Short Questions

1. What are activation functions in NN?
2. Describe the structure of a convolutional neural network (CNN).
3. How do dropout layers help prevent overfitting in NN?
4. What is the significance of the learning rate in NN training?
5. Compare shallow and deep neural networks.
6. What is SVM in machine learning?
7. How is SVM used for classification?
8. Explain reproducing kernels in SVM.
9. How does SVM perform regression?
10. What is the kernel trick in SVM?
11. How does KNN handle categorical features?
12. Explain the distance metrics used in KNN.
13. Compare weighted KNN to the standard KNN.
14. How does KNN perform in large datasets?
15. What preprocessing steps are beneficial for KNN?
16. What is unsupervised learning?
17. Explain the concept of cluster analysis.
18. What are association rules in unsupervised learning?
19. How is principal component analysis (PCA) used in machine learning?
20. Describe the application of unsupervised learning to customer segmentation.
21. What is gradient boosting?
22. Define numerical optimization in machine learning.
23. How is gradient boosting applied to spam data classification?
24. Explain gradient boosting for housing price prediction with California housing data.
25. Describe the use of gradient boosting in analyzing New Zealand fish data.
26. How can demographic data benefit from gradient boosting?
27. What is the difference between gradient boosting and AdaBoost?
28. How does gradient boosting handle overfitting?
29. Explain the role of learning rate in gradient boosting.
30. What are loss functions in gradient boosting?
31. Describe the role of the C parameter in SVM.
32. How does SVM handle non-linear data?
33. Compare SVM and logistic regression.
34. What are support vectors in SVM?
35. Discuss the importance of feature scaling in SVM.
36. What is K-nearest Neighbor in machine learning?
37. How is KNN used for image scene classification?
38. What factors affect the performance of KNN?
39. How do you choose the value of K in KNN?

40. Discuss the pros and cons of KNN.
41. How are decision trees used in gradient boosting?
42. Discuss the importance of feature importance in gradient boosting.
43. How do you tune a gradient boosting model?
44. What are the limitations of gradient boosting?
45. Compare gradient boosting to random forests.
46. What is a neural network in machine learning?
47. Explain the concept of fitting neural networks.
48. What is backpropagation in neural networks?
49. Discuss issues in training neural networks.
50. How do neural networks learn non-linear relationships?
51. How does deep learning differ from traditional neural networks?
52. Discuss the application of KNN in recommendation systems.
53. What is the significance of hyperparameter optimization in SVM?
54. How can PCA be used to improve the performance of a classifier?
55. What challenges arise in training deep neural networks?
56. Compare the efficacy of NN, SVM, and KNN for image classification.
57. How can ensemble learning improve model performance?
58. What is the best approach to handle high-dimensional data?
59. Discuss the trade-offs between precision and recall in classification models.
60. How does the choice of algorithm affect the interpretability of the model?
61. How can domain knowledge be incorporated into feature engineering?
62. What are the implications of GDPR for machine learning models?
63. How does the scalability of the algorithm impact its choice for large datasets?
64. What are the challenges in real-time predictions with SVM?
65. How can transfer learning be applied to neural networks?
66. Discuss the impact of quantum computing on machine learning algorithms.
67. What are the emerging trends in unsupervised learning?
68. How is machine learning being applied in healthcare for predictive analytics?
69. What role does machine learning play in cybersecurity?
70. How are generative adversarial networks (GANs) transforming machine learning?
71. Compare supervised and unsupervised learning.
72. How do you determine the number of clusters in K-means clustering?
73. What is dimensionality reduction, and why is it important?
74. Explain hierarchical clustering and its types.
75. Discuss the challenges in unsupervised learning.
76. What is a random forest in machine learning?
77. How does random forest perform classification?
78. Explain the concept of bagging in random forests.
79. What is feature importance in random forests?

80. How do random forests handle missing values?
81. Compare random forests and decision trees.
82. Discuss overfitting in random forests.
83. How do you tune a random forest model?
84. What are the advantages of using random forests?
85. Explain the role of tree depth in random forests.
86. How can gradient boosting be optimized for large datasets?
87. Describe the use of neural networks in natural language processing (NLP).
88. How are SVMs applied in bioinformatics for classification problems?
89. What is the role of unsupervised learning in anomaly detection?
90. Explain the use of random forests in feature selection.
91. Compare the computational complexity of training
92. How do boosting algorithms enhance weak learners?
93. What strategies can be used to handle imbalanced datasets in SVM?
94. How do neural networks handle tabular data compared to random forests?
95. Discuss the benefits of combining supervised and unsupervised learning methods.
96. What considerations are important for deploying machine learning models in production?
97. How can cross-validation be applied to assess the performance of NN?
98. What are the common pitfalls in interpreting model evaluations?
99. How do you ensure the ethical use of machine learning in sensitive applications?
100. Discuss the role of data quality in machine learning outcomes.
101. How can machine learning optimize supply chain management?
102. Discuss the application of KNN in social media analysis.
103. How does machine learning enhance user experience in e-commerce?
104. What challenges does machine learning face in real estate valuation?
105. How are random forests used in credit scoring?
106. What is the impact of machine learning on personalized marketing?
107. Discuss the ethical considerations of machine learning in surveillance.
108. How can bias in machine learning algorithms be addressed?
109. What are the privacy concerns with using machine learning in personal data analysis?
110. How does machine learning influence job markets and employment?
111. What are the societal impacts of predictive policing using machine learning?
112. How do advancements in hardware affect machine learning algorithms?
113. What are the challenges of dataset curation for training machine learning models?
114. How does noise in data affect the accuracy of machine learning models?
115. Discuss the challenges of multi-language support in NLP models.
116. How can the reproducibility of machine learning experiments be ensured?

117. What is the future of reinforcement learning in AI?
118. Discuss the role of machine learning in environmental modeling.
119. How can machine learning contribute to solving social issues?
120. What advancements are being made in explainable AI (XAI)?
121. How does machine learning integrate with IoT devices?
122. How is machine learning applied in financial fraud detection?
123. Discuss the use of machine learning in autonomous vehicle technology.
124. How are SVMs used in stock market prediction?
125. What is the role of neural networks in speech recognition?