InterviewBit

Artificial Intelligence Interview Questions

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Let's get Started

Artificial Intelligence and Machine Learning are exploited in so many wonderful ways behind the scenes to influence our daily lives. Whether we're attempting to read our emails, get driving directions, or find music or movie recommendations, AI can help us in every aspect of our life.

Here we'll show you how artificial intelligence is applied in everyday activities in this post, such as Use of social media, Personal digital assistants, Vehicles that drive and park by themselves, email correspondence, Searching the internet, Services and stores, Offline encounters.

According to Alan Turing, AI is- "systems that act like humans". AI is a field of data science that tries to impart human-like intelligence and wisdom to machines. It makes use of subfields like Machine learning and Deep learning to achieve the purpose. You interact with Artificial Intelligence more often than you notice. For example, a car in autopilot mode that can slow itself down if the car ahead is slowing down, or the Google Assistant that can understand your voice and process your request, use Artificial Intelligence.

In this article, we are going to answer some common questions related to AI that are asked in interviews.

Artificial Intelligence Interview Questions for Freshers

1. What is Artificial Intelligence?

Artificial Intelligence is the field of computer science concerned with building intelligent machines or computer systems, capable of simulating human intelligence. The machines created using Artificial Intelligence can work and react like humans without human intervention. Speech Recognition, Customer service, Recommendation Engine, Natural Language Processing (NLP) are some of the applications of Artificial Intelligence.

Since its inception, AI research has explored and rejected a variety of methodologies, including mimicking the brain, modelling human problem-solving, formal logic, massive knowledge libraries, and imitating animal behavior. Highly mathematical-statistical machine learning dominated the subject in the first decades of the twenty-first century. The many sub-fields of AI research are based on specific aims and the application of certain techniques. Reasoning, knowledge representation, planning, learning, natural language processing, sensing, and the ability to move and manipulate objects are all conventional AI research aims. One of the field's long-term goals is general intelligence (the capacity to solve any problem). AI researchers have adapted and integrated a wide range of problem-solving strategies to handle these issues, including search and mathematical optimization, formal logic, artificial neural networks, and statistics, probability, and economics methodologies. AI also makes use of various fields like psychology, linguistics, philosophy.

2. What are some real-life applications of Artificial Intelligence?

- **Social Media:** The most common use of Artificial Intelligence in social media is facial detection and verification. Artificial Intelligence, along with machine learning, is also used to design your social media feed.
- **Personalized online shopping:** Shopping sites use AI-powered algorithms to curate the list of buying recommendations for users. They use data like users' search history and recent orders to create a list of suggestions that users might like.
- **Agriculture:** Technologies, especially Artificial Intelligence embedded systems, help farmers protect their crops from various adversities like weather, weeds, pests, and changing prices.
- **Smart cars:** Smart cars are another one of the real-life applications of AI. Artificial intelligence collects data from a car's radar, camera, and GPS to operate the vehicle when the autopilot mode is on.
- **Healthcare:** Artificial Intelligence has come out as a reliable friend of doctors. From intelligent testing to medical recommendations, they assist medical professionals in every possible way.

3. What are different platforms for Artificial Intelligence (AI) development?

Some different software platforms for AI development are-

1. Amazon AI services
2. Tensorflow
3. Google AI services
4. Microsoft Azure AI platform
5. Infosys Nia
6. IBM Watson
7. H2O
8. Polyaxon
9. PredictionIO

## 4. What are the programming languages used for Artificial Intelligence?

Python, LISP, Java, C++, R are some of the programming languages used for Artificial Intelligence.

5. What is the future of Artificial Intelligence?

Artificial Intelligence has affected many humans and almost every industry, and it is expected to continue to do so. Artificial Intelligence has been the main driver of emerging technologies like the Internet of Things, big data, and robotics. AI can harness the power of a massive amount of data and make an optimal decision in a fraction of seconds, which is almost impossible for a normal human. AI is leading areas that are important for mankind such as cancer research, cutting-edge climate change technologies, smart cars, and space exploration. It has taken the center stage of innovation and development of computing, and it is not ceding the stage in the foreseeable future. Artificial Intelligence is going to impact the world more than anything in the history of mankind.

6. What are the types of Artificial Intelligence?

There are seven types of Artificial Intelligence. These are:
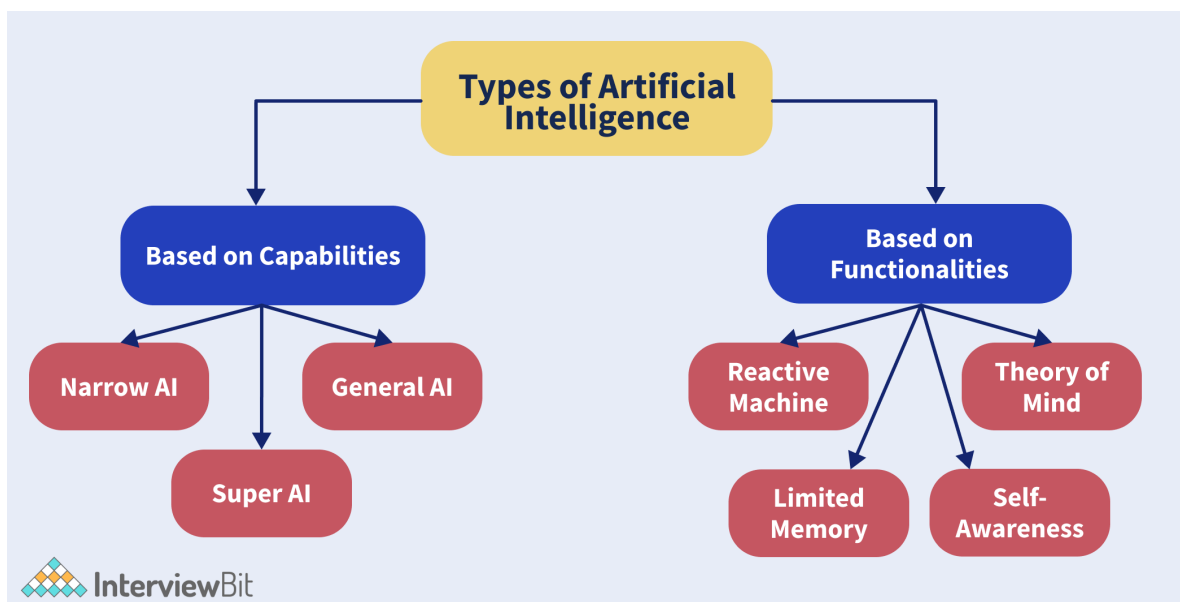
1. **Weak AI or Narrow AI-** These are designed to perform dedicated tasks. They can not perform beyond their capabilities. Apple's Siri and IBM's Watson are some examples of weak AI or narrow AI.
2. **General AI-** General AI can perform any intellectual task like humans. Currently, there is no system in the world that can be categorized under general AI. Researchers, however, are focused on developing AI devices that can perform tasks as perfectly as humans.
3. **Super AI-** Super AI is the level of Artificial Intelligence at which it can pass the intelligence of humans and can perform tasks better than humans. Super AI is still a hypothetical concept.
4. **Reactive Machines-** These kinds of machines react in the best possible way in a current situation. They do not store memories or experiences. IBM's Deep Blue system and Google's Alpha go are some examples of reactive machines.
5. **Limited memory-** These machines store experiences, but only for a limited amount of time. For example, smart cars store the information of nearby cars, their speed, speed limit, route information for a limited amount of time.
6. **Theory of mind-** The theory of machine AI is a theoretical concept. They might be able to understand human emotions, beliefs, society, and might be able to interact like humans.
7. **Self-awareness-** Self-awareness AI is the future of AI. It is expected that these machines will be super-intelligent, having their own consciousness, emotions, and self-awareness.

