**Unit 1- Overview of AI**

Artificial intelligence (AI) is the capability of a computer to imitate intelligent human behavior. Through AI, machines can analyze images, comprehend speech, interact in natural ways, and make predictions using data.

The below are four ways in which you may understand Artificial intelligence.



**History of AI-** <https://sitn.hms.harvard.edu/flash/2017/history-artificial-intelligence/>

<https://www.livescience.com/47544-history-of-a-i-artificial-intelligence-infographic.html>

Alan Turing, a young British mathematician worked on possibility of artificial intelligence. Turing suggested that humans use available information as well as reason in order to solve problems and make decisions, so why can’t machines do the same thing? This was the logical framework of his 1950 paper, [**Computing Machinery and Intelligence**](https://www.csee.umbc.edu/courses/471/papers/turing.pdf) in which he discussed how to build intelligent machines and how to test their intelligence.

Five years later, the proof of concept was initialized through Allen Newell, Cliff Shaw, and Herbert Simon’s, [**Logic Theorist**](https://history-computer.com/ModernComputer/Software/LogicTheorist.html). The Logic Theorist was a program designed to mimic the problem solving skills of a human and was funded by Research and Development (RAND) Corporation. It’s considered by many to be the first artificial intelligence program and was presented at the [**Dartmouth Summer Research Project on Artificial Intelligence**](https://aaai.org/ojs/index.php/aimagazine/article/view/1911/1809) (DSRPAI) in 1956.

From 1957 to 1974, AI flourished. Computers could store more information and became faster, cheaper, and more accessible. Machine learning algorithms also improved and people got better at knowing which algorithm to apply to their problem. Early demonstrations such as Newell and Simon’s General Problem Solver and Joseph Weizenbaum’s [**ELIZA**](http://www.alicebot.org/articles/wallace/eliza.html) showed promise toward the goals of problem solving and the interpretation of spoken language respectively.

In the 1980’s, AI was reignited by two sources: an expansion of the algorithmic toolkit, and a boost of funds. John Hopfield and David Rumelhart popularized “deep learning” techniques which allowed computers to learn using experience. On the other hand Edward Feigenbaum introduced [**expert systems**](https://saltworks.stanford.edu/assets/vf069sz9374.pdf) which mimicked the decision making process of a human expert.

We haven’t gotten any smarter about how we are coding artificial intelligence, so what changed? It turns out, the fundamental limit of computer storage that was holding us back 30 years ago was no longer a problem. [**Moore’s Law**](https://www.investopedia.com/terms/m/mooreslaw.asp)[**,**](http://www.investopedia.com/terms/m/mooreslaw.asp) which estimates that the memory and speed of computers doubles every year, had finally caught up and in many cases, surpassed our needs. This is precisely how Deep Blue was able to defeat Gary Kasparov in 1997, and how Google’s [**Alpha Go**](http://www.bbc.com/news/technology-40042581) was able to defeat Chinese Go champion.

We now live in the age of “[**big data**](http://sloanreview.mit.edu/article/how-big-data-is-empowering-ai-and-machine-learning-at-scale/),” an age in which we have the capacity to collect huge sums of information too cumbersome for a person to process. Today AI is practically everywhere.

**Other Emerging Technologies**

* Internet of Things- The Internet of things (IoT) describes the network of physical objects—“things”—that are embedded with sensors, software, and other technologies for the purpose of connecting and exchanging data with other devices and systems over the Internet.
* Data Science- Data science is an inter-disciplinary field that uses scientific methods, processes, algorithms and systems to extract knowledge and insights from many structural and unstructured data.
* Blockchain- A blockchain is a growing list of records called blocks which are interconnected by utilizing cryptography.
* AR & VR- AR a technology that superimposes a computer-generated image on a user's view of the real world, thus providing a composite view. Virtual reality (VR), the use of computer modeling and simulation that enables a person to interact with an artificial three-dimensional (3-D) visual or other sensory environment.
* 5G-  fifth generation technology standard for broadband cellular networks, which cellular phone companies began deploying worldwide in 2019, and is the planned successor to the 4G networks which provide connectivity to most current cellphones.
* Cloud- Simply put, **cloud** computing is the delivery of computing services—including servers, storage, databases, networking, software, analytics, and intelligence—over the Internet (“the **cloud**”) to offer faster innovation, flexible resources, and economies of scale
* Quantum Computing -  use of quantum phenomena such as superposition and entanglement to perform computation. Computers that perform quantum computations are known as quantum computers

**Responsible AI**

An Artificial System should be responsible, i.e. should have the below traits

* Fairness- AI systems should treat all people fairly
* Reliability & Safety -AI systems should perform reliably and safely
* Privacy & Security -AI systems should be secure and respect privacy
* Inclusiveness -AI systems should empower everyone and engage people
* Transparency - AI systems should be understandable
* Accountability- People should be accountable for AI systems

**Unit 5- Application of AI**

**Computer vision** is a field of artificial intelligence that trains computers to interpret and understand the visual world. Using digital images from cameras and videos and deep learning models, machines can accurately identify and classify objects — and then react to what they “see.”

**Image recognition** is a computer vision technique that allows machines to interpret and categorize what they “see” in **images** or videos. Often referred to as “**image classification**” or “**image** labeling”, this core task is a foundational component in solving many computer vision-based machine learning problems.

