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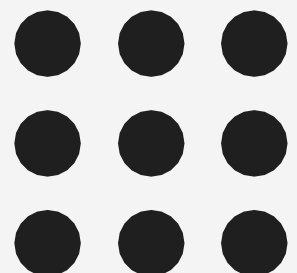
Department of Artificial Intelligence and

Data Science

Course Name – Introduction to Artificial Intelligence

II Year / III Semester

Unit 1 INTRODUCTION





What Is Artificial Intelligence?

Artificial Intelligence is a method of making a computer, a computer-controlled robot, or a software think intelligently like the human mind. AI is accomplished by studying the patterns of the human brain and by analyzing the cognitive process. The outcome of these studies develops intelligent software and systems.

A Brief History of Artificial Intelligence

Here's a brief timeline of the past six decades of how AI evolved from its inception.

1956 - John McCarthy coined the term 'artificial intelligence' and had the first AI conference.

1969 - Shakey was the first general-purpose mobile robot built. It is now able to do things with a purpose vs. just a list of instructions.

1997 - Supercomputer 'Deep Blue' was designed, and it defeated the world champion chess player in a match. It was a massive milestone by IBM to create this large computer.

2002 - The first commercially successful robotic vacuum cleaner was created.

2005 - 2019 - Today, we have speech recognition, robotic process automation (RPA), a dancing robot, smart homes, and other innovations make their debut.

2020 - Baidu releases the LinearFold AI algorithm to medical and scientific and medical teams developing a vaccine during the early stages of the SARS-CoV-2 (COVID-19) pandemic. The algorithm can predict the RNA sequence of the virus in only 27 seconds, which is 120 times faster than other methods.



Types of Artificial Intelligence

Below are the various types of AI:

1. Purely Reactive

These machines do not have any memory or data to work with, specializing in just one field of work. For example, in a chess game, the machine observes the moves and makes the best possible decision to win.

2. Limited Memory

These machines collect previous data and continue adding it to their memory. They have enough memory or experience to make proper decisions, but memory is minimal. For example, this machine can suggest a restaurant based on the location data that has been gathered.

3. Theory of Mind

This kind of AI can understand thoughts and emotions, as well as interact socially. However, a machine based on this type is yet to be built.

4. Self-Aware

Self-aware machines are the future generation of these new technologies. They will be intelligent, sentient, and conscious.



How Does Artificial Intelligence Work?

Put simply, AI systems work by merging large with intelligent, iterative processing algorithms. This combination allows AI to learn from patterns and features in the analyzed data. Each time an Artificial Intelligence system performs a round of data processing, it tests and measures its performance and uses the results to develop additional expertise.

Ways of Implementing AI

Let's explore the following ways that explain how we can implement AI:

Machine Learning

It is machine learning that gives AI the ability to learn. This is done by using algorithms to discover patterns and generate insights from the data they are exposed to.

Deep Learning

Deep learning, which is a subcategory of machine learning, provides AI with the ability to mimic a human brain's neural network. It can make sense of patterns, noise, and sources of confusion in the data.

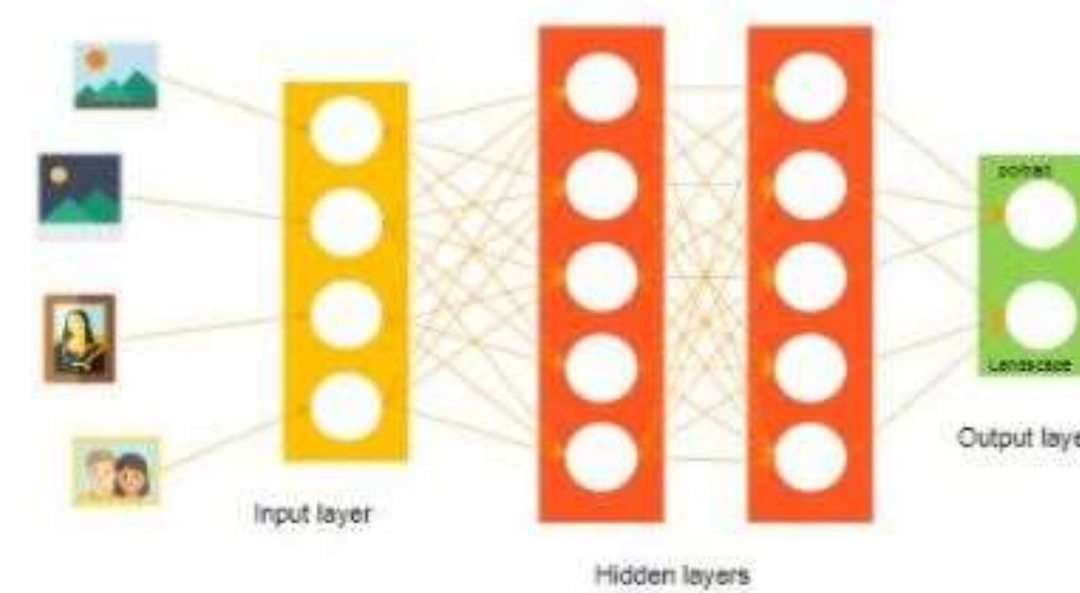
Let us understand how deep learning works.