7. What is the difference between Artificial Intelligence, Machine learning, and Deep learning?
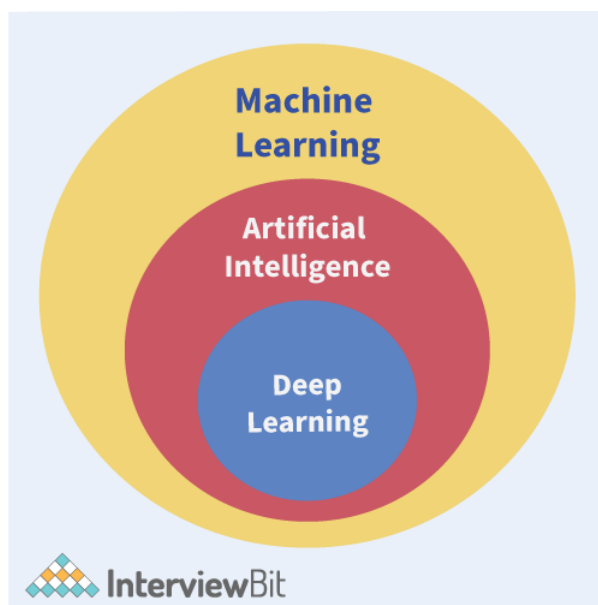
Artificial Intelligence	Machine Learning	Deep Learning
Artificial Intelligence is the ability of machines to function like the human brain.	Machine learning is processing data, learning from it, and then making informed decisions.	Deep learning uses Artificial Neural Networks to solve complex problems.
The goal of AI is to allow machines to think for themselves without the need for human involvement.	The purpose of machine learning is to allow a machine to learn from its previous experiences.	Deep learning's purpose is to use numerous algorithms to tackle complicated problems in the same way that the human brain does.
AI is capable of dealing with both structured and semi-structured data.	Machine learning works with both organized and semi-structured data.	Deep learning uses both structured and unstructured data to solve problems.
AI is a subset of data science.	Machine Learning is a subset of AI.	Deep learning is a subset of Machine learning.
Example- Google Search engine	Example- Image recognition	Example- Automatic car driving system

## 8. How are Artificial Intelligence and Machine Learning related?

Artificial Intelligence and Machine Learning are two popular and often misunderstood words. Artificial Intelligence is a domain of computer science that enables machines to mimic human intelligence and behavior. On the other hand, Machine Learning is a subset of Artificial Intelligence and is all about feeding computers with data so that they can learn on their own from all the patterns and models. Machine Learning models are used to implement Artificial Intelligence frequently.

AI can be approached in a variety of ways, for as by building a computer program that implements a set of domain expert-developed rules. Artificial Intelligence (AI) incorporates Machine Learning (ML). Machine learning (ML) is the study of creating and implementing algorithms that can learn from previous experiences. If a pattern of behavior has been seen in the past, you can anticipate whether or not it will occur again.

For instance, if you want to develop a program that can identify the animal by looking at the image, you have to use a machine-learning algorithm that can predict the animal in the image based on millions of images stored in the database. The algorithm goes through all the images and classifies each image based on its features (color of pixels, for instance).

9. What is Deep Learning?

Deep learning is a subset of Machine learning, which makes use of artificial neural networks to solve complex problems. The artificial neural network is a concept inspired by information processing and distributed communication nodes, neurons, which are present in human brains. It gives deep learning the power to look at a problem and solve it like a human brain in that situation would. The word 'deep' in deep learning means the number of hidden layers in the neural network. Deep learning models are developed in such a way that they are capable of training and managing themselves.
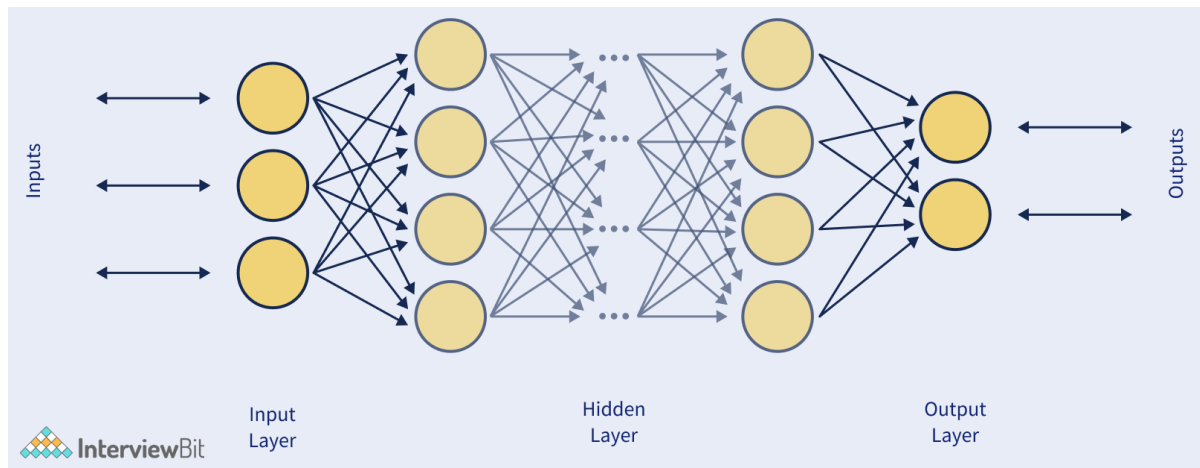
In the above figure, the deep neural network takes input through an input layer. The algorithm's input and output are separated by a hidden layer, in which the function applies weights to the inputs and guides them through an activation function as the output. Activation functions of a Deep neural network may vary. For example, a Sigmoid Function can take any input and produce the output between 0 and 1. The output layer is the network's last layer that takes the information gleaned from the hidden layer and turns it into a final value.

In a nutshell, the hidden layers conduct nonlinear changes on the network's inputs. The function of the neural network determines the hidden layers, and the layers themselves may vary depending on their associated weights.

