k-means? \*

- ☐ Sensitive to outliers
- ☐ It is a linear algorithm
- ☒ It is a soft clustering method
- ☐ It is suitable to use for discovering clusters that are hyper-ellipsoids

Given the Hidden Markov Model (HMM) of atmospheric temperature with the initial probabilities:  $P(\text{'Low'}) = 0.5$ ,  $P(\text{'High'}) = 0.5$ . Calculate the probability of observation sequence of {'Hot', 'Cold'} by answering Q14 - Q16.



Q14. What is/are the states of this HMM? \*

- ☒ Low
- ☒ High
- ☐ Cold
- ☐ Hot



Q15. What is/are the observations of this HMM? \*

- ☐ Low
- ☐ High
- ☒ Cold
- ☒ Hot

Q16. What is the value of  $P(\{\text{'Hot', 'Cold'}\}, \{\text{'High', 'Low'}\})$ ? \*

Your answer

Given 2 hidden states: H and C; 3 observed states: S, M, and L; state transition probabilities A; observation matrix B; and initial state distribution  $\pi$ , as below. Calculation the state sequence probability of Q17. [Write your answer in 8 decimal places, e.g. 0.12345678]

$$A = \begin{matrix} & \begin{matrix} H & C \end{matrix} \\ \begin{matrix} H \\ C \end{matrix} & \begin{bmatrix} 0.7 & 0.3 \\ 0.4 & 0.6 \end{bmatrix} \end{matrix} \quad B = \begin{matrix} & \begin{matrix} S & M & L \end{matrix} \\ \begin{matrix} H \\ C \end{matrix} & \begin{bmatrix} 0.1 & 0.4 & 0.5 \\ 0.7 & 0.2 & 0.1 \end{bmatrix} \end{matrix} \quad \pi = \begin{bmatrix} 0.6 & 0.4 \end{bmatrix}$$

Q17. What is the state sequence probability of  $P(\text{HCHC}|\text{SMSL})$ ? \*

Your answer



Q18. Which of the following is/are example(s) of "Exploration" in reinforcement learning? \*

- ☒ Try a new route
- ☒ Browse a new website
- ☐ Show the most watched video
- ☐ Play the best move

Q19. Which of the following is NOT the major component of an Reinforcement Learning agent? \*

- ☐ Policy
- ☒ Labelled data
- ☐ Value function
- ☐ Model

Q20. Which of the following is/are suitable to use Reinforcement Learning? \*

- ☒ Manage an investment portfolio
- ☐ Classify cat and dog
- ☒ Control a power station
- ☐ Social network analysis clustering

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