9 More on AI

Learning Outcomes

- Types of Artificial Intelligence
- Artificial Narrow Intelligence (ANI)
- Artificial General Intelligence (AGI)
- Domains of Artificial Intelligence
- Computer Vision
- Data Analyzing
- Natural Language Processing

Artificial intelligence can be defined as the ability of computer systems that is **hardware and software**, to do tasks that normally require human beings to use Intelligence. This definition describes the commonly accepted definition of Artificial Intelligence. Almost all of the year scientist will agree with it. But this definition leaves out the definition of the term intelligence, which causes a difference of opinion in the field. For understanding this we have to understand the usage and meaning of the term human intelligence.

Language recognition system, smart navigation system, etc all fall under the term intelligent systems or Artificial Intelligence.

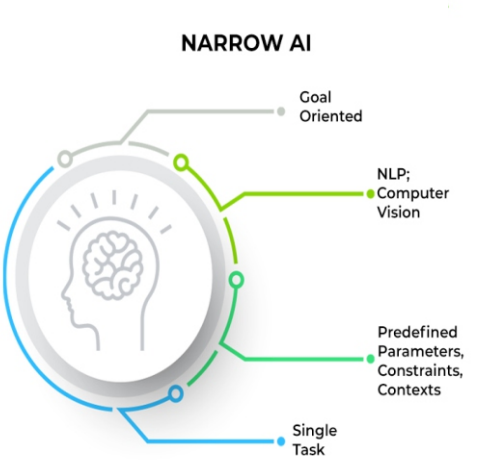
Types of Artificial Intelligence

There are two types of Artificial Intelligence.

1. Artificial Narrow Intelligence (ANI)
2. Artificial General Intelligence (AGI)

Artificial Narrow Intelligence (ANI)

An existing type of AI which is capable of performing simple tasks required basic intelligence. The intelligence of these systems is narrow in the sense that they are not capable of performing one task, but in many cases, they can perform this one task better than human beings.



For example, Google and Alexa can recognize and speak multiple languages. The number of languages spoken and understood by these systems are more than what human can speak and understand. However Google and Alexa cannot drive vehicles, but in the future they might be able to communicate with the AI, which is capable of driving vehicles.

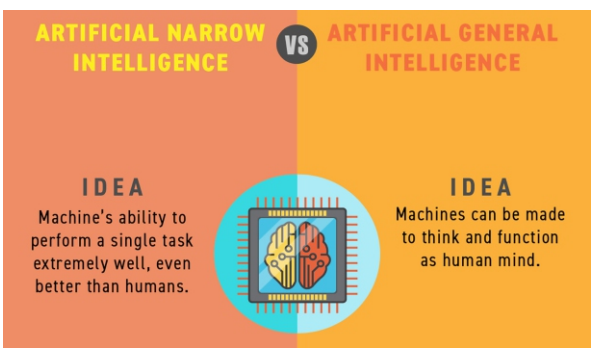
What can Artificial Narrow Intelligence do?

Artificial narrow intelligence is capable of undertaking a number of actions which includes the following:

- Processing videos for understanding them. for example, recognizing when an intruder enters a house or when small children are in danger in the house.
- Performing but routine of everyday task which might requires some limited decisions making. For example, ordering milk, switching off the power in empty room, switching on air condition when needed.
- Performing simple tasks done by secretaries. For example taking decision , scheduling appointment, taking minutes of meeting, reading emails, etc.
- Performing task that requires processing data. For example assisting doctors in diagnosing diseases based on symptoms.

Artificial General Intelligence (AGI)

Artificial general intelligence refers to the science fiction ideas of artificial intelligence, that is the computer systems, which are at least as intelligent as human beings, if not more. These systems can be capable of learning and developing themselves. They will not be limited by the task which can perform. These systems are in the research stage, and much breakthrough has not been made regarding them.



Weak versus Strong Artificial Intelligence

Artificial intelligence systems can also be classified into strong AI and weak AI systems.

- **Weak AI:** It is the intelligence that mimic intelligence but does not process it or in other words, acts intelligently without having any intelligence. All of the AI systems in existence today fall under this category. for example, a self driving car might recognize that it is raining, but it will not understand what rain is. AI smart home security system can recognize intruders without understanding what intruder is.
- **Strong AI:** It's strong AI systems are theoretical systems that actually process intelligence. These systems currently are in the research stage.

Limitations of Artificial Intelligence

The development in the field of artificial intelligence have been truly tremendous. Today, artificial intelligence has made it possible for humans to do things that were unimaginable a decade ago.