10. What are different types of Machine Learning?
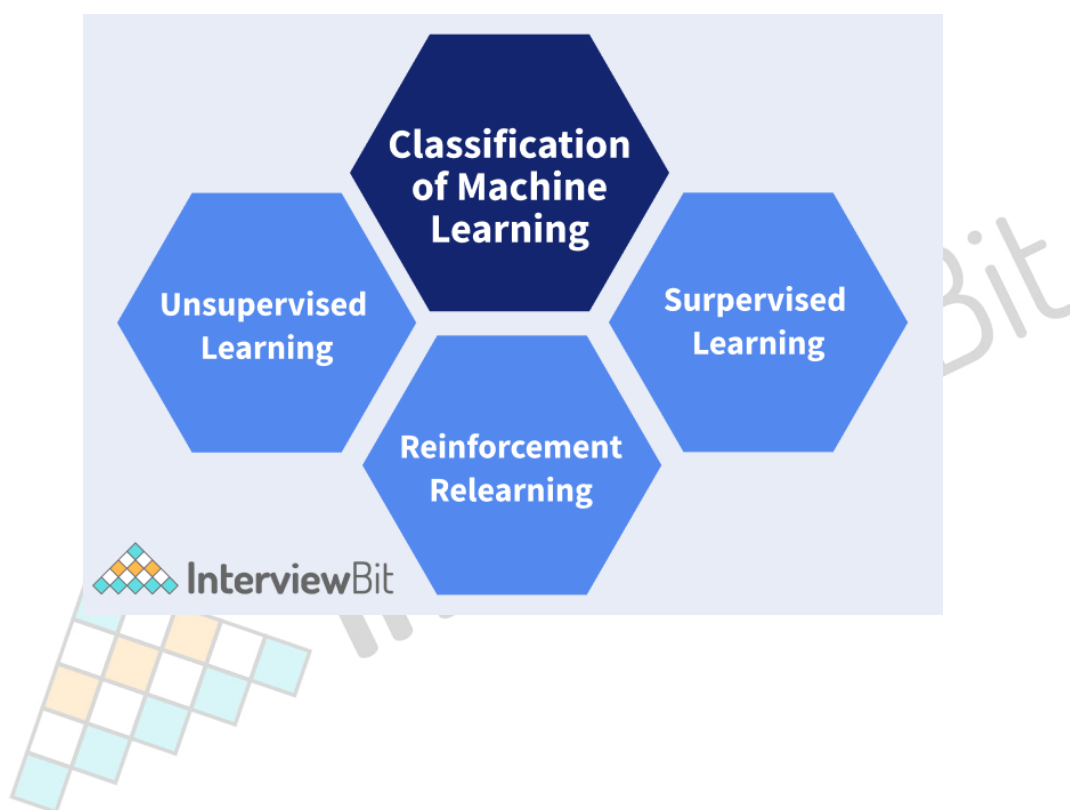
- **Supervised Learning:** Supervised learning is the easiest type of machine learning. It is used to train the machine with labeled data. Labeled data is a group of samples that have been tagged with one or more labels (information tags). The labeled data is fed to the machine one by one until the machine can recognize the data on its own. It is just like a teacher trying to teach a kid all kinds of labeled cards in a deck of cards one by one. The data itself is the teacher in supervised learning.

- **Unsupervised Learning:** Unsupervised learning is, interestingly, the opposite of supervised learning. It is used for data with without labels or information tags. The algorithm is fed with a lot of data and tools to understand the properties of data. The machine will organize the data in clusters, classes, or groups in such a way that it can make sense. Taking a huge amount of random data as an input and making sense out of it is what makes this learning model brilliant.

- **Reinforcement learning:** The reinforcement learning model from the above-mentioned learning models. It is a kind of model which learns from its mistakes. When we place a reinforcement learning model in any environment, it makes a lot of mistakes. We provide a positive feedback signal when the model performs well and a negative feedback signal when it makes errors, to promote positive learning and make our model efficient.

11. What are the misconceptions about Artificial Intelligence?

Some misconceptions about Artificial Intelligence that exists are:

- **Machines learn from themselves-** The reality is far from the statement. Machines are not yet at that stage where they can make a decision on their own. Machines learn through a process called machine learning that enables systems to learn and develop based on their experiences without having to be explicitly programmed. Machine learning is concerned with the creation of computer programs that can access data and learn on their own.
- **Artificial Intelligence is the same thing as Machine learning-** Artificial Intelligence and Machine learning differ from each other. Artificial Intelligence concerns itself with creating devices that can mimic human intelligence, while machine learning is a subset of artificial intelligence which is about creating programs that can analyze data, learn from it, and then make decisions.
- **Artificial Intelligence will take over humans-** There is a possibility that the capabilities of AI can match or even surpass human intelligence in the near future. But, saying that AI will take over humans is just a work of fiction. AI is supposed to complement human intelligence, not enslave it.
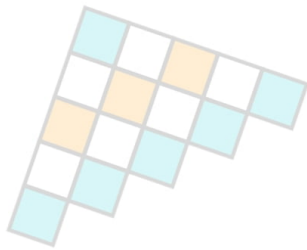
Artificial Intelligence Interview Questions for Experienced

12. What is Q-learning?

Q Learning is a model-free learning policy that chooses the best course of action in an environment, depending on where in the environment the agent is (an agent is an entity that makes a decision and enables AI to be put into action). Model-free learning policy means that the nature and predictions of the environment to learn and move forward. It does not reward a system to learn, it uses the trial and error method instead.

The model's goal is to determine the optimum course of action given the current situation. To accomplish this, it may devise its own set of rules or act outside of the policy that has been established for it to obey. This means there isn't a real need for a policy, which is why it's called off-policy. The agent's experience is saved in the Q table in Q-learning, and the value in the table indicates the long-term reward value of executing a certain action in a specific condition. The Q learning algorithm, according to the Q table, can instruct the Q agent the action to take in a given situation to maximize the predicted reward.

13. What is the difference between a strong AI and a weak AI?

Strong AI	Weak AI
Strong AI is a theoretical form of AI with a view that machines can develop consciousness and cognitive abilities equal to humans.	Weak AI, also called narrow AI, is AI with limited functionality. It refers to building machines with complex algorithms to accomplish complex problem-solving, but it does not show the entire range of human cognitive capabilities.
Strong AI can perform a wide range of functions.	In comparison to strong AI, weak AI has fewer functions. Weak AI is unable of achieving self-awareness or demonstrating the full spectrum of human cognitive capacities and operate within a pre-defined range of functions.
Strong AI-powered machines have a mind of their own, and they can think and accomplish tasks on their own.	Weak AI-powered machines do not have a mind of their own.
No machine of strong AI exists in reality.	Examples include Siri or Google Assistant.

14. Which assessment is used to test the intelligence of a machine? Explain it.

The Turing test is used to determine whether or not a machine is capable of thinking like a human. IT was developed by Alan Turing in 1950.

The Turing Test is like an interrogation game between three players. There is an interrogator who is a human. He has to interrogate two other players- one computer and one human. The interrogator has to figure out which one is a computer by asking questions. The computer has to do its best to make itself hard to be distinguished from the human. The machine will be considered intelligent if it makes it hard to be distinguished from the human.

Consider the following scenario: Player A is a computer, Player B is a human, and Player C is a questioner. The interrogator is aware that one of them is a robot, but he needs to figure out which one. Since all players communicate via keyboard and screen, the outcome is unaffected by the machine's capacity to transform words into speech. The exam result is determined not by the number of correct answers, but by how closely the responses resemble those of a human. The computer is permitted to do whatever it can to force the interrogator to make a false identification.

The question-answer session can be like this-

Interrogator: Are you a computer?

Player A (computer)- No.

Interrogator: Multiply two huge numbers, such as (256896489*456725896).

Player A- After a long delay, he gives the incorrect answer.

If an interrogator is unable to distinguish between a machine and a human in this game, the computer passes the test, and the machine is said to be intelligent and capable of thinking like a human. This game is popularly called 'imitation game'.
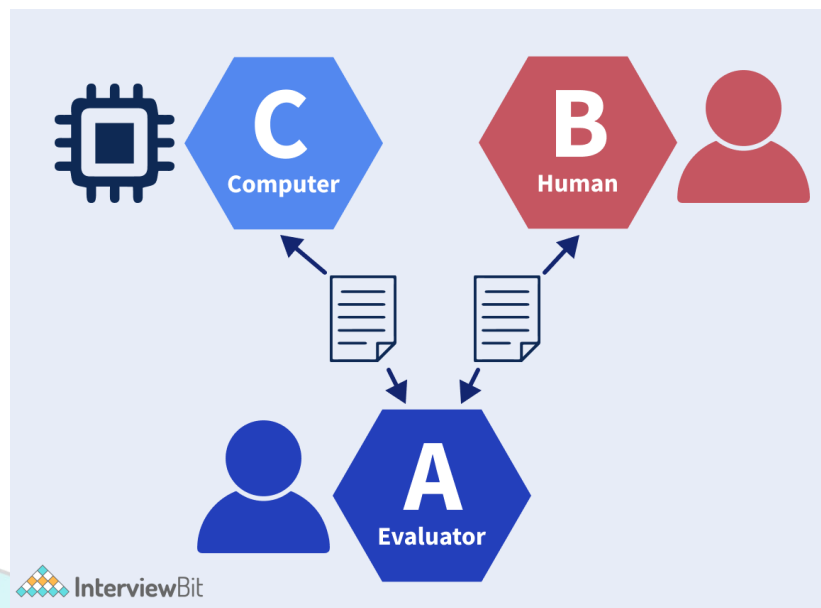
15. What is Computer Vision in AI?

