**QUESTION 1**

1. **In Random forest you can generate hundreds of trees (say T1, T2 …..Tn) and then aggregate the results of these tree. Which of the following is true about individual(Tk) tree in Random Forest?**
   1. Individual tree is built on a subset of the features
   2. Individual tree is built on all the features
   3. Individual tree is built on a subset of observations
   4. Individual tree is built on full set of observations

|  |  |  |
| --- | --- | --- |
|  |  | 1, 2 and 3 |
|  |  | 1 and 3 |
|  |  | 2 and 3 |
|  |  | 3 and 4 |

**1 points**

**QUESTION 2**

1. **Imagine, you are solving a classification problems with highly imbalanced class. The majority class is observed 99% of times in the training data. Your model has 99% accuracy after taking the predictions on test data. Which of the following is true in such a case?**
   1. Accuracy metric is not a good idea for imbalanced class problems.
   2. Accuracy metric is a good idea for imbalanced class problems.
   3. Precision and recall metrics are good for imbalanced class problems.
   4. Precision and recall metrics aren’t good for imbalanced class problems.

|  |  |  |
| --- | --- | --- |
|  |  | 1 and 4 |
|  |  | 1 and 2 |
|  |  | 1 and 3 |
|  |  | 2 and 3 |

**1 points**

**QUESTION 3**

1. **In which of the following scenario a gain ratio is preferred over Information Gain?**

|  |  |  |
| --- | --- | --- |
|  |  | Number of categories is the not the reason |
|  |  | When a categorical variable has very small number of category |
|  |  | When a categorical variable has very large number of category |
|  |  | None of these |

**1 points**

**QUESTION 4**

1. Perform modeling for the following dataset

[heart-statlog.csv](https://blackboard.svkm.ac.in/bbcswebdav/pid-520815-dt-content-rid-3938897_1/xid-3938897_1)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | |  |  |  |  |  |  |  |  |  | |  |  | | --- | --- | |  |  | |  | |  |  | | --- | --- | |  |  | |  | |  |  | | --- | --- | |  |  | |  | |  |  | | --- | --- | |  |  | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  |  | | --- | --- | |  |  | |  | |  |  | | --- | --- | |  |  | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | |  |  |  |  | |  |  | | --- | --- | | [https://blackboard.svkm.ac.in/webapps/vtbe-tinymce/tiny_mce/plugins/bb_mashup/mashuplogo.png](javascript:;) |  | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | |  |  |  |  |  |  | | |  | | Path: [p](javascript:;)  Words:0 | |

**10 points**

**QUESTION 5**

1. **In ensemble learning, you aggregate the predictions for weak learners, so that an ensemble of these models will give a better prediction than prediction of individual models. Which of the following statements is / are true for weak learners used in ensemble model?**
   1. **They don’t usually overfit.**
   2. **They have high bias, so they cannot solve complex learning problems**
   3. **They usually overfit.**

|  |  |  |
| --- | --- | --- |
|  |  | 1 and 2 |
|  |  | only 1 |
|  |  | only 2 |
|  |  | 2 and 3 |

**1 points**

**QUESTION 6**

1. In Reinforcement learning we Maximize the expected sum of rewards.

|  |  |  |
| --- | --- | --- |
|  |  | True |
|  |  | False |

**1 points**

**QUESTION 7**

1. **Which of the following is/are true about bagging trees?**
   1. In bagging trees, individual trees are independent of each other
   2. Bagging is the method for improving the performance by aggregating the results of weak learners

|  |  |  |
| --- | --- | --- |
|  |  | None of these |
|  |  | 1 |
|  |  | 1 and 2 |
|  |  | 2 |

**1 points**

**QUESTION 8**

**Which of the algorithm would you take into the consideration in your final model building on the basis of performance?**

Suppose you have given the following graph which shows the ROC curve for two different classification algorithms such as Random Forest(Red) and Logistic Regression(Blue)

|  |  |  |
| --- | --- | --- |
|  |  | Both |
|  |  | None |
|  |  | Logistic Regression |
|  |  | Random Forest |

