**Bobble AI**

Internship SMU (2020-2021)

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**Applied for : AI Profile**

**Part A: MCQ**

Q1. There are 60 data points which are randomly split into 3 classes of equal size. All partitions are equally likely. A and B are two data points among them. What is the probability that two data points A and B will end up in the same class?

A. 1/3

**B. 19/59 (correct answer)**

C. 18/58

D. 19/60

**Answer : B**

Q2. A report is stating that a person is suffering from COVID-19 though he is actually not affected by coronavirus. Which of the following case is correct

A. True positive

**B. False positive**

C. True negative

D. False negative

**Answer : B**

Q3. Which of the following time series data can be declared as stationary?

**Answer : B**

Q4.Consider the following training set of m=4 training examples:

x y

1 0.5

2 1

4 2

0 0

Consider the linear regression model hθ (x)=θ0+θ1x. What are the values of θ0 and θ1 that you would expect to obtain upon running gradient descent on this model? (Linear regression will be able to fit this data perfectly.)

(A) θ0=0.5,θ1=0

(B) θ0=0.5,θ1=0.5

(C) θ0=1,θ1=0.5

**(D) θ0=0,θ1=0.5**

(E) θ0=1,θ1=1

**Answer : D**

Q5. Let f be some function so that f(θ0 ,θ1 ) outputs a number. For this problem, f is some arbitrary/unknown smooth function (not necessarily the cost function of linear regression, so f may have local optima). Suppose we use gradient descent to try to minimize f(θ0 ,θ1 ) as a function of θ0 and θ1 . Which of the following statements are true? (Check all that apply)

Statement1: If and are initialized at the global minimum, then one iteration will not change their values. [Correct]

Statement2: Setting the learning rate to be very small is not harmful, and can only speed up the convergence of gradient descent.

Statement3: No matter how and are initialized, so long as is sufficiently small, we can safely expect gradient descent to converge to the same solution.

Statement4: If the first few iterations of gradient descent cause to increase rather than decrease, then the most likely cause is that we have set the learning rate to too large a value.[Correct]

(A) Statement 1 and Statement 2 are correct

(B) Statement 2 and Statement 3 are correct

**(C) Statement 1 and Statement 4 are correct**

(D) Statement 2 and Statement 4 are correct

**Answer : C**

6. What are the effects of pooling operation on a CNN based model Statement1: Increase feature / dimensionality Statement2: Reduce feature / dimensionality Statement3: Performs down sampling operations Statement4: Performs up sampling operations

(A) Statement 1 and Statement 3 are correct

(B) Statement 1 and Statement 4 are correct

(C) Statement 2 and Statement 4 are correct

**(D) Statement 2 and Statement 3 are correct**

**Answer : D**

Q7. Role of activation function Statement1:Introduce non-linearity Statement2: Delivers output based on linear combinations of inputs Statement3: To learn complex patterns in data

**(A) Statement 1 and Statement 3 are correct**

(B) Statement 2 and Statement 3 are correct

(C) Statement 1 and Statement 2 are correct

(D) Only statement 1 is correct

**Answer : A**

Q8. Which of the following is a widely used and effective machine learning algorithm based on the idea of bagging?

(A) Decision tree

(B) Regression

(C) Classification

**(D) Random forest**

**Answer : D**

Q9. How do you handle missing or corrupted data in a dataset?

(A) Drop missing rows or columns

(B) Replace missing values with mean/median/mode

(C) Assign a unique category to missing values

(**D) All of the above**

**Answer : D**

Q10. Why is second order differencing in time series needed?

(A) To remove stationarity

(B) To find the maxima or minima at the local point

**(C) Both A and B**

(D) None of the above

**Answer : C**

Q11. When performing regression or classification, which of the following is the correct way to preprocess the data?

**(A) Normalize the data -> PCA -> training**

(B) PCA -> normalize PCA output -> training

(C) Normalize the data -> PCA -> normalize PCA output -> training

(D) None

**Answer : A**

Q12. Which of the following is an example of feature extraction?

1. Constructing bag of words vector from an email
2. Applying PCA projects to a large high-dimensional data
3. Removing stopwords in a sentence
4. **All of the above**

**Answer : D**

Q13. Which of the following is true about Naive Bayes ?

1. Assumes that all the features in a dataset are equally important
2. Assumes that all the features in a dataset are independent
3. **Both A and B**
4. None of the above options

**Answer : C**

Q14. Which of the following statements about regularization is not correct?

1. **Using too large a value of lambda can cause your hypothesis to underfit the data**
2. Using too large a value of lambda can cause your hypothesis to overfit the data
3. Using a very large value of lambda cannot hurt the performance of your hypothesis
4. None of the above

**Answer : A**

Q15 How can you prevent a clustering algorithm from getting stuck in bad local optima?