Computer Vision in the field of AI enables computer systems to deduce meaningful interpretations from images or any other visual stimulation and take action based on that input. AI gives the system the ability to think, then computer vision gives the system the ability to observe. Computer vision is very much similar to human vision.

Pattern recognition is the foundation of today's computer vision algorithms. We train computers on a vast amount of visual data—images are processed, things are labeled, and patterns are found in those items. For example, if we submit a million photographs of flowers to the computer, it will analyze them, find patterns that are common to all flowers, and produce a model "flower" at the end of the process. As a result, every time we submit them photographs, the computer will be able to precisely recognize whether a certain image is a flower. Computer vision is can be witnessed in many areas of our lives.

For example- Content organization in Apple Photos, Facial Recognition systems, self-driving cars, augmented reality, etc. use computer vision.

Facial Recognition System

16. What are Bayesian networks?

A Bayesian network is a probabilistic graphical model based on a set of variables and their dependencies, represented in the form of an acyclic graph. Bayesian networks are based on probability distribution, and they predict outcomes and detect anomalies using probability theory. The Bayesian networks are used to perform tasks such as prediction, detecting anomalies, reasoning, gaining insights, diagnostics, and decision-making. A Bayesian network, for example, could be used to illustrate the probability correlations between diseases and symptoms. The network may be used to calculate the chances of certain diseases being present based on symptoms.

17. What is Reinforcement learning, and how does it work?

Reinforcement learning is an area of machine learning which works on reward-based models for prediction and decision making. It deploys a feedback-based mechanism to reward a machine when it makes good decisions. Negative feedback is provided to the machine when it does not perform well. This encourages the machine to find the best possible behavior in a particular situation. Unlike supervised learning, the agent learns autonomously utilizing feedback and no labelled data in Reinforcement Learning. Because there is no labeled data, the agent must rely only on its own experience to learn. RL is used to tackle a certain sort of problem in which sequential decision-making is required and the aim is long-term, such as game-playing, robotics, and so on. The agent interacts with and explores the world on its own. In reinforcement learning, an agent's primary goal is to increase performance by obtaining the most positive rewards. The agent learns through trial and error, and as a result of its experience, it improves its ability to complete the task.

Reinforcement learning can be best understood by taking an example of a dog. When the owner of the dog wants to cultivate a good habit in his dog, he will train his dog to do that thing with the help of a treat. The dog will be rewarded with the treat if he obeys his owner. If he disobeys the owner, the owner will use a negative reinforcement technique by not giving his dog his favorite treat. This way, the dog will associate the habit with the treat. This is precisely how reinforcement learning works in a machine.
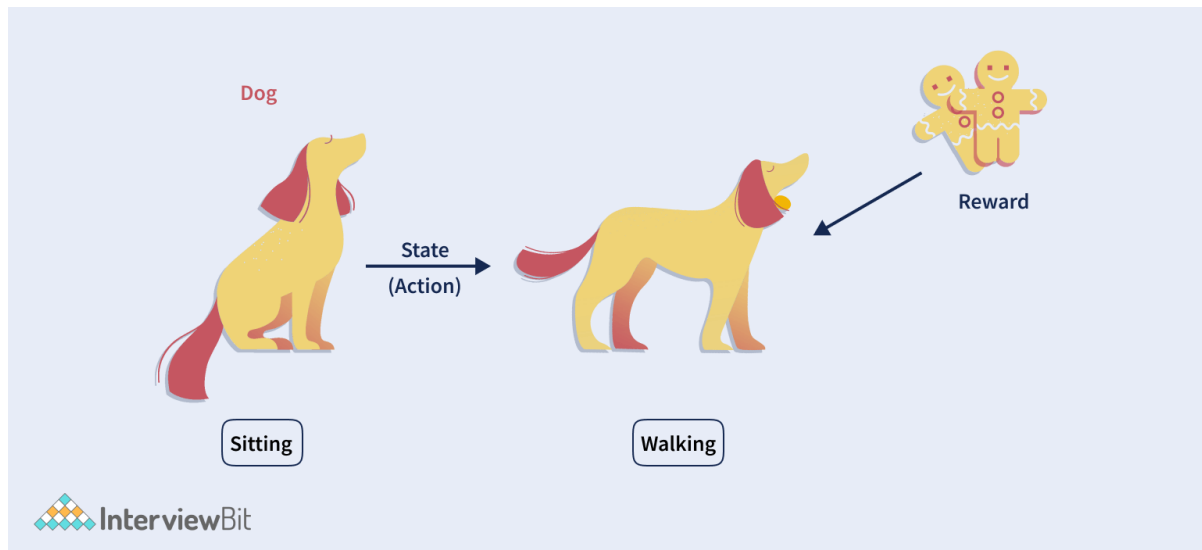
Applying Reinforcement learning Principles to dogs. Repeatedly awarding the dog with treats (positive reinforcement) can make the dog adapt to the good habits (walking in this case) quickly.

18. How many types of agents are there in Artificial Intelligence?

- **Simple Reflex Agents:** Simple reflex agents ignore the history of the environment and its interaction with the environment and act entirely on the current situation.
- **Model-Based Reflex Agents:** These models perceive the world according to the predefined models. This model also keeps track of internal conditions, which can be adjusted according to the changes made in the environment.
- **Goal-Based Agents:** These kinds of agents react according to the goals given to them. Their ultimate aim is to reach that goal. If the agent is provided with multiple-choice, it will select the choice that will make it closer to the goal.
- **Utility-based Agents:** Sometimes, reaching the desired goal is not enough. You have to make the safest, easiest, and cheapest trip to the goal. Utility-based agents chose actions based on utilities (preferences set) of the choices.
- **Learning Agents:** These kinds of agents can learn from their experiences.

19. Explain Markov's decision process.

Markov's decision process (MDP) is a mathematical approach for reinforcement learning. Markov's decision process (MDP) is a mathematical framework used to solve problems where outcomes are partially random and partly controlled. To solve a complex problem using Markov's decision process, the following basic things are needed-

- **Agent-** The agent is an entity that we are going to train. For example, a robot that is going to be trained to assist in cooking is an agent.
- **Environment-** The surroundings around the agent are called Environment. The kitchen is an environment in the case of the above-mentioned robot.
- **State (S)-** The current situation of the agent is called the state. So, in the case of the robot, the position where the robot is, the temperature of the robot, its posture, etc. collectively define the state of the robot.
- **Action (A)-** The robot can move left or right, or it can pass an onion to the chef, these are some of the actions that the agent (robot) can take.
- **Policy (π)-** The policy is the reasoning behind taking an action.
- **Reward (R) -**A reward is received by the agent for taking a desirable action.
- **Value (V)-** The value is the potential future reward that the agent can receive.