**1 points**

**QUESTION 9**

1. The problem of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is not solved using Bellman equation hence \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is used in Q-learning.

|  |  |  |
| --- | --- | --- |
|  |  | Convergence and Function Approximate |
|  |  | Scalability and CNN |
|  |  | Convergence and Forward Pass |
|  |  | Scalability and Function Approximate |

**1 points**

**QUESTION 10**

1. **Which of the following options is/are true for K-fold cross-validation?**
   1. **Increase in K will result in higher time required to cross validate the result.**
   2. **Higher values of K will result in higher confidence on the cross-validation result as compared to lower value of K.**
   3. **If K=N, then it is called Leave one out cross validation, where N is the number of observations.**

|  |  |  |
| --- | --- | --- |
|  |  | 1 and 2 |
|  |  | 1 and 3 |
|  |  | 1, 2 and 3 |
|  |  | only 1 |

**1 points**

**QUESTION 11**

1. The cost parameter in the SVM means

|  |  |  |
| --- | --- | --- |
|  |  | None |
|  |  | The kernel to be used. |
|  |  | The trade off between misclassification and simplicity of the model |
|  |  | The number of cross validation to be made. |

**1 points**

**QUESTION 12**

1. More features means better discriminant power. But this is not true always and we find a problem named as "Curse of Dimensionality" Which one is correct reason for curse of dimensionality?

1. All features may not be relevant.

2. There may be redundant features

3. limited training

|  |  |  |
| --- | --- | --- |
|  |  | only 3 |
|  |  | 1 and 2 |
|  |  | All three |
|  |  | only 2 |

**1 points**

**QUESTION 13**

1. Perform modeling for the following dataset to find out gender based on voice

[voice.csv](https://blackboard.svkm.ac.in/bbcswebdav/pid-520815-dt-content-rid-3938895_1/xid-3938895_1)

Attributes are following

* + meanfreq: mean frequency (in kHz)
  + sd: standard deviation of frequency
  + median: median frequency (in kHz)
  + Q25: first quantile (in kHz)
  + Q75: third quantile (in kHz)
  + IQR: interquantile range (in kHz)
  + skew: skewness (see note in specprop description)
  + kurt: kurtosis (see note in specprop description)
  + sp.ent: spectral entropy
  + sfm: spectral flatness
  + mode: mode frequency
  + centroid: frequency centroid (see specprop)
  + peakf: peak frequency (frequency with highest energy)
  + meanfun: average of fundamental frequency measured across acoustic signal
  + minfun: minimum fundamental frequency measured across acoustic signal
  + maxfun: maximum fundamental frequency measured across acoustic signal
  + meandom: average of dominant frequency measured across acoustic signal
  + mindom: minimum of dominant frequency measured across acoustic signal
  + maxdom: maximum of dominant frequency measured across acoustic signal
  + dfrange: range of dominant frequency measured across acoustic signal
  + modindx: modulation index. Calculated as the accumulated absolute difference between adjacent measurements of fundamental frequencies divided by the frequency range

label: male or female

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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**10 points**

**QUESTION 14**

1. To protect blood supply from contamination, screening of all the donars for hepatitis C infection is required. This screening test has a specificity of 90% and sensitivity of 95% and is used on sample donors in which 10% are known to have hepatitis C infection. Which of the following is the best estimate of the chance that a donor who tests negative is actually free of infection.

|  |  |  |
| --- | --- | --- |
|  |  | 85% |
|  |  | 88% |
|  |  | 99% |
|  |  | 90% |

**1 points**

**QUESTION 15**

1. If a market is strong there is 80% chance the research would have indicated so. If the market was weak there was 90% chance the research would have indicated so. We know there is currently a 30% chance that the market will be weak. What is the probability that economy is strong given positive research?

|  |  |  |
| --- | --- | --- |
|  |  | 0.59 |
|  |  | 0.99 |
|  |  | 0.95 |
|  |  | 0.659 |

