

My Drift

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Since I'm a computer programmer and have worked with computers most of my life, I thought I knew what artificial intelligence was. I thought by programming to safe specific data in a database, that over time this program or system could figure certain things out without actually changing the code to do so. For example, let's say you google or search for a certain product over and over on your computer or cell phone. Then all of a sudden you start getting all these advertisements popping up on your social media like Facebook trying to sell you that exact product you were interested in. Have you noticed that? Is that an example of AI? Yes, I think so, but I didn't know how complex and powerful AI has gotten over the years until I started researching it for this article.

Recently, there have been several articles in newspapers and online stating that AI can even be dangerous to us humans or even the world. How can this be?

I think it is time that me and my readers learn more about AI.

Introduction to Artificial Intelligence

The intelligence shown by the machines in par with the natural intelligence of humans is called artificial intelligence. The computer program is made to learn, think and act according to human beings. So, we can say that we are making machines smart. The best examples are speech and image recognition. Different types of AI include reactive machines, limited memory, the theory of mind, and self-awareness. John McCarthy (a Computer Scientist) is called the father of AI as he coined the term first in 1956. The computer program or system can analyze and interpret data, learn from the data, and make conclusions from the data due to AI.



John McCarthy

What is Artificial Intelligence?

As the name suggests, AI is imparting intelligence to the machines so that the machines operate like human beings. AI is that sector in computer science that emphasizes the creation of intelligent machines that work, operate, and react like human beings. AI is used in decision-making by machines considering real-time scenario. An Artificially Intelligent machine reads the real-time data, understands the business scenario, and reacts accordingly.

Artificial intelligence (AI) is the ability of a computer, or a robot controlled by a computer to do tasks that are usually done by humans because they require human intelligence and discernment.

Some of the activities that the artificially intelligent machines are designed for are:

- Speech and image recognition
- > Learning
- > Planning
- > Problem-solving



AI has now become a very important part of Information Technology. This branch aims to create machines that are intelligent. AI has highly technical and specialized research associated with it.

The Key Concepts of AI 1. Artificial Intelligence

Artificial intelligence is any software that mimics our natural intelligence. For example, a calculator performs a task that we normally do with our intelligence, but it is not mimicking our ability to think. However, when you ask Siri to perform a calculation and she answers your question correctly, that is a very simple form of AI.



Alexa and Siri Virtual Assistants

In most forms, AI can observe its environment to some degree (listening to your voice, for example) and use the data it gathers to make better decisions. Oftentimes, the interactions AI has with a user are taken as feedback and added to the AI's knowledge base to be used in future decisions, which is a simple type of AI learning.

2. Machine Learning

Machine Learning (ML) is a subset of AI that focuses on the ability of a program to adapt when given new information. In simpler terms, machine learning often ignores the mimicry typically associated with AI and strictly focuses on the learning component. Without any additional coding provided by a programmer, ML software can discover new and better methods to make decisions.



Think of this like the equations you learned in algebra. You start out using equations in specific use cases and eventually realize that they apply more broadly to other areas of math. That realization — the connection between something you've been taught and something you've discovered — is the primary goal of machine learning: to teach software enough that it can begin to teach itself.

3. Neural Network

A neural network is a set of algorithms used in machine learning that model an AI as layers of interconnected nodes. This method of representing a system is loosely based on interconnected neurons in the human brain. In other words,

when you hear someone talking about neural networks, just think of it as a really primitive digital brain.



Neural Network Example

For example, you've likely noticed a feature in your smartphone's photo application that can sort pictures based on the people in each photo. This is accomplished with a neural network built to recognize faces, something that can normally only be done by a human. That "digital brain" can't hold a conversation – it's far too simple. But it can do something that a traditional computer program can't, which is adaptable recognition.

4. Deep Learning

Deep learning is another subset of machine learning that uses layers of neural networks rather than a single neural network. The word "deep" in deep learning is referring to these layers. You can think of each neural-networklayer as a space where something new is learned from a set of data.