The working of Markov's model can be understood from the following diagram.
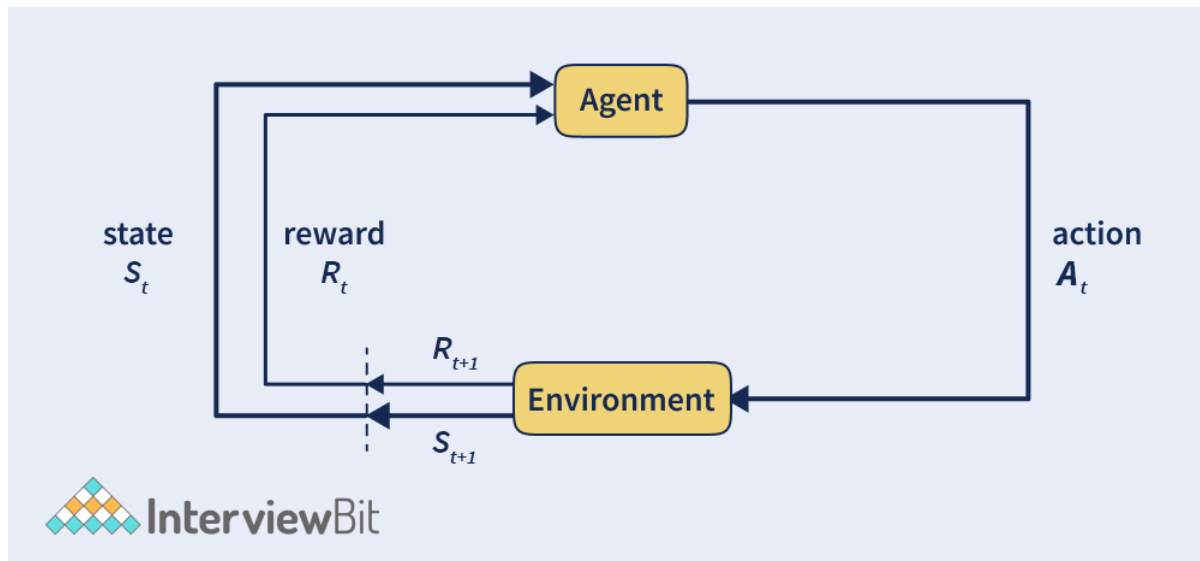
In simple words, the agent has to do some action to start from its initial state. While doing so, it receives rewards based on the actions it takes. The policy defines the action it takes, and the reward collected defines the value (V).

20. What do you understand by reward maximization?

Reward maximization is a technique used in Reinforcement learning. Reinforcement learning is a subset of AI algorithms made up of three main components: an environment, agents, and incentives. The agent alters its own and the environment's state by completing actions. The agent is awarded or penalized based on how much their activities affect the goal the agent must attain. Many reinforcement learning challenges begin with the agent having no prior knowledge of the environment and conducting random behaviors. The agent learns to optimize its actions and adopt policies that maximize its reward based on the feedback it receives.

The goal is to maximize the reward and the action of the agent by using optimal policies. This is called reward maximization. Any abilities that are repeatedly requested by the agent's environment must eventually be created in the agent's behavior if it can alter it to improve its cumulative reward. A good reinforcement learning agent could eventually learn perception, language, social intelligence, and other skills while maximizing its reward.

21. Explain the Hidden Markov Model.

The Hidden Markov model is a probabilistic model which is used to identify the probabilistic character of any event. It says that an observed event is related to a set of probability distributions. If a system is being modeled into a Markov's chain, then the main goal of HMM is to identify the hidden layers of the Markov's chain. Hidden means that the particular state is not observable to the observer. It is generally used for temporal data. HMM finds its application in reinforcement learning, temporal pattern recognition, etc.
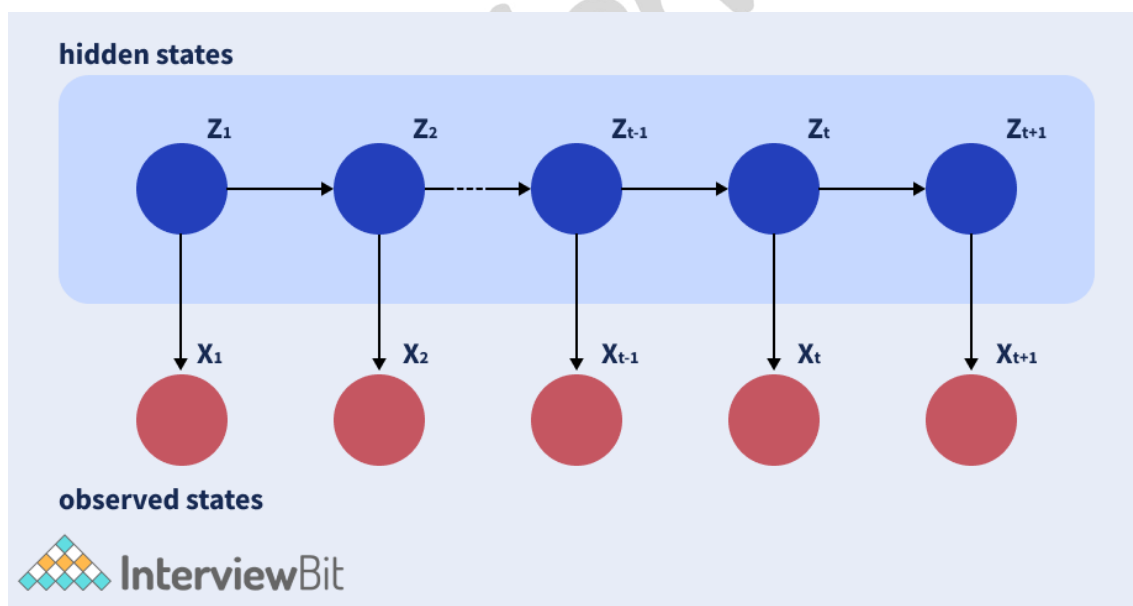
A Hidden Markov Model. $Z_1…..Z\square\square_1$ are hidden states

22. What is the difference between parametric and non-parametric models?

| Parametric model	Non-Parametric model
Parametric models fix a number of parameters to build the model in machine learning	The Non-parametric models use a flexible number of parameters to build the model.
Parametric analysis is to test group means.	A non-parametric analysis is to test medians.
It is applicable only for variables.	It is applicable for both – Variable and Attribute.
Parametric methods can be useful in a variety of scenarios, but they function best when the dispersion of each group is varied.	Similarly, Non-Parametric Methods can perform well in a variety of conditions, but their performance is at its best (top) when each group's spread is equal.
Parametric models hold strong assumptions about the data.	It holds fewer assumptions about data.
Examples: Naive Bayes model, logical regression, etc.	Example: KNN.

23. What do you understand by hyperparameters?

Hyperparameters are the parameters that control the entire training process. These variables are adjustable and have a direct impact on how successfully a model trains. They are declared beforehand. Model hyperparameters, which cannot be inferred while fitting the machine to the training set because they refer to the model selection task, and algorithm hyperparameters, which have no effect on the model's performance but affect the speed and quality of the learning process, are two types of hyperparameters.

The selection of good hyperparameters is crucial for the training process. Activation function, alpha learning rate, hidden layers, number of epochs, number of branches in a decision tree, etc. are some of the examples of hyperparameters.

