1. **What is the concept of supervised learning? What is the significance of the name?**

Supervised learning is a subset of artificial intelligence and machine learning. It is also known as Supervised machine learning. And is defined by its ability to train algorithms to categorize data and predict outcomes accurately. Moreover, it teaches computer systems to find hidden insights using the available data.

1. **In the hospital sector, offer an example of supervised learning.**

Machine learning can be used to develop chatbots and virtual assistants that help patients with managing chronic conditions such as diabetes or asthma. These chatbots provide patients with personalized advice on managing their medical conditions based on data such as blood glucose levels or lung function.

**3. Give three supervised learning examples.**

Image and speech recognition, recommendation systems, and fraud detection are all examples of how supervised learning is used.

**4. In supervised learning, what are classification and regression?**

Classification tries to find the decision boundary, which divides the dataset into different classes. Regression algorithms solve regression problems such as house price predictions and weather predictions

**5. Give some popular classification algorithms as examples.**

* Logistic Regression.
* Naive Bayes.
* K-Nearest Neighbors.
* Decision Tree.
* Support Vector Machines.

**6. Briefly describe the SVM model.**A support vector machine (SVM) is a type of supervised learning algorithm used in machine learning to solve classification and regression tasks; SVMs are particularly good at solving binary classification problems, which require classifying the elements of a data set into two groups.

**7. In SVM, what is the cost of misclassification?**

Misclassification costs are basically weights applied to specific outcomes. These weights are factored into the model and may actually change the prediction (as a way of protecting against costly mistakes).

**8. In the SVM model, define Support Vectors.**

Support Vectors: These are the points that are closest to the hyperplane. A separating line will be defined with the help of these data points. Margin: it is the distance between the hyperplane and the observations closest to the hyperplane (support vectors). In SVM large margin is considered a good margin.

**9. In the SVM model, define the kernel.**

SVM algorithms use a set of mathematical functions that are defined as the kernel. The function of kernel is to take data as input and transform it into the required form. Different SVM algorithms use different types of kernel functions. These functions can be different types.

**10. What are the factors that influence SVM's effectiveness?**

The effectiveness of SVM depends on the selection of kernel, kernel's parameters and soft margin parameter C.

**11. What are the benefits of using the SVM model?**

The advantages of SVM and support vector regression include that they can be used to avoid the difficulties of using linear functions in the high-dimensional feature space, and the optimization problem is transformed into dual convex quadratic programs.

**12. What are the drawbacks of using the SVM model?**

SVM algorithm is not suitable for large data sets. SVM does not perform very well when the data set has more noise i.e. target classes are overlapping. In cases where the number of features for each data point exceeds the number of training data samples, the SVM will underperform

**13. Notes should be written on**

**1. The kNN algorithm has a validation flaw.:** The KNN algorithm is also affected by the K value. In future investigations, researchers may use validation sets or cross-validation to find the best K value. In conclusion, the KNN algorithm assumes equally distributed data, which may not be true for real-world data.

**2. In the kNN algorithm, the k value is chosen.:** The KNN algorithm is also affected by the K value. In future investigations, researchers may use validation sets or cross-validation to find the best K value. In conclusion, the KNN algorithm assumes equally distributed data, which may not be true for real-world data.

**3. A decision tree with inductive bias:** Decision tree learning is a method that uses inductive inference to approximate a target function, which will produce discrete values. It is widely used, robust to noisy data, and considered a practical method for learning disjunctive expressions.

**14. What are some of the benefits of the kNN algorithm?**

One advantage of using KNN for time series data is that it does not make any assumptions about the underlying distribution of the data, which is useful for non-stationary data. Additionally, it is computationally inexpensive and easy to implement.

**15. What are some of the kNN algorithm's drawbacks?**

* High memory and computational cost. ...
* Choice of k and distance metric.

**16. Explain the decision tree algorithm in a few words.**

A decision tree is a flowchart-like structure in which each internal node represents a "test" on an attribute (e.g. whether a coin flip comes up heads or tails), each branch represents the outcome of the test, and each leaf node represents a class label (decision taken after computing all attributes)

**17. What is the difference between a node and a leaf in a decision tree?**

When a sub-node splits into further sub-nodes, it's a decision node. Leaf Node or Terminal Node: Nodes that do not split are called leaf or terminal nodes. Pruning: Removing the sub-nodes of a parent node is called pruning. A tree is grown through splitting and shrunk through pruning

**18. What is a decision tree's entropy?**

n decision trees, entropy is a measure of impurity used to evaluate the homogeneity of a dataset. It helps determine the best split for building an informative decision tree model.

**19. In a decision tree, define knowledge gain.**

Information gain represents the difference in entropy before and after a split on a given attribute. The attribute with the highest information gain will produce the best split as it's doing the best job at classifying the training data according to its target classification.

**20. Choose three advantages of the decision tree approach and write them down.**

1. It's Great for Making Decisions.
2. It is an All-Inclusive Algorithm.
3. Simple to Understand for Coders.
4. Missing Values Aren't an Issue.
5. They are Inexpensive.

**21. Make a list of three flaws in the decision tree process.**

1. Prone to Overfitting. ...
2. Unstable to Changes in the Data. ...
3. Unstable to Noise. ...
4. Non-Continuous. ...
5. Unbalanced Classes. ...
6. Greedy Algorithm. ...
7. Computationally Expensive on Large Datasets. ...
8. Complex Calculations on Large Datasets.

**22. Briefly describe the random forest model.**

Random Forest is a famous machine learning algorithm that uses supervised learning methods. You can apply it to both classification and regression problems. It is based on ensemble learning, which integrates multiple classifiers to solve a complex issue and increases the model's performance.