**1 points**

**QUESTION 16**

1. A 4-input neuron has weight 1, 2, 3 and 4. The transfer function is linear with the constant of proportionality being equal to 2. The inputs are 4, 10, 5 and 20 respectively. The output will be

|  |  |  |
| --- | --- | --- |
|  |  | 249 |
|  |  | 40 |
|  |  | 238 |
|  |  | 157 |

**1 points**

**QUESTION 17**

1. Perform KNN classification on the following dataset and predict the class for X(p1=3 & p2=7). K=3

1. (p1=7 & p2=7)-->False

2. (p1=7 & p2=4)-->False

3. (p1=3 & p2=4)-->True

4. (p1=1 & p2=4)-->True

|  |  |  |
| --- | --- | --- |
|  |  | False |
|  |  | Not possible with such few dataset |
|  |  | True |

**1 points**

**QUESTION 18**

1. **Below are the 8 actual values of target variable in the train file.**

**[0,0,0,1,1,1,1,1]**

**What is the entropy of the target variable?**

|  |  |  |
| --- | --- | --- |
|  |  | 5/8 log(3/8) – 3/8 log(5/8) |
|  |  | 3/8 log(5/8) + 5/8 log(3/8) |
|  |  | 5/8 log(5/8) + 3/8 log(3/8) |
|  |  | -(5/8 log(5/8) + 3/8 log(3/8)) |

**1 points**

**QUESTION 19**

1. Which of the following are used to deal with overfitting?

1. Use more data

2. Regularization

3. Bayesian

|  |  |  |
| --- | --- | --- |
|  |  | Only 2 |
|  |  | 1 and 2 |
|  |  | only 1 |
|  |  | 1, 2 and 3 |

**1 points**

**QUESTION 20**

if the value of K is 2 then find out how many values will be in both the clusters

|  |  |  |
| --- | --- | --- |
|  |  | Cluster 1 {1,2,5}  Cluster 2 {3,4,6,7} |
|  |  | Cluster 1 {1,2,3,4,5}  Cluster 2 {6,7} |
|  |  | Cluster 1 {1,2}  Cluster 2 {3,4,5,6,7} |
|  |  | Cluster 1 {1,2, 3}  Cluster 2 {4,5,6,7} |

**1 points**

**QUESTION 21**

1. **For which of the following hyperparameters, higher value is better for decision tree algorithm?**
   1. **Number of samples used for split**
   2. **Depth of tree**
   3. **Samples for leaf**

|  |  |  |
| --- | --- | --- |
|  |  | 1 and 2 |
|  |  | can't say |
|  |  | 1, 2, 3 |
|  |  | 2 and 3 |

**1 points**

**QUESTION 22**

1. Which of the following is required by K means clustering?

|  |  |  |
| --- | --- | --- |
|  |  | All of them |
|  |  | Define distance metric |
|  |  | number of cluster |
|  |  | Initial guess as to cluster centriod |

**1 points**

**QUESTION 23**

1. Overfitting: model is too “complex” and fits irrelevant characteristics (noise) in the data. Which of the following is correct?

|  |  |  |
| --- | --- | --- |
|  |  | Low Bias and High Variance |
|  |  | There is no effect |
|  |  | Only depends on Training and testing error |
|  |  | High Bias and Low Variance |

**1 points**

**QUESTION 24**

1. **Which of the following is true about training and testing error in such case?**

Suppose you want to apply AdaBoost algorithm on Data D which has T observations. You set half the data for training and half for testing initially. Now you want to increase the number of data points for training T1, T2 … Tn where T1 < T2…. Tn-1 < Tn.

|  |  |  |
| --- | --- | --- |
|  |  | The difference between training error and test error increases as number of observations increases |
|  |  | The difference between training error and test error decreases as number of observations increases |
|  |  | The difference between training error and test error will not change |
|  |  | None of these |

**1 points**

**QUESTION 25**

1. **Which of the following is/are true about boosting trees?**
   1. In boosting trees, individual weak learners are independent of each other
   2. It is the method for improving the performance by aggregating the results of weak learners

|  |  |  |
| --- | --- | --- |
|  |  | 1 and 2 |
|  |  | None |
|  |  | 1 |
|  |  | 2 |

