**Chapter 15**

**Application**

**The chapter consist of Short type Questions &Answers , Descriptive Question & Answer and MCQs & answers.**

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# Short type Questions & Answers

## Q List some applications of AI.

* Natural language processing
* Chat bots
* Sentiment analysis
* Sales Prediction
* Self-driving cars
* Facial expression recognition
* Image tagging

## Q Write Category of Applications of AI

AI is important as it can be very much helpful in solving immense difficult issues in various industries, such as entertainment, education, health, commerce, transport and utilities. AI applications can be grouped into the following five categories:

1. Reasoning: The ability to solve problems through the logical deduction is known as reasoning. For example, financial asset management, legal assessment, financial application processing, autonomous weapons systems and games.

2. Knowledge: The ability to present knowledge about the world is termed as knowledge. For example, financial market trading, purchase prediction, fraud prevention, drug creation, medical diagnosis and media recommendation.

3. Planning: The planning is the ability to set and achieve goals. For example, inventory management, demand forecasting, predictive maintenance, physical and digital network optimisation, navigation, scheduling and logistics.

4. Communication: The ability to understand spoken and written language is known as communication. For example, real-time translation of spoken and written languages, real-time transcription, intelligent assistants and voice control.

5. Perception: Perception is the ability to infer things about the world by sounds, images and other sensory inputs. For example, medical diagnosis, autonomous vehicles and surveillance

## Q What is Natural Language Processing

Natural language processing (NLP) is a subfield of AI and linguistic. It studies the problems inherent in the processing and manipulation of the natural language and natural language understanding devoted towards making computers understand statements written in the human languages

## Q What is Visual Perception

Visual perception can be defined as one of the senses, consisting of the ability to detect light and interpret (see). It is the perception known as sight or the naked eye vision. Vision has a specific sensory system and a visual system.

## Q How an Agents Communicates?

The agents mostly communicate in the following two different ways:

1. Agents who share a common internal representation language which communicates without any external language.

2. Agents who make no assumption of each other’s internal language, but they share a communication language. This language is a subset of English.

# Descriptive Question & Answer

## Q Explain AI trends in various sectors

1. Healthcare

AI and ML technology has been particularly useful in the healthcare industry because it generates massive amounts of data to train with and enables algorithms to spot patterns faster than human analysts.

* Medision developed an algorithm that detects 8 variables in diabetes patients to determine if hospitalization is required.
* An app called [BiliScreen](https://ubicomplab.cs.washington.edu/publications/biliscreen/) utilizes a smartphone camera, ML tools, and computer vision algorithms to detect increased levels of bilirubin in the sclera (white portion) of a person’s eye, which is used to screen people for pancreatic cancer. This cancer has no telltale symptoms, hence it has one of the worst prognoses of all cancers.
* [NuMedii](http://numedii.com/), a biopharma company, has developed a platform called Artificial Intelligence for Drug Discovery (AIDD), which uses big data and AI to detect the link between diseases and drugs at the systems level.
* GNS Healthcare uses ML algorithms to match patients with the most effective treatments for them.

**2. Entertainment**

A familiar application of AI in everyday life is seen with services like Netflix or Amazon, wherein ML algorithms analyze the user’s activity and compare it with that of other users to determine which shows or products to recommend. The algorithms are becoming intelligent with time—to the extent of understanding that a user may want to buy a product as a gift and not for himself/herself, or that different family members have different watching preferences.

3. Finance

* Financial services companies use AI-based natural language processing tools to [analyze brand sentiment](https://link.springer.com/article/10.1007/s00146-014-0549-4) from social media platforms and provide actionable advice.
* Investment companies like [Aidya](http://fortune.com/2015/12/07/dataminr-hedge-funds-twitter-data/) and [Nomura Securities](https://asia.nikkei.com/Markets/Equities/Securities-houses-turn-to-AI-for-high-frequency-trading) use AI algorithms to conduct trading autonomously and robo-traders to conduct high-frequency trading for greater profits, respectively.
* Fintech firms like [Kensho](https://www.forbes.com/sites/antoinegara/2017/02/28/kensho-sp-500-million-valuation-jpmorgan-morgan-stanley/#2db079a05cbf) and ForwardLane use AI-powered B2C robo-advisors to augment rebalancing decisions and portfolio management performed by human analysts. Wealthfront uses AI algorithms to track account activity and help financial advisors customize their advice.
* Chatbots, powered by natural language processing, can serve banking customers quickly and efficiently by answering common queries and providing information promptly.
* Fraud detection is an important application of AI in financial services. For example, Mastercard uses [Decision Intelligence technology](http://www.businessinsider.com/mastercard-artificial-intelligence-fraud-protection-2017-1?IR=T) to analyze various data points to detect fraudulent transactions, improve real-time approval accuracy, and reduce false declines.

4. Data security

[Cyber attacks](https://www.hackerearth.com/recruit/resources/e-books/the-role-of-hr-in-managing-cybersecurity/) are becoming a growing reality with the move to a digital world. There are also concerns about AI programs themselves turning against systems.