24. What is Overfitting?

Overfitting is a concept in data science when a data point does not fit against its training model. When the raining model is fed with data, there is a possibility that it might encounter some noise that cannot fit into the statistical model. This happens when the algorithm cannot perform accurately against unseen data.
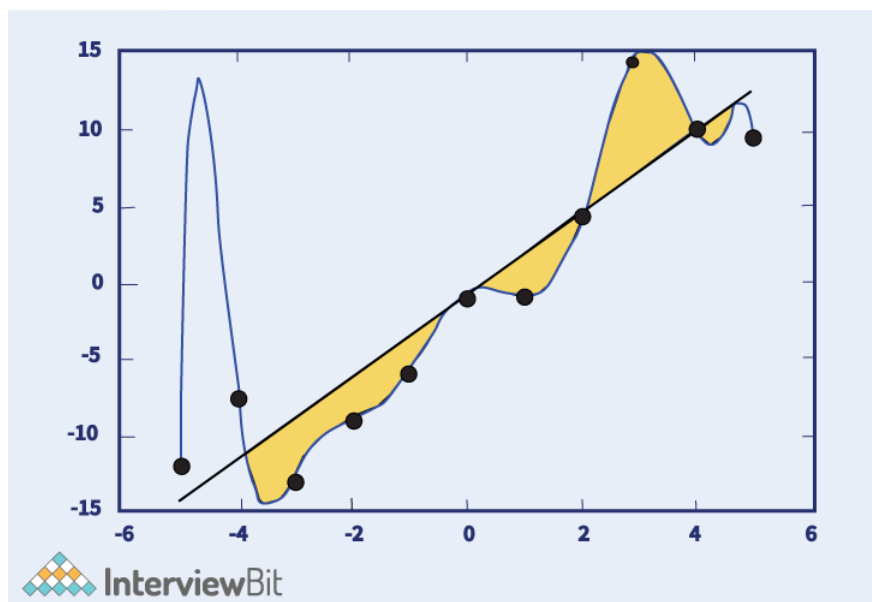
Overfitting data points- In the above linear model, some points do not fit in. These points are outliers.

25. What are the techniques used to avoid overfitting?

If we can detect overfitting at an early stage, it will be very useful for our training model. There are several methods up our sleeves that can be used to avoid overfitting-

- **Cross-validation:** Cross-validation is a resampling technique for evaluating machine learning models on a small sample of data.
- **Remove features:** We can remove the unnecessary features of the models to encompass the outliers.
- **Early stopping:** Early stopping is a type of regularization used in machine learning to minimize overfitting when using an iterative method like gradient descent to train a learner. Early stopping criteria specify how many iterations can be completed before the learner becomes over-fit.
- **Training with more data:** We can train our model with more data to accommodate outliers.
- **Regularization:** In machine learning, regularization is a method to solve the over-fitting problem by adding a penalty term with the cost function.
- **Ensembling:** Ensemble learning refers to combining the predictions from two or more models.

26. What is Natural Language Processing?

Natural Language Processing (NLP) is a field of Artificial Intelligence, concerned with giving computers the ability to understand and interact in human languages in a way humans can.

NLP combines rule-based modeling of human language with statistical, machine learning, and deep learning models. This makes a computer fully understand and comprehend human language in the form of voice or text. Voice-operated GPS systems, speech-to-text systems, customer service chat boxes, etc. use NLP.

Natural language processing encompasses a wide range of methods for analyzing human language, including statistical and machine learning techniques, as well as rules-based and algorithmic approaches. Because text- and voice-based data, as well as practical applications, require a diverse set of methodologies. Tokenization and parsing, lemmatization/stemming, part-of-speech tagging, language detection, and semantic link identification are all basic NLP activities. You've probably done these chores manually previously if you ever diagrammed sentences in elementary school. NLP tasks, in general, break down language into smaller, more basic bits and attempt to comprehend the relationships between them. These tasks are used in higher NLP capabilities like- content categorization, topic discovery and modelling, sentiment analysis, speech-to-text, and text-to-speech conversion.
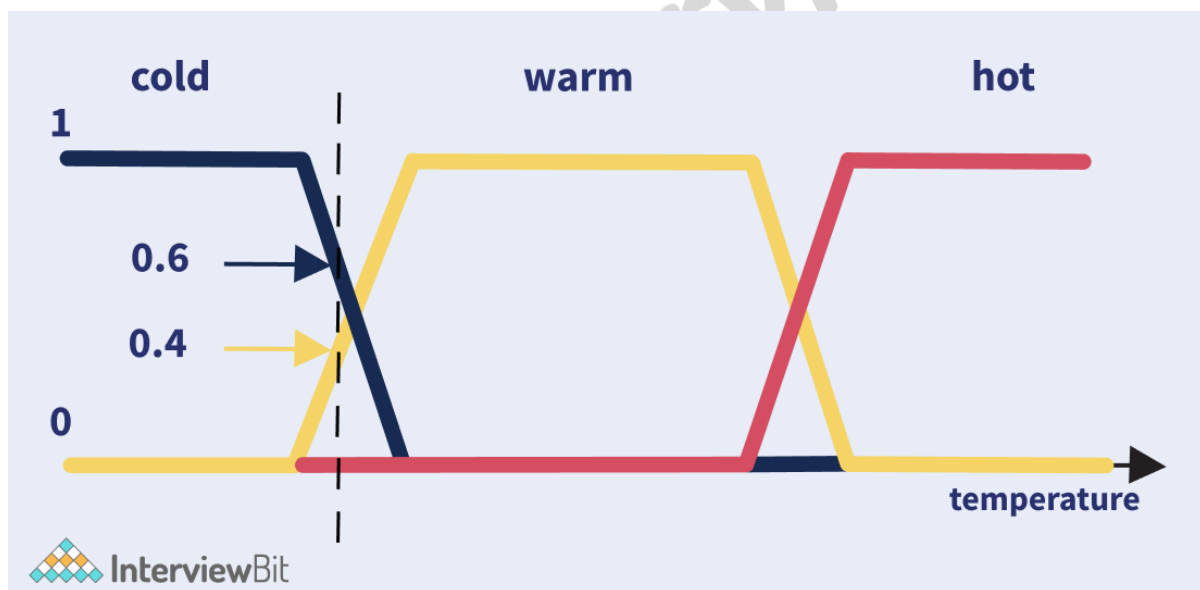
27. What is the difference between Natural language processing and text mining?

Text Mining	Natural Language Processing
Text mining is used to extract information from the text. This includes analyzing documents, emails, social media posts, etc. to get the needed information in and= optimized way.	NLP is a method that allows machines to understand, interpret and create human-based languages.
It employs a variety of tools and languages to process data.	It processes data and generates output using high-level machine learning models.
It does not consider semantic analysis when doing tasks.	When doing tasks, it considers syntactic and semantic analysis.
In comparison to NLP, we can readily measure the system's performance and accuracy.	In comparison to Text Mining, measuring system performance is rather challenging in this case.
It does not necessitate the use of humans.	Human assistance is sometimes required to process data.
Outcomes include word frequency, correlation, pattern, and interpretation.	The outcome includes semantics, syntax, and grammatical structure.

28. What is Fuzzy logic?

Fuzzy logic (FL) is a method of reasoning in Artificial Intelligence that resembles human reasoning. According to this logic, the outcome can take any values between TRUE and FALSE (digitally, 0, or 1). For example, the outcome can be certainly yes, possibly yes, not sure, possibly no, or certainly no.

Conventional logic states that a computer can take input and produce definite output which is True or False, which is equivalent to human YES or NO.

Fuzzy logic: the outcome can take any value between 0 and 1

29. What is the difference between eigenvalues and eigenvectors?

- **Eigenvalues** are the coefficients given to eigenvectors that determine the length or magnitude of the vectors. Eigenvalues are unit vectors having magnitude 1. A negative eigenvalue, for example, may scale the eigenvector in the opposite way.
- **Eigenvectors** are unit vectors, meaning their length or magnitude is the same as 1.0. They're also known as right vectors, which simply means "column vectors" (as opposed to a row vector or a left vector). A right-vector is a vector in the traditional sense.