Yet till date, we have being unable to create AI systems to function in the open ended world. All of our existing AI systems are narrow or weak AI's, which are more or less closed system, that is these are capable of only limited interactions with the world. The following info graphic will help us in better understanding these limitations…

What AI system can do?

- Recognizing faces in Images and Videos.
- Increasing automation of Vehicles.
- Making simple machine translations.
- Helping in decision making.
- Converting thousands of his spoken words into text.
- Categorizing text, videos and images.
- Beating best of the human players in the strategy games.

What AI system cannot do?

- Learn a natural language.
- Reading and understanding articles and books.
- Understanding the implications of decisions.
- Interpreting visual scenes.
- Exhibiting autonomy, and Intelligence.

Domains of Artificial Intelligence

Artificial intelligence is generally divided into three separate domains…

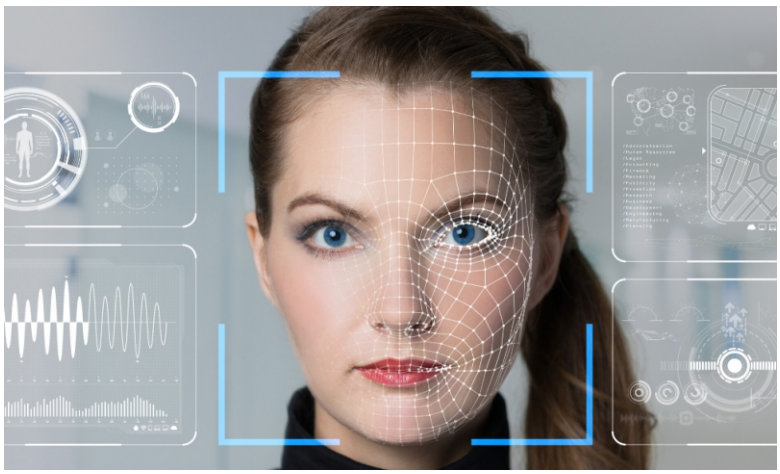
- Data Analysis **(DA)**
- Computer vision **(CV)**
- Natural Language Processing **(NLP)**

Data Analysis

Every Artificial Intelligence System irrespective of its function, nature or capabilities is heavily dependent on data for its functioning or in other words data is act the core of every AI system. Both of the other AI domains also need data for their functioning. Data is also at the core of General AI systems, as the systems will have the capabilities of processing data for learning and growing.

Data for artificial intelligence systems mean **data** that is relevant for the AI system in question. For example as AI based automatic student attendance system for school will not be helped by the data of images of world leaders. Different **type of data** serves different purposes in AI systems.

Computer Vision



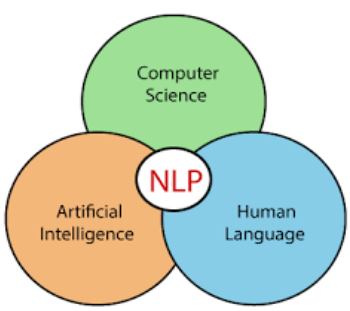
This domain of artificial intelligence is working towards the development of AI systems, which will be able to perceive the human words as human beings do. There has been sustainable development in this domain, and this technology is currently being used in number of AI based systems.

Uses of Computer Vision

- **Face recognition:** Identify faces in images and videos.
  - Application like Google Photos, Snapchat etc.
  - Social media networks like Facebook, Instagram etc.
  - Law enforcement agencies like Interpol, FBI.
- **Content based Image Retrival (CBIR)**: Identifying images based on their composition, color, texture etc.
  - Search engine like Google and Bing.
  - Medical image database of CT scan, MRI, etc.
  - Scientific database like earth sciences.
- **Smart Interaction**: One more way to provide input to the computer systems.
  - Gaming systems like Microsoft Kinect.
  - Games like Emoji Scavenger hunt.
  - Systems for differently abled individuals.
- **Environment Perception:** Analyzing videos, images or videos feeds for identifying patterns and perceiving environment.
  - Law and enforcement agencies for identifying illegal and suspicious behavior.
  - Home security systems
  - Office security systems
  - Drone based surveillance systems
  - Smart vehicles

Natural Language Processing

This domain of EA is working towards creation of artificial intelligence systems which will be capable of communicating with human beings using natural language rather than by syntax or by identification of keywords.



This domain is working for development of both oral and spoken language.

Components of NLP

Natural language processing contains 2 main components..