* [Automatic exploit generation](http://security.ece.cmu.edu/aeg/aeg-current.pdf) (AEG) is a bot that can determine whether a software bug, which may cause security issues, is exploitable. If a vulnerability is found, the bot automatically secures it. AEG systems help develop automated signature generation algorithms that can predict the likelihood of cyberattacks.

5. Manufacturing

* [Landing.ai](https://medium.com/syncedreview/andrew-ng-announces-landing-ai-bringing-ai-to-manufacturing-fd9ef8e1ebd0) claims to have created machine-vision tools to find microscopic defects in objects like circuit boards using an ML algorithm trained using tiny volumes of sample images. In the future, self-driving robots may be created which can move finished goods around without endangering anyone or anything around.
* AI tools help in **predicting malfunctions and breakdown of equipment** and taking or recommending preemptive actions as well as tracking operating conditions and performance of factory tooling.

6. Automotive industry

* Tesla introduced Teslabot an intelligent virtual assistant integrated with Tesla models S and X, allows users to interact with their car from their phone or desktop.
* Uber AI Labs is working on developing self-driven cars with the help of the best engineers and scientists. Uber has already tested a batch of self-driving cars in 2016.

## Q Explain Robotics and its basic concept

The robots of the movies such as C-3PO and the Terminator are portrayed as fantastic intelligent, even dangerous form of artificial life however robots of today are not exactly the walkie-talkie intelligent machine of movies, stories and our dreams. today we find most robots working for people in factories warehouses in the Laboratories. in the future robots may show up in other places: schools, homes even our bodies.

Robot have the potential to change our economy, our health, our standard of living, our knowledge and the world which we live. as a technology progresses, we are finding new ways to use robots. each new use brings new hope and possibilities, but also potential dangers and risks.

**What is a robot?**

Joseph Engelberger, a Pioneer in industrial robotics, once remarked " I can't Define robot, but I know one when I see one" if you consider all different machines people called robot, you can see that it's nearly impossible to come up with a comprehensive definition.

In Practical usage, robot is an autonomous or say about semi-autonomous device which performs it's task either by direct human control, partial control with human supervision, are completely autonomously. robots are typically used to do task that are too dull, dirty or dangerous for humans. industrial robots used in manufacturing line used to be the most common form of robots,

but that has recently been replaced by Consumer Reports cleaning floors and moving lawns. other applications include toxic waste cleanup, underwater and space exploration, surgery mining search and rescue, and mine finding. robots are also finding their way into entertainment and Home Health Care.

Examples:

* R2D2 and C-3PO: The intelligent, speaking robots with loads of personality in the Star Wars movies.
* Sony’s AIBO: A robotic dog who learns through human interaction
* Honda’s ASIMO: A robot that can walk on two legs like a person
* Industrial robots: Automated machines that work on Assembly lines
* Bomb-defusing robots
* NASA’s Mars rovers
* The lawn-mowing robots from friendly robotics

**Robotic basics**

Most robots are designed to be helping hand. They help people with tasks that would be difficult, unsafe or boring for a real person to do alone.

As its simplest, a robot is a machine that can be programmed to perform variety of jobs, which usually involve moving or handling objects. Robots cane range from simple machines to highly complex, computer-controlled devices.

Many of today’s robot are robotic arms. In this exhibit, we will focus on one very “flexible” kind of robot, which looks similar to a certain part of your body. It is called jointed arm robot. The vast majority of robots do have several qualities in common. First of all, almost all robots have moveable body. Some only have motorized wheels, and others have dozens of moveable segments, typically made up of metal or plastic. Like the bones in your body, the individual segments are connected together with joints.

Robots spin wheels and pivot jointed segments with some sort of actuator. Some robots use electric motors and solenoids as actuators; some use a hydraulic system and some use a pneumatic system(a system driven by compressed gases). Robots may use all these actuators types. A robot needs a power source to drive these actuators. Most robots either have a battery or they plug into the wall. Hydraulic robots also need a pump to pressurize the hydraulic fluid, and pneumatic robots need an air compressor or compressed air tanks.

The actuators are all wired to an electric circuit. The circuit powers electrical motors and solenoids directly, and it activates the hydraulic system by manipulating electrical valves. The valves determine the pressurized fluid’s path through the machine. To move a hydraulic leg, for example, the robot’s controller would open the value leading from the fluid pump to a piston cylinder attached to that leg. The pressurized fluid would extend the piston, swiveling the leg forward. Typically, in order to move their segments in two directions, robots use piston that can push both ways.

The robot’s computer control everything attached to the circuit. To move the robot, the computer switches on all the necessary motors and valves. Most robots are reprogrammable- to change the robot’s behavior, you simply write a new program to its computer.

Not all robots have sensory systems, and few have ability to see, hear, smell or taste. The most common robot sense is the sense of movement- the robot’s ability to monitor its own motion. A standard design uses slotted wheels attached to robot’s joints. An LED on one side of the wheel shines a beam of light through the slots to a light sensor on the other side of the wheel. When the robot moves particular joint, the slotted wheels turns. The slot break the light beam as the wheel spins. The light sensor reads the pattern of the flashing light and transmits the data to the computer. The computer can tell exactly how far the joint has swiveled based on this pattern. This is same basic system used in computer mice.