1. Set the same seed value for each run
2. Use multiple radom initializations
3. **Both A and B**

(D) None of the above

**Answer : C**

Q16. In which of the following cases will K-means clustering fail to give good results? 1) Data points with outliers 2) Data points with different densities 3) Data points with nonconvex shapes

(A) 1 and 2

(B) 2 and 3

**(C) 1,2 and 3**

(D) 1 and 3

**Answer : C**

Q17. Which of the following is a reasonable way to select the number of principal components "k"? **(A) Choose k to be the smallest value so that at least 99% of the varinace is retained**

(B) Choose k to be 99% of m (k = 0.99\*m, rounded to the nearest integer)

(C) Choose k to be the largest value so that 99% of the variance is retained

(D) Use the elbow method.

**Answer : A**

Q18. You run gradient descent for 15 iterations with a=0.3 and compute J(theta) after each iteration. You find that the value of J(Theta) decreases quickly and then levels off. Based on this, which of the following conclusions seems most plausible?

(A) Rather than using the current value of a, use a larger value of a (say a=1.0)

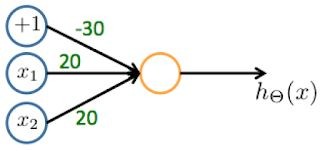
(B) Rather than using the current value of a, use a smaller value of a (say a=0.1)

**(C) a=0.3 is an effective choice of learning rate**

(D) None of the above

**Answer : C**

Q19. Consider the following neural network which takes two binary-valued inputs and outputs . Which of the following logical functions does it (approximately) compute?



* 1. NAND (meaning “NOT AND”)
  2. OR
  3. XOR (exclusive OR)
  4. **AND**

**Answer : D**

Q20. 3 people Alice, Bob and Charlie. Alice can shoot with probability 0.2, Bob with 0.5 and Charlie with 1. What is the probability of Bob surviving if they all were shooting in cyclic order.

(A) 1/10

**(B) 13/30**

(C) 8/10

(D) None

**Answer : B**

Q21. Histogram equalization is not used for

(A) Image enhancement

(**B) Image translation**

C) Contrast adjustment

(D) All

**Answer : B**

Q22. Which filter is advisable to remove salt and pepper noise

(A) Gaussian filter

**(B) Median filter**

(C) Averaging filter

(D) Contraharmonic mean filter

**Answer : B**

Q23. Which of the following color space doesn’t have a channel corresponding to luminosity of image

**(A) RGB**

(B) LAB

(C) HSV

(D) all

**Answer : A**

Q24. What is padding in image processing

(A) The process of removing noise from an image

(B) The process of modifying pixel intensity value of an image

**(C) The process of adding layers of zeros to an image**

(D) All

**Answer : A**

Q25. Second derivative of approximation says that value at the end of ramp must be

**(A) Zero**

(B) Nonzero

(C) Positive

(D) negative

**Answer : A**

***Part B: Fill in the blanks with correct option***

Q1 : Decrease

Q2 : non -linear,classification,decrease

Q3: classification

Q4 : testing,training

Q5 : -1 to 256

***Part C: Long Questions***

**Q1 – Jupyter File uploaded in github**

**Q2 A)**

Steps Involved:

1) Importing Libraries

2) Setting pointer color to black

3)drawing the oval of given coordinates so that it intersects

4) Alotting area to both the ovals

5) Figuring out the intersection

6) Filling the Intersection

Import java.applet.Applet;

import java.awt.\*;

public class GraphicsDemo extends Applet{

public void paint(Graphics g){

Ellipse2D.Double oval1, oval2;

g.setColor(Color.black);

oval1 = g.drawOval(70,200,30,30);

//This is how one more oval can be drawn which can intersect the previous oval

g.setColor(Color.black);

// The color has already been set to black

Area area1 = new Area(oval1);

Area area2 = new Area(oval2);

area1.intersect(area2);

g.fill(area1); // Intersection area is filled

g.dispose();

}

**Q3**

print("Enter Rows:")

n = int(input().strip()) #rows

print("Enter Columns:")

m = int(input().strip()) #columns

a = [[0]\*n for \_ in range(m)]

for i in range(n):

a[i] = [int(j) for j in input().strip().split(" ")]

print(a)

R=len(a)

C = len(a)

rows, cols = set(), set()

for i in range(R):

for j in range(C):

if a[i][j] == 0:

rows.add(i)

cols.add(j)

for i in range(R):

for j in range(C):

if i in rows or j in cols:

a[i][j] = 0

print(a)

**Q5- Uploaded in Github respository**