To put this in plain terms, picture five vertical lines, like so: ||||| The first one is the input layer — that's where the deep learning software receives data. The second line, layer two, runs the data through an algorithm to learn something about that data. The third layer does the same thing using a different algorithm, which allows the software to learn a second thing about the data. The fourth layer does the same thing, with yet another algorithm, so that the deep learning software now has three things it's learned about the initial input. In the fifth and final layer, the software outputs what it has learned.



The layers in-between the first and last layers are known as "hidden" layers, and most deep learning applications have far more than three hidden layers. But the idea here is that rather than doing one thing with a piece of data, several things are done with it to give the software a deeper understanding of the data.

5. Supervised and Unsupervised Learning

Supervised learning is a method of teaching AI by providing it with labeled training data. For example, you might give an AI a set of images labeled as either "cat" or "dog". Then, by learning from those images, the AI would be able to identify new unlabeled images as "cat" or "dog" on its own.



Unsupervised learning has the same end goal — for the AI to be able to correctly label data — but it's never given the initial training. Let's say you have an AI program and you want it to tell the difference between cars and bicycles, but you want it to figure out the difference on its own. So, all you do is give it a hundred images of cars and bicycles and say "right" or "wrong" when it labels an image as a car or a bicycle. Eventually, the AI should be able to piece together what makes a "bike" a bike and a "car" a car.

6. Reinforcement Learning

Reinforcement learning is a type of machine learning that teaches AI through trial and error. Take the lab mouse trying to find the cheese at the end of a maze. On a first attempt, the mouse may struggle to even make it to the end. Each time it is placed in the maze, however, it becomes more and more proficient at the maze, until eventually, it can make consistently perfect runs.

This type of iterative learning is one of the most valuable ways in which humans and other animals learn. We are penalized when we make mistakes and rewarded when we get things right, and eventually learn how to do something (almost) perfectly.

Reinforcement learning applies the same concept to teaching AI. It gives an AI a goal, the AI makes attempts at that goal, and feedback is given on how close or far it was from reaching that goal. The AI is told to complete the task to 100%, and then the AI is left to do its thing.



Learning Processes that contributes to Artificial Intelligence

Machine Learning is a core part and a subset of AI. Making machines learn without any kind of supervision is very difficult and hence requires the ability to understand the data, like identifying patterns in streams of inputs. This is very different from learning with supervision. Learning with supervision involves actions like classification and numerical regressions. Classification is the process of determining what category the object belongs to. The process of regression deals with obtaining a set of numerical inputs and thereby discovering functions that enable the generation of suitable outputs for the respective inputs.

Computational Learning Theory is a very well-defined branch of theoretical computer science that uses Mathematical Analysis which is done using Machine Learning Algorithms. The perception of the machine, reaction, and decision-making totally depends on the capability of the machine to use inputs from various sensors to deduce various aspects of the environment. The computer vision analyses the visual inputs, and facial recognition, object recognition, and gesture recognition are the subsets of the overall analysis.



Robotics is another major field that is somewhat related to AI. Various tasks handled by robots are navigation and object manipulation. The subproblems are localization, mapping, and motion planning.

Programming without and with Artificial Intelligence

Given below is the basic programming of a system and how different they are when developed with and without the use of AI:

| Programming Without | Programming With Al |
|---|---|
| A computer program without AI can answer the specific questions it i meant to solve. | A computer program with Al can answer the generic questions it is meant to solve. |
| Modification in the program leads to change its structure. | Al programs can absorb new modifications by putting highly independent pieces of information together. Hence you can modify even a minute piece of information of program without affecting its structure. |
| Modification is not quick and easy. It may lead to affecting the program adversely. | Quick and Easy program modification. |

Real World Artificial Intelligence Applications



Let's take a look at a few interesting applications of AI.

Gaming How Deep Blue vs. Kasparov changed AI forever.