Consider an image shown :

The image depicts the three main layers

of a neural network:

- Input Layer
- Hidden Layer
- Output Layer



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Input Layer

The images that we want to segregate go into the input layer. Arrows are drawn from the image on to the individual dots of the input layer. Each of the white dots in the yellow layer (input layer) are a pixel in the picture. These images fill the white dots in the input layer.

We should have a clear idea of these three layers while going through this artificial intelligence tutorial.

Hidden Layer

The hidden layers are responsible for all the mathematical computations or feature extraction on our inputs. In the above image, the layers shown in orange represent the hidden layers.

The lines that are seen between these layers are called ‘weights’. Each one of them usually represents a float number, or a decimal number, which is multiplied by the value in the input layer. All the weights add up in the hidden layer. The dots in the hidden layer represent a value based on the sum of the weights. These values are then passed to the next hidden layer.

Output Layer:

The output layer gives us segregated photos. Once the layer adds up all these weights being fed in, it'll determine if the picture is a portrait or a landscape.

Example - Predicting Airfare Costs

This prediction is based on various factors, including:

- Airline
- Origin airport
- Destination airport
- Departure date



We begin with some historical data on ticket prices to train the machine. Once our machine is trained, we share new data that will predict the costs. Earlier, when we learned about four kinds of machines, we discussed machines with memory. Here, we talk about the memory only, and how it understands a pattern in the data and uses it to make predictions for the new prices as shown.

AI Programming Cognitive Skills: Learning, Reasoning and Self-Correction

Artificial Intelligence emphasizes three cognitive skills of learning, reasoning, and self-correction, skills that the human brain possess to one degree or another. We define these in the context of AI as:

- Learning: The acquisition of information and the rules needed to use that information.
- Reasoning: Using the information rules to reach definite or approximate conclusions.
- Self-Correction: The process of continually fine-tuning AI algorithms and ensure that they offer the most accurate results they can.

However, researchers and programmers have extended and elaborated the goals of AI to the following:

Logical Reasoning

AI programs enable computers to perform sophisticated tasks. On February 10, 1996, IBM's Deep Blue computer won a game of chess against a former world champion, Garry Kasparov.

Knowledge Representation

Smalltalk is an object-oriented, dynamically typed, reflective programming language that was created to underpin the “new world” of computing exemplified by “human-computer symbiosis.”

Planning and Navigation

The process of enabling a computer to get from point A to point B. A prime example of this is Google's self-driving Toyota Prius.

Natural Language Processing

Set up computers that can understand and process language.

Perception

Use computers to interact with the world through sight, hearing, touch, and smell.

Emergent Intelligence

Intelligence that is not explicitly programmed, but emerges from the rest of the specific AI features. The vision for this goal is to have machines exhibit emotional intelligence and moral reasoning.



Artificial intelligence has its pluses and minuses, much like any other concept or innovation. Here's a quick rundown of some pros and cons.

Pros

- It reduces human error
- It never sleeps, so it's available 24x7
- It never gets bored, so it easily handles repetitive tasks
- It's fast

Cons

- It's costly to implement
- It can't duplicate human creativity
- It will definitely replace some jobs, leading to unemployment
- People can become overly reliant on it