Artificial Intelligence

What it is and why it matters

Artificial intelligence (AI) makes it possible for machines to learn from experience, adjust to new inputs and perform human-like tasks. Most AI examples that you hear about today – from chess-playing computers to self-driving cars – rely heavily on deep learning and natural language processing. Using these technologies, computers can be trained to accomplish specific tasks by processing large amounts of data and recognising patterns in the data.

Artificial Intelligence History

The term artificial intelligence was coined in 1956, but AI has become more popular today thanks to increased data volumes, advanced algorithms, and improvements in computing power and storage.

Early AI research in the 1950s explored topics like problem solving and symbolic methods. In the 1960s, the US Department of Defence took interest in this type of work and began training computers to mimic basic human reasoning. For example, the Defence Advanced Research Projects Agency (DARPA) completed street mapping projects in the 1970s. And DARPA produced intelligent personal assistants in 2003, long before Siri, Alexa or Cortana were household names.

This early work paved the way for the automation and formal reasoning that we see in computers today, including decision support systems and smart search systems that can be designed to complement and augment human abilities.

While Hollywood movies and science fiction novels depict AI as human-like robots that take over the world, the current evolution of AI technologies isn't that scary – or quite that smart. Instead, AI has evolved to provide many

1950s–1970s

Neural Networks

Early work with neural networks stirs excitement for "thinking machines."

1980s–2010s

Machine Learning

Machine learning becomes popular.

2011–2020s

Deep Learning

Deep learning breakthroughs drive AI boom.

Present Day

Generative AI

Generative AI, a disruptive tech, soars in popularity.

Why is artificial intelligence important?

essential to set up the system and ask the right questions.

AI adds intelligence to existing products. Many products you already use will be improved with AI capabilities, much like Siri was added as a feature to a new generation of Apple products. Automation, conversational platforms, bots and smart machines can be combined with large amounts of data to improve many technologies. Upgrades at home and in the workplace, range from security intelligence and smart cams to investment analysis.

AI adapts through progressive learning algorithms to let the data do the programming. AI finds structure and regularities in data so that algorithms can acquire skills. Just as an algorithm can teach itself to play chess, it can teach itself what product to recommend next online. And the models adapt when given new data.

AI analyses more and deeper data using neural networks that have many hidden layers. Building a fraud detection system with five hidden layers used to be impossible. All that has changed with incredible computer power and big data. You need lots of data to train deep learning models because they learn directly from the data.

AI achieves incredible accuracy through deep neural networks. For example, your interactions with Alexa and Google are all based on deep learning. And these products keep getting more accurate the more you use them. In the medical field, AI techniques from deep learning and object recognition can now be used to pinpoint cancer on medical images with improved accuracy.

AI gets the most out of data. When algorithms are self-learning, the data itself is an asset. The answers are in the data – you just have to apply AI to find them. Since the role of the data is now more important than ever, it can create a competitive advantage. If you have the best data in a competitive industry, even if everyone is applying similar techniques, the best data will win. But using that data to innovate responsibly requires trustworthy AI. And that means your AI systems should be ethical, equitable and sustainable.

How Artificial Intelligence Is Being Used

Every industry has a high demand for AI capabilities – including systems that can be used for automation, learning, legal assistance, risk notification and research. Specific uses of AI in industry include:

Health Care	Retail
AI applications can provide personalised medicine and X-ray readings. Personal health care assistants can act as life coaches, reminding you to take your pills,	AI provides virtual shopping capabilities that offer personalised recommendations and discuss purchase options with the consumer. Stock management and site layout

Manufacturing	Banking
AI can analyse factory IoT data as it streams from connected equipment to forecast expected load and demand using recurrent networks, a specific type of deep learning network used with sequence data.	Artificial Intelligence enhances the speed, precision, and effectiveness of human efforts. In financial institutions, AI techniques can be used to identify which transactions are likely to be fraudulent, adopt fast and accurate credit scoring, as well as automate manually intense data management tasks.

WildTrack and SAS: Saving endangered species one footprint at a time.

Flagship species like the cheetah are disappearing. And with them, the biodiversity that supports us all. WildTrack is exploring the value of artificial intelligence in conservation – to analyse footprints the way indigenous trackers do and protect these endangered animals from extinction.

How Artificial Intelligence Works

AI works by combining large amounts of data with fast, iterative processing and intelligent algorithms, allowing the software to learn automatically from patterns or features in the data. AI is a broad field of study that includes many theories, methods, and technologies, as well as the following major subfields:

Machine Learning

Neural Networks

Deep Learning

Machine learning automates analytical model building. It uses methods from neural

A neural network is a type of machine learning that is made up of interconnected units (like

Deep learning uses huge neural networks with many layers of processing units, taking advantage of advances in computing power and

insights in data without explicitly being programmed for where to look or what to conclude.	inputs, relaying information between each unit. The process requires multiple passes at the data to find connections and derive meaning from undefined data.	amounts of data. Common applications include image and speech recognition.

Additionally, several technologies enable and support AI:

Computer vision relies on pattern recognition and deep learning to recognise what's in a picture or video. When machines can process, analyse and understand images, they can capture images or videos in real time and interpret their surroundings.

Natural language processing (NLP) is the ability of computers to analyse, understand and generate human language, including speech. The next stage of NLP is natural language interaction, which allows humans to communicate with computers using normal, everyday language to perform tasks.

Graphical processing units are key to AI because they provide the heavy compute power that's required for iterative processing. Training neural networks requires big data plus compute power.

The Internet of Things generates massive amounts of data from connected devices, most of it unanalysed. Automating models with AI will allow us to use more of it.

Advanced algorithms are being developed and combined in new ways to analyse more data faster and at multiple levels. This intelligent processing is key to identifying and predicting rare events, understanding complex systems, and optimising unique scenarios.

APIs, or application programming interfaces, are portable packages of code that make it possible to add AI functionality to existing products and software packages. They can add image recognition capabilities to home security systems and Q&A capabilities that describe data, create captions and headlines, or call out interesting patterns and insights in data.

In summary, the goal of AI is to provide software that can reason on input and explain on output. AI will provide human-like interactions with software and offer decision support for specific tasks, but it's not a replacement for humans – and won't be anytime soon.

Next Steps

See how Artificial Intelligence Solutions augment human creativity and endeavours with AI.

SAS® Visual Data Mining and Machine Learning

AI is simplified when you can prepare data for analysis, develop models with modern machine-learning algorithms and integrate text analytics all in one product. Plus, you can code projects that combine SAS with other languages, including Python, R, Java or Lua.

Recommended reading

ARTICLE

From Apollo to AI: A new era of American exploration

As we celebrate the 50th anniversary of the Apollo 11 mission, what's the next frontier for American Innovation? It's available now, from our desks and waits for us to unlock its potential.

ARTICLE

AI in banking: Survey reveals factors for success

What do banking executives report about their experiences with AI? Where are they focusing today? What's working? What are their plans for the future?

RESEARCH

Nerd in the herd: protecting elephants with data science

A passionate SAS data scientist uses machine learning to detect tuberculosis in elephants. Find out how her research can help prevent the spread of the disease.