30. What are the different components of an expert system?

An expert system is a computer program that simulates the judgement and behavior of a human or an organization with expert knowledge and expertise in a particular field using artificial intelligence (AI) technologies.

The expert systems belong to an important domain of Artificial Intelligence, which is used to solve complex problems using extraordinary human intelligence and expertise.

The different components used to build an expert system are:

- **Knowledge base-** It is a storage area that contains domain-specific, high-quality knowledge.
- **Inference engine-** The Inference engine uses and manipulates the knowledge from the knowledge base.
- **User Interface-** It provides interaction between the expert system and the user.

31. What are some differences between classification and regression?

Regression and classification are both supervised learning algorithms. Both works on labeled data and are used to predict in machine learning. The difference, however, arises from the manner in which they are used.

Classification	Regression
In classification, a computer is trained against a training dataset. Upon training, the algorithm categorized the data into various classes.	Regression is the process of finding correlations between dependent and independent variables. It is used to predict continuous variables.
In classification, the mapping function is used for mapping values to predefined classes.	In regression, the Mapping Function is used for the mapping of values to continuous output.
Involves prediction of values.	Involves prediction of continuous values.
Nature of predicted data is unordered.	Nature of predicted data is ordered.
Types of classification algorithms- • K- Nearest Neighbors • Support Vector Machines • Naive Bayes	Types of regression algorithm- • Simple Linear Regression • Multiple Linear Regression • Support Vector Regression

32. What is an Artificial Neural Network? What are some commonly used Artificial Neural networks?

Artificial Neural networks, simply called Neural networks, are computer systems based on units called nodes or artificial neurons, which resemble the neurons in human brains. Each node can transmit a signal from one node to another.
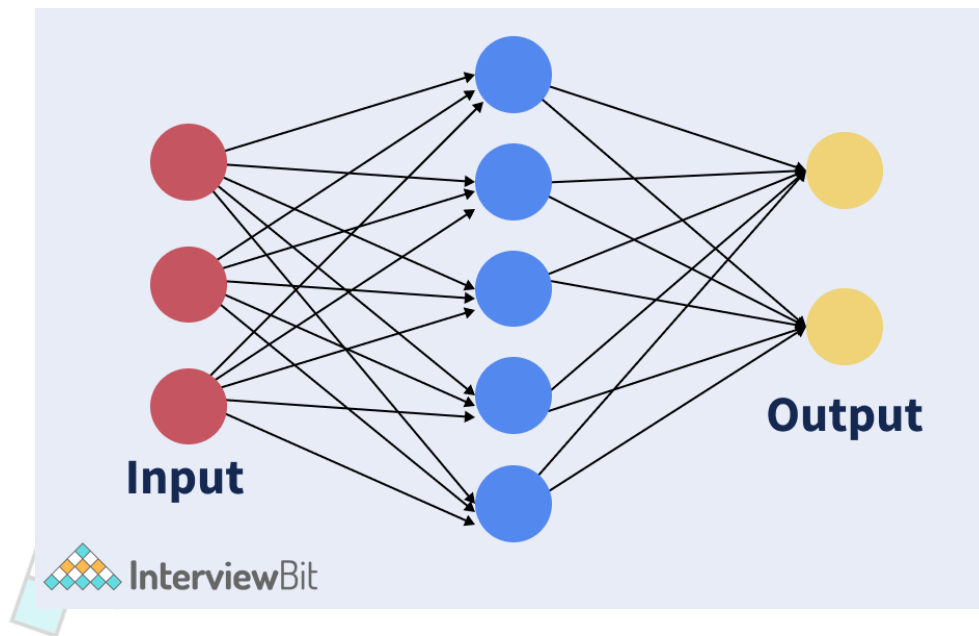
An Artificial Neural Network

A neural network includes several layers, each of which performs a specialized job. As the model's complexity grows, the number of layers grows as well, which is why it's called a multi-layer perceptron.

A neural network in its purest form includes three layers: an input layer, a hidden layer, and an output layer. The input layer receives the input signals and passes them on to the next layer, with the output layer delivering the final prediction. These neural networks, like machine learning methods, must be taught with some training data before being used to solve a specific problem. Let's learn more about the perceptron now.

An ANN consists of multiple layers including an input layer, an output layer, and hidden layers. Some commonly used ANN are:

- Feed Forward Neural Network
- Convolution Neural Network
- Recurrent Neural Networks
- Auto-encoders.

33. What is a rational agent, and what is rationality?

A rational agent is a person or entity, based on realistic models, that has preferences for advantageous outcomes and will try to achieve them in all scenarios. A rational agent is one who has defined preferences, models uncertainty and acts in such a way that its performance measure is maximized using all available actions. The proper things are stated to be done by a reasonable agent. AI is concerned with the development of rational agents for application in game theory and decision theory in a variety of real-world contexts. The rational action is the most crucial for an AI agent because, in an AI reinforcement learning algorithm, an agent receives a positive reward for each best feasible action and a negative reward for each incorrect action.

Rationality is the ability to remain reasonable and just in all possible scenarios. The performance metric of an agent is used to determine its rationality. The following criteria can be used to assess rationality:

- The success criterion is defined by a performance metric.
- The agent has prior knowledge of its surroundings.
- The most effective activities that an agent can take.
- The order in which precepts appear.

34. What Is Game Theory?

Game theory is a branch of AI that attempts to define a strategic game with predefined rules and outcomes between two players of equal rationality. Every player is selfish and tries to maximize the reward to be obtained using a particular strategy. All the players abide by certain rules in order to receive a playoff- which is a reward. Therefore, a game can be defined as a set of players, actions, strategies, and a final reward.

Game theory and AI are related to each other and complement each other. Game theory is used in AI situations where multiple agents are in an environment trying to achieve a goal. Various games are logical and have a set of pre-decided rules like chess, poker, etc., which can be made available digitally with the help of Artificial Intelligence and Game Theory.

# Artificial Intelligence Scenario Based Question

35. If you are starting a new business, how will you use AI to promote your business?

We can use the following techniques to promote our business.

- **Sales forecasting-** Through AI, we can check what customers want and how many quantities have been sold.
- **Get customer insights-** The valuable insights gained from the costumes will be very helpful to expand your business later on.
- **Personalized customer experience-** Use AI to craft offers and suggestions for every individual. Based on the things people have searched and things that people have bought, You can create a personalized feed for your customer.
- **Marketing-** AI tools can be used to create powerful content and advertisements for your brand.
- **Customer support-** A happy customer is a loyal customer. Customer support is crucial for any business. AI-powered Chatbots can be deployed to assist customers. Speech recognition applications can get customers what they want.
- **Dynamic pricing-** It is a pricing strategy based on the factors such as demand and supply. AI can be used to monitor cookies, search history, and other activities to offer real-time pricing. The most common example of AI offering dynamic pricing is the ride-sharing apps, where the price rises when the demand for the cabs is high.

36. Suppose you know a farmer. He tells you that despite working hard in the fields, his crop yield is deteriorating. How can AI help him?

