

Machine Learning (CS3035)

Question Bank: Part-II

Some fundamental questions up to ML (CS-3035) post-mid-semester exam. (but not limited to):

1. What do you mean by Bayesian Learning?
2. Why do we call Naive Bayes classifier "Naive"?
3. What is Class conditional independence? States its merits and demerits.
4. Explain the Naive Bayes classification algorithm using a suitable toy problem.
5. What is Decision Tree classifier technique?
6. What are the measures of impurity?
7. What do you mean by a "pure split"?
8. Make a comparative analysis on Information Gain, Gain Ratio and Gini Index.
9. Why do we prefer Gini Index-based splits over Information Gain?
10. States the strength and weakness of Decision Tree classifier.
11. Short notes on: ID3, C4.5 and CART
12. Explain the importance of pruning the tree.
13. What are the support vectors?
14. Explain linear and non-linear separable datasets?
15. Derive the Support Vector Machine (SVM) for hard margin using necessary mathematical equations and explanations.
16. Explain the Support Vector Machine (SVM) for soft margin using necessary mathematical equations and explanations.
17. What is slack variable and its role in soft-margin SVM classifier?
18. What is a Kernel function in SVM paradigm?
19. States the Mercers conditions for a valid kernel function.
20. Provide few examples of kernel functions used in SVM classification algorithm.
21. The merits and demerits of the SVM classifier.
22. What is Support Vector Regression (SVR)?
23. Explain the significance of decomposing a multi-class classification problem into binary classification tasks.
24. Short notes: One-Against-All (OAA) and One-Against-One (OAO)
25. What is non-linearly separable problem?
26. What is Artificial Neuron and explain it with an example?
27. What is Artificial Neuron Network?
28. What is Binary activated neuron model and who proposed it?
29. What is a feed-forward neural network?
30. What is a single layer perceptron network?
31. What is multi-layer perceptron (MLP) network?
32. Explain the limitation of perceptron algorithm for linear classification task.
33. Explain AND, OR and NOT logic with perceptron neuron model.
34. Explain XOR problem with an appropriate artificial neuron model.
35. What is learning rate in ANN model?
36. What is bias and variance trade off?
37. What is decision boundary and explain its significance in

Machine Learning (CS3035)

Question Bank: Part-II

classification problem.

38. What is an Activation function?
39. Give suitable examples of activation function.
40. Explain Sigmoid transfer function with example.
41. Name the different types of learning rule in ANN.
42. What is the significance of bias in hyper-plane equation?
43. What is Radial-basis function (RBF) neural network? Explain them with suitable diagram
44. Explain a 2-3-1 (Input-Hidden_neuron-Output) ANN model with suitable diagram and necessary mathematical expressions.
45. What is an ensemble learning?
46. Explain the role of diversity in an ensemble architecture.
47. What are the different possible techniques to introduce diversity in an ensemble composition?
48. What is majority voting?
49. Short notes: Bagging/Bootstrap Aggregator, Adaptive Boosting (AdaBoost) and LogitBoost.
50. What is a "curse of the dimensionality"?
51. What is the significance of feature selection or reduction in machine learning domain?
52. What are the lossy and lossless feature selection/reduction techniques? Provide at least one example for each cases.
53. Short notes: Covariance Matrix, Pearson Correlation Coefficients and Spearman Rank Correlation Coefficients.
54. What is principal component?
55. Explain Principal Component Analysis (PCA) using necessary mathematical expressions and suitable visual representation.
56. What are the different evaluation metrics used in measuring the performance of a classification problem?
57. What are the different evaluation metrics/errors used in measuring the performance of a regression problem?
58. What is a confusion matrix? Explain its different components using a suitable example.
59. Explain the following with examples: Accuracy, Precision, Recall, F1-score and Area Under the Curve (AUC).
60. What is standard normal distribution/standard scalar?
61. Use Principal Component Analysis (PCA) for the following dataset U:

Features#	Sample-1	Sample-2	Sample-3	Sample-4
X1	4	8	13	7
X2	11	4	5	14

Generate the first principal component (PC1) for the given dataset U.