These are basic nuts and bolts of robotics. Roboticists can combine these elements in an infinite number of ways to create robots of unlimited complexity.

## Q What is Natural Language Processing. Explain

Natural language processing (NLP) is a subfield of artificial intelligence and linguistic. It studies the problems inherent in the processing and manipulation off natural language, natural language understanding devoted to making computers understand statements written in human languages.

  Early system such as SHRDLU working in restricted “Blocksworld” with restricted vocabularies, worked extremely well leading researchers 2 excessive optimism which was soon] lost when the system were extended to more realistic situations with real world ambiguity and complexity.

Natural language understanding is sometimes referred to as an AI complete problem, because natural language recognition seems to require extensive knowledge about the outside world and the ability to manipulate it. The definition of understanding is one of the major problems in natural language processing.

Some examples off the problem faced by natural language understanding systems:

The sentences we give the monkeys go bananas because they were hungry and we gave the Monkeys the bananas they were over ripe have the same surface grammatical structure. however in one of them the word they refers to the Monkeys, in the other it refers to the bananas: the sentence cannot be understood properly without knowledge of the properties end behavior of monkeys and bananas

a string of words may be interpreted in myriad ways. for example, the string time flies like an arrow may be interpreted in a variety of ways:

* Time moves quickly just like an arrow does.
* Measure the speed of flying insects like you would measure thatof an arrow;
* Measure the speed of flying insects like an arrow wood
* Measure the speed of flying insect like the arrows
* A type of flying insect, “time-flies” enjoy arrows(compare fruit flies like a banana)

The word time alone can be interpreted as three different parts of speech, noun in De bus example, verb in in two, three, four, and adjectives in 5

English is particularly challenging in this regard because it has little inflectional morphology to distinguish between parts of speech.

The major task in NLP:

* Text to speech
* Natural language generation
* Question answering
* Information extraction
* Translation technology
* Speech recognition
* Machine translation
* Information retrieval
* Text roofing
* Automatic summarization

## Q Write a short note on Applications of AI

AI has been dominant in various fields such as −

* Gaming − AI plays crucial role in strategic games such as chess, poker, tic-tac-toe, etc., where machine can think of large number of possible positions based on heuristic knowledge.
* Natural Language Processing − It is possible to interact with the computer that understands natural language spoken by humans.
* Expert Systems − There are some applications which integrate machine, software, and special information to impart reasoning and advising. They provide explanation and advice to the users.
* Vision Systems − These systems understand, interpret, and comprehend visual input on the computer. For example,
  + A spying aeroplane takes photographs, which are used to figure out spatial information or map of the areas.
  + Doctors use clinical expert system to diagnose the patient.
  + Police use computer software that can recognize the face of criminal with the stored portrait made by forensic artist.
* Speech Recognition − Some intelligent systems are capable of hearing and comprehending the language in terms of sentences and their meanings while a human talks to it. It can handle different accents, slang words, noise in the background, change in human’s noise due to cold, etc.
* Handwriting Recognition − The handwriting recognition software reads the text written on paper by a pen or on screen by a stylus. It can recognize the shapes of the letters and convert it into editable text.
* Intelligent Robots − Robots are able to perform the tasks given by a human. They have sensors to detect physical data from the real world such as light, heat, temperature, movement, sound, bump, and pressure. They have efficient processors, multiple sensors and huge memory, to exhibit intelligence. In addition, they are capable of learning from their mistakes and they can adapt to the new environment.

# MCQs & answers

**1.** What was originally called the “imitation game” by its creator?

(a) The Turing test

(b) LISP

(c) The logic theorist

(d) Cybernetics

(e) None of the above

**2.** Decision support programs are designed to help managers make:

(a) Budget projections

(b) Visual presentations

(c) Business decisions

(d) Vacation schedules

(e) None of the above

**3.** If a robot can alter its own trajectory in response to external conditions, it is considered be:

(a) Intelligent

(b) Mobile

(c) Open loop

(d) Nonservo

(e) None of the above

4. Artificial Intelligence has its expansion in the following application.

(a) Planning and Scheduling

(b) Game Playing

(c) Robotics

(d) All of the above

5. The characteristics of the computer system capable of thinking, reasoning and learning is known as

(a) machine intelligence

(b) human intelligence

(c) artificial intelligence

(d) virtual intelligence

6. The first widely-used commercial form of Artificial Intelligence (Al) is being used in many popular products like microwave ovens, automobiles and plug in circuit boards for desktop PCs. It allows machines to handle vague information with a deftness that mimics human intuition. What is the name of this AI?

(a) Boolean logic

(b) Human logic

(c) Fuzzy logic

(d) Functional logic

7. What is the term used for describing the judgmental or commonsense part of problem solving?

(a) Heuristic

(b) Critical

(c) Value based

(d) Analytical

8. Which kind of planning consists of successive representations of different levels of a plan?

(a) hierarchical planning

(b) non-hierarchical planning

(c) project planning

(d) All of the above

**Answers**

**1. (a) 2. (c) 3. (a) 4. (d) 5. (c) 6. (c) 7. (a) 8. (a)**