AI can assist Farmers in the following ways:
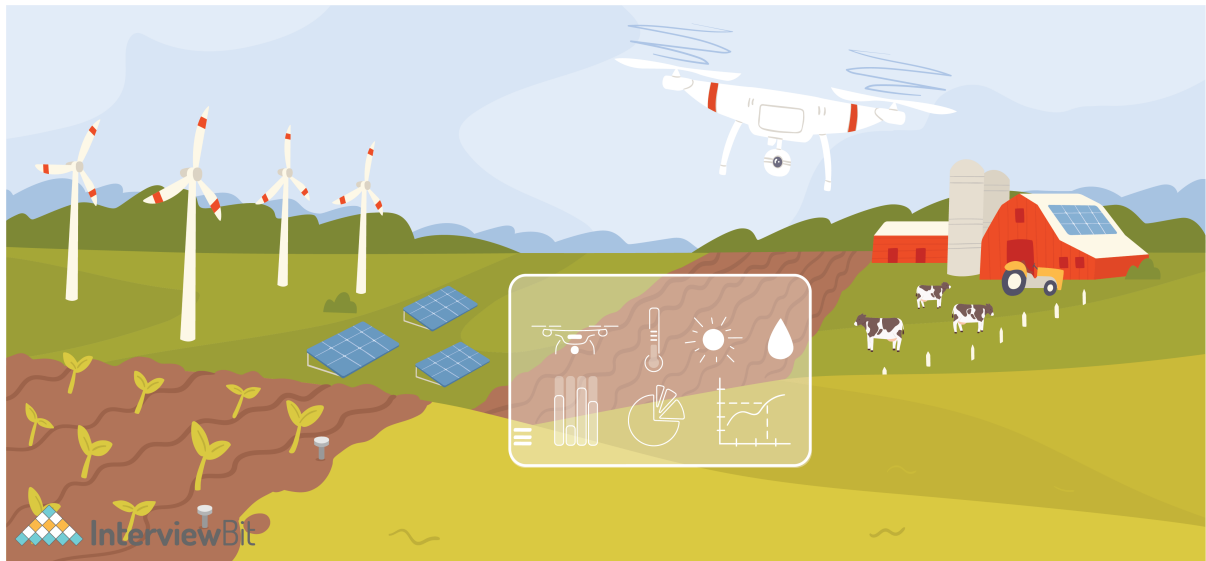
Artificial Intelligence in Farming

- **Using AI for intelligent spraying of chemicals-** Every day, farms generate hundreds of data points about temperature, soil, water use, weather, and other factors. This data is used in real-time with the use of artificial intelligence and machine learning models to derive important insights such as when to sow seeds, which crops to plant, which hybrid seeds to plant for higher yields, and so on. Precision agriculture is a term used to describe how AI systems are helping to enhance overall harvest quality and accuracy. AI technology aids in the detection of plant disease, pests, and poor agricultural nutrition. AI sensors can detect and target weeds, then determine the best herbicide to use in the area. These sophisticated AI sprayers can substantially reduce the amount of pesticides needed in the fields, improving the quality of agricultural output while also reducing costs.

- **Using AI-based robots for farm harvesting-** Many businesses are attempting to increase agricultural efficiency. Autonomous strawberry-picking machine1 and a vacuum system that can harvest mature apples from trees are examples of products. Sensor fusion, machine vision, and artificial intelligence models are used by these devices to locate harvestable produce and assist in picking the proper crops.

- **Predicting the best time to sow-** The difference between a successful harvest and a failing one is just timely information on a single data point: seed sowing timing. To tackle this, AI can use a predictive analytics technique to determine the best time to sow the seeds for optimal yield. In addition to a 7-day weather forecast, it provides information on soil health and fertilizer recommendations.

- **Crop yield prediction and price forecast-** The major concern for many farmers is the unpredictability of crop prices. Farmers are never able to design a fixed production schedule due to fluctuating pricing. This issue is particularly widespread in crops with short shelf lives, such as tomatoes. Companies are assessing land and monitoring crop health in real-time using satellite imagery and weather data. Companies can detect pest and disease infestations, estimate tomato output and yield, and forecast prices using technologies like big data, AI, and machine learning. They can guide the farmers and governments on the future price patterns, demand level, type of crop to sow for maximum benefit, pesticide usage, etc.

37. "Customers who bought this also bought this", you might have seen this when shopping on Amazon. How do you think this works?

E-commerce giant Amazon uses a concept called collaborative filtering to achieve this. Collaborative filtering is a process of comparing the users with similar shopping behavior in order to suggest products to other users with similar shopping behavior. The engine makes predictions of what might interest a user based on the preferences of other users, and all it has is data. The data it contains include users browsing history, recently ordered products, wishlisted products, etc.

For example, a sales record shows that a certain number of people who buy a phone also buy tempered glass along with them. So if next time a user buys a smartphone, he will receive a recommendation to buy a tempered glass as well.
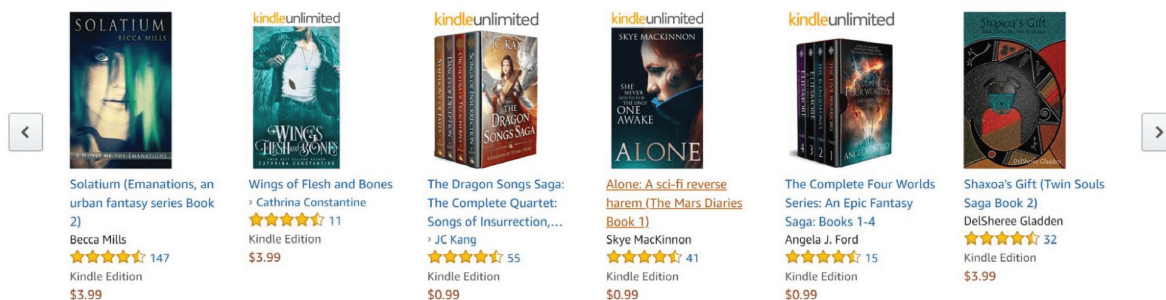
38. What is a Chatbot? How can they help to deliver the best customer support to the customers?

A chatbot is a computer program that simulates and processes human conversations. They can interact with us just like any other real person. Chatbots can be a basic program that answers a query in a single line or can be sophisticated assistants that can learn and evolve to attain an increasing level of personalization as they gather and process information.

Chatbots have now developed to a level where they can chat with a person without giving the impression that they are talking to a robot. They can work continuously 24*7 even when the customer support executives of organizations are not around. Furthermore, they can harness the power of data and can properly address the grievances of the customer. Therefore, chatbots can be deployed to deliver the best customer support and can decrease the cost of customer service of an organization considerably.

39. Suppose you have to explain to a beginner how a face detection system works. How would you do that?

Facial recognition is a technology capable of recognizing a person based on his face. In simple terms, a facial recognition algorithm works in the following ways:

- The facial detection system takes photos as input.
- The system reads your facial features. Facial features used by different systems can differ. Some facial features used by these systems to distinguish a face are- the distance between the eyes, the length of the forehead, the contour of the eye socket, the shape of nose and chin, the position of any mole, etc.
- The algorithm verifies your face. It encodes your face into a signature (a vector of information in the form of numbers). These numeric codes are also called faceprints which are analogous to Fingerprint in contact biometric systems. Each code distinguishes the individual from the rest of the training dataset. During the face detection procedure, the feature vector is then utilized to look across the whole database of enrolled people. The system then compares the signature with the database of stored images, looking for a potential match. The database contains all the information on the users who have signed up. If the software finds a match for an exact feature in the database, it displays all the information about the person.
- If any match is found, the system takes further action. For example, it can grant access to the system if the user is registered.

Facial Recognition System

Conclusion

Artificial Intelligence is the new trending guy in town with a bright future. AI influences many spheres of our lives and will continue to drive change in the computing world. I sincerely hope that this article answers the questions you were looking for.
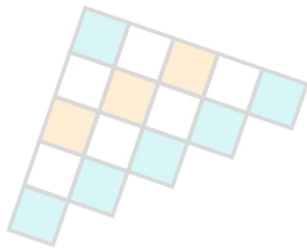
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