**1 points**

**QUESTION 26**

1. **Suppose you are building random forest model, which split a node on the attribute, that has highest information gain. In the below image, select the attribute which has the highest information gain?**

|  |  |  |
| --- | --- | --- |
|  |  | Outlook |
|  |  | Humidity |
|  |  | Temperature |
|  |  | Windy |

**1 points**

**QUESTION 27**

1. Perform appropriate modeling for the given dataset which is collected from an online application for hotels.

[hotel.csv](https://blackboard.svkm.ac.in/bbcswebdav/pid-520815-dt-content-rid-3938894_1/xid-3938894_1)

The attributes are is following

Restaurant ID,

Restaurant Name,

Country Code,City,

Address,Locality,

Locality Verbose,

Longitude,Latitude,

Cuisines,

Average Cost for two,

Currency,

Has Table booking,

Has Online delivery,

Is delivering now,

Switch to order menu,

Price range,

Aggregate rating,

Rating color,

Rating text,

Votes

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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**10 points**

**QUESTION 28**

1. **Let’s say, you are using activation function X in hidden layers of neural network. At a particular neuron for any given input, you get the output as “-0.0001”. Which of the following activation function could X represent?**

|  |  |  |
| --- | --- | --- |
|  |  | tanh |
|  |  | None of these |
|  |  | SIGMOID |
|  |  | ReLU |

**1 points**

**QUESTION 29**

1. Consider the following dataset

[table regression.png](https://blackboard.svkm.ac.in/bbcswebdav/pid-520815-dt-content-rid-3938811_1/xid-3938811_1)

predict what will be the salary of a person who has 10 years of experience.

|  |  |  |
| --- | --- | --- |
|  |  | $66,500 |
|  |  | $55,500 |
|  |  | $60,400 |
|  |  | $58,600 |

**1 points**

**QUESTION 30**

1. Which of the following is true for neural network?

1. The training time depends on the size of network.

2. NN can be simulated on a conventional computer.

3. Artificial neurons are identical in operation to biological ones.

|  |  |  |
| --- | --- | --- |
|  |  | all of them |
|  |  | 1 and 3 |
|  |  | 1 and 2 |

**1 points**

**QUESTION 31**

1. What is/are true about the kernel function in SVM?

1. Kernel function maps low dimensional data to high dimensional space.

2. Its a similarity function

|  |  |  |
| --- | --- | --- |
|  |  | 2 is correct |
|  |  | Both are correct |
|  |  | None of them are correct |
|  |  | 1 is correct |

**1 points**

**QUESTION 32**

1. **Given below is a scenario for training error TE and Validation error VE for a machine learning algorithm M1. You want to choose a hyperparameter (H) based on TE and VE.**

|  |  |  |
| --- | --- | --- |
| **H** | **TE** | **VE** |
| 1 | 105 | 90 |
| 2 | 200 | 85 |
| 3 | 250 | 96 |
| 4 | 105 | 85 |
| 5 | 300 | 100 |

1. **Which value of H will you choose based on the above table?**

|  |  |  |
| --- | --- | --- |
|  |  | 1 |
|  |  | 2 |
|  |  | 4 |
|  |  | 3 |

**1 points**

**QUESTION 33**

1. What is Occam's Razor?

|  |  |  |
| --- | --- | --- |
|  |  | Inductive Bias |
|  |  | Multivariate Linear Function |
|  |  | Used for Feature Selection |
|  |  | Hypothesis Space |

**1 points**

**QUESTION 34**

1. Perform Modeling for the following dataset

[Nutrition\_\_Physical\_Activity\_\_and\_Obesity\_-\_Behavioral\_Risk\_Factor\_Surveillance\_System.csv](https://blackboard.svkm.ac.in/bbcswebdav/pid-520815-dt-content-rid-3938896_1/xid-3938896_1)

This dataset includes data on adult's diet, physical activity, and weight status from Behavioral Risk Factor Surveillance System. This data is used for DNPAO's Data, Trends, and Maps database, which provides national and state specific data on obesity, nutrition, physical activity, and breastfeeding.