Face recognition is a method of identifying or verifying the identity of an individual using their face. Face recognition systems can be used to identify people in photos, video, or in real-time. A facial **recognition** system uses biometrics to map facial features from a photograph or video. It compares the information with a database of known **faces** to find a match

**Object detection** is a **computer vision** technique that allows us to identify and locate **objects** in an image or video. **Object detection** allows us to at once classify the types of things found while also locating instances of them within the image.

**Speech recognition** is an interdisciplinary subfield of computer science and computational linguistics that develops methodologies and technologies that enable the recognition and translation of spoken language into text by computers. Artificial Intelligence is being used extensively in Speech recognition.

**Biometric recognition** (also known as biometrics) refers to the automated **recognition** of individuals based on their biological and behavioral traits. Examples of **biometric** traits include fingerprint, face, iris, palmprint, retina, hand geometry, voice, signature and gait.

A robot is a machine—especially one programmable by a computer— capable of carrying out a complex series of actions automatically. Robots can be guided by an external control device or the control may be embedded within

<https://www.simplilearn.com/tutorials/artificial-intelligence-tutorial/artificial-intelligence-applications>

<https://www.edureka.co/blog/artificial-intelligence-applications/>

Artificial Intelligence Applications

1. AI in E-Commerce

Personalized Shopping

Artificial Intelligence technology is used to create recommendation engines through which you can engage better with your customers. These recommendations are made in accordance with their browsing history, preference, and interests. It helps in improving your relationship with your customers and their loyalty towards your brand.

AI-powered Assistants

Virtual shopping assistants and chatbots help improve the user experience while shopping online. Natural Language Processing is used to make the conversation sound as human and personal as possible. Moreover, these assistants can have real-time engagement with your customers. Did you know that on amazon.com, soon, customer service could be handled by chatbots?

Fraud Prevention

Credit card frauds and fake reviews are two of the most significant issues that E-Commerce companies deal with. By considering the usage patterns, AI can help reduce the possibility of credit card frauds taking place. Many customers prefer to buy a product or service based on customer reviews. AI can help identify and handle fake reviews.

2. AI in Navigation

Based on research from MIT, GPS technology can provide users with accurate, timely, and detailed information to improve safety. The technology uses a combination of Convolutional Neural Network and Graph Neural Network, which makes lives easier for users by automatically detecting the number of lanes and road types behind obstructions on the roads. AI is heavily used by Uber and many logistics companies to improve operational efficiency, analyze road traffic, and optimize routes.

3. AI in Robotics

Robotics is another field where artificial intelligence applications are commonly used. Robots powered by AI use real-time updates to sense obstacles in its path and pre-plan its journey instantly.

It can be used for -

Carrying goods in hospitals, factories, and warehouses

Cleaning offices and large equipment

Inventory management

4. AI in Human Resource

Did you know that companies use intelligent software to ease the hiring process?

Artificial Intelligence helps with blind hiring. Using machine learning software, you can examine applications based on specific parameters. AI drive systems can scan job candidates' profiles, and resumes to provide recruiters an understanding of the talent pool they must choose from.

5. AI in Healthcare

Artificial Intelligence finds diverse applications in the healthcare sector. AI is used in healthcare to build sophisticated machines that can detect diseases and identify cancer cells. AI can help analyze chronic conditions with lab and other medical data to ensure early diagnosis. AI uses the combination of historical data and medical intelligence for the discovery of new drugs.

6. AI in Agriculture

Artificial Intelligence is used to identify defects and nutrient deficiencies in the soil. This is done using computer vision, robotics, and machine learning, AI can analyze where weeds are growing. AI bots can help to harvest crops at a higher volume and faster pace than human laborers.

7. AI in Gaming

Another sector where Artificial Intelligence applications have found prominence is the gaming sector. AI can be used to create smart, human-like NPCs to interact with the players.

It can also be used to predict human behavior using which game design and testing can be improved. The Alien Isolation games released in 2014 uses AI to stalk the player throughout the game. The game uses two Artificial Intelligence systems - ‘Director AI’ that frequently knows your location and the ‘Alien AI,’ driven by sensors and behaviors that continuously hunt the player.

8. AI in Automobiles

Artificial Intelligence is used to build self-driving vehicles. AI can be used along with the vehicle’s camera, radar, cloud services, GPS, and control signals to operate the vehicle. AI can improve the in-vehicle experience and provide additional systems like emergency braking, blind-spot monitoring, and driver-assist steering.

9. AI in Social Media

Instagram

On Instagram, AI considers your likes and the accounts you follow to determine what posts you are shown on your explore tab.

Facebook

Artificial Intelligence is also used along with a tool called DeepText. With this tool, Facebook can understand conversations better. It can be used to translate posts from different languages automatically.

Twitter

AI is used by Twitter for fraud detection, removing propaganda, and hateful content. Twitter also uses AI to recommend tweets that users might enjoy, based on what type of tweets they engage with.

10. AI in Marketing

Artificial intelligence applications are popular in the marketing domain as well.

Using AI, marketers can deliver highly targeted and personalized ads with the help of behavioral analysis, pattern recognition, etc. It also helps with retargeting audiences at the right time to ensure better results and reduced feelings of distrust and annoyance.

AI can help with content marketing in a way that matches the brand's style and voice. It can be used to handle routine tasks like performance, campaign reports, and much more.

Chatbots powered by AI, Natural Language Processing, Natural Language Generation, and Natural Language Understanding can analyze the user's language and respond in the ways humans do.

AI can provide users with real-time personalizations based on their behavior and can be used to edit and optimize marketing campaigns to fit a local market's needs.