- **Natural Language Understanding NLU..** for understanding spoken or written language which includes..
  - Establishing linkage with natural language inputs and what they represent.
  - Analyzing different aspects of language.
- **Natural Language Generation NLG..** for producing meaningful phrases and sentences in the form of natural language which involves..
  - **Text planning:** Retrieving relevant text from the data stores.
  - **Sentence planning:** Deciding on the correct Words, linking them into meaningful phrases, etc.
  - **Text realisation:** Combining phrases and words for forming sentences.

For AI systems, NLU is much more complicated than NLG. Interestingly , human being find NLU easier than NLG..

Quick Look

- Artificial intelligence can be defined as the ability of computer systems that is hardware and software, to do tasks that normally require human beings to use Intelligence.
- The number of languages spoken and understood by these systems are more than what human can speak and understand.
- Artificial general intelligence refers to the science fiction ideas of Artificial Intelligence.
- Weak AI is the intelligence that mimic intelligence but does not process it or in other words, acts intelligently without having any intelligence.
- Strong AI is strong AI systems are theoretical systems that actually process intelligence.
- Data is also at the core of General AI systems, as the systems will have the capabilities of processing data for learning and growing.
- Computer Vision is will be able to perceive the human words as human beings do.
- NLP is be capable of communicating with human beings using natural language rather than by syntax or by identification of keywords.

Brain Booster

Section - I

Objective Type Questions

A. Fill in the blanks with the correct words.

Artificial Narrow Intelligence Artificial General Intelligence Three
A Neutral Network Deep Learning

1. _____is capable of undertaking a number of actions like Processing videos for understanding them etc.
2. _____refers to the science fiction ideas of artificial intelligence.
3. Artificial intelligence is generally understood in _____major domains.
4. A _____is a computer system designed to function like the human brain.
5. An _____function of artificial intelligence that imitates the human brain by learning from the way data is structured.

B. Write T for the true statement and F for the false one:

1. Natural language processing contains 3 main components.
2. Natural language understanding (NLU) is a subset of natural language processing.
3. The machine translation of text by an algorithm, independent of any Human involvement.
4. Artificial intelligence is generally understood in two major domains.
5. Artificial narrow intelligence is an example of Google now and Alexa.

C. Choose the right option:

1. Artificial intelligence systems can also be classified into

   a. Strong AI and Weak AI systems. b. Only Strong AI

   c. Only weak d. None of these

2. _____is an example for Computer Vision.

a. Alexa
b. Face recognition
c. Speech recognition
d. None of These

3. Natural language processing contains_____.

a. Only Natural language understanding NLU
b. Only Natural language generation NLG.
c. a) and b) both
d. None of These

4. Major domais of AI.

a. Computer Vision
b. NLP
c. Data Analytics
d. All of Them

5. How many types of Artificial Intelligence?

a. 1
b. 2
c. 3
d. 4

D. Application Based Questions:

1. How can we co-exist with machines that inherently lack human values.

_____

2. Which AI technologies we uses while taking to Alexa? Write more examples of this technologies..

_____

Section - II

▶ Descriptive Type Questions:

E. Answer the following question.

1. Write two differences between Weak versus Strong Artificial Intelligence?

_____

_____

_____

2. Write three major differences between ANI and AGI.

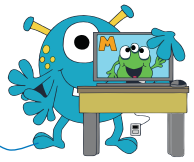
3. Write three domains of AI?

4. Write the components of NLP?

5. Write the uses of Computer Vision?

LAB ACTIVITY

Practice Makes Perfect



AI GAME - AI DUET (Based On Data)

This is an AI Experiment in which the computer plays the piano with you. There is no need to have knowledge about playing piano.

REQUIREMENTS:

- Any Computing Device
- Internet Connection
- Speaker

Using AI DUET :

Go to http://experiment.withgoogle.com/ai/ai-duet/view/

Step 1: Click on PLAY Button.

Step 2: Press some keys. The keys can be pressed using the mouse or keyboard. The blue bars present the keys pressed by you.

Step 3: The AI system will start responding to the keys played by you.

GROUP DISCUSSION

For Better Clarity

Divide the class into two groups and conduct debates on the following topics:

- Will artificial intelligence surpass human intelligence?
- Alexa is an example of ANI or AGI.

PROJECT

For Practising More

- Make a presentation on Binary Number System. Set a beautiful background, apply nice formatting and add animation effects to it.

ONLINE LINKS

For Searching More

- http://www.https://teachablemachine.withgoogle.com/
- http://www.https://experiments.withgoogle.com/collection/ai