On the 35th floor of the Equitable Center in Midtown Manhattan, a high-stakes chess match with a prize of \$1.1 million was being played in earnest. It was May 11, 1997.

World chess champion Garry Kasparov, to this day considered one of the greatest chess players of all time, furrowed his brow as Game 6 – the last game in this match – went on. Then, he stood up and walked away, conceding the game to his opponent: IBM supercomputer Deep Blue.

Over 9 days, man competed against the machine. The machine won.

That globally publicized event almost 26 years ago, the first time a computer had prevailed against a world chess champion, showcased one of the greatest accomplishments in artificial intelligence.

But today's computer chess engines, with increases in computing power and programming techniques, can outplay Deep Blue. How? They are powered by AI that learns while Deep Blue had relied mainly on a programmed understanding of chess.

This watershed moment in 1997 not only cemented IBM's status as an AI innovator, but it led to a leap forward: the IBM Watson supercomputer, which used machine learning and natural language processing to defeat Jeopardy champions Ken Jennings and Brad Ritter in 2011.



IBM Watson supercomputer Wins Jeopardy! Match

Robotics

What is the relation between AI and robotics? Robotics involves the creation of robots to perform tasks without further intervention, while AI is how systems emulate the human mind to make decisions and 'learn.' While you can have robotics with an AI element (and vice versa), both can, and usually do, exist independently of each other.

For example, robots used in the auto industry are programmed to perform a specific function that normally is unrelated to any AI capabilities.



Meet BRILLO, the AI-powered bartending robot that's capable of mixing complex drinks while engaging in complex dialogue with customers.



Your favorite bartender is likely someone who can expertly mix your favorite drink while serving up a side of friendly banter. It's an experience that's difficult to top, but a group of scientists at an Italian university have tried to do just that, with a twist: Their ultimate bartender is a machine.

Researchers at Italy's University of Naples Federico II have developed a bartending robot, called BRILLO, that can not only whip up a cocktail but can also remember your favorite drink and have a conversation.

The university's team of computer scientists are using machine-learning algorithms to teach BRILLO, which is short for "Bartending Robot for Interactive Long-Lasting Operations," how to interact with human customers. The robot can gauge whether the tone of a conversation is serious or playful and even ask appropriate questions, or crack a joke, depending on the situation.

New Las Vegas Strip bar features robot bartenders

Tipsy Robot is billed as the "first land-based robotic bar." There's another pair of robot bartenders on Royal Caribbean's Harmony of the Seas cruise liner, but these are infinitely better, because they are in Las Vegas.

Guests place orders via one of 33 tablets. There's a robust list of 18 signature cocktails, but guests may order custom-built drinks, too.



For an existing drink, it's just a matter of making a selection and providing a name and e-mail address. For custom drinks, guests can choose from virtually unlimited options, from the kind of liquor (Tipsy Robot boasts 172 bottles, or 59 different brands) to exact proportions of liquor and mixers and ice.

Once an order is placed and paid for with a credit card (drinks are \$14 for a standard drink with one shot of alcohol), it goes into a queue. That's a fancy European term for "line." The robots take anywhere from a minute to 90 seconds to prepare a drink, so the virtual line moves quite quickly.

A fun part of the process is that video displays keep track of where your order is in the queue, and you can tell when your specific drink is being made. While a drink is being prepared, an e-mail is sent to the address given when the order was placed. The e-mail contains a QR code which, when scanned, "unlocks" the drink. This ensures nobody can abscond with a cocktail.

That's it.

The robots prepare drinks element by element, grabbing ice from a dispenser, extracting liquor from bottles hanging overhead, slicing fruit, shaking up the drink and pouring the cocktails ever-so-carefully into plastic cups. What don't the robot bartenders do? They don't take breaks and they don't accept tips.

There are attendants in space-aged uniforms to handle delivering the drinks and they accept tips!

Well, I don't know about you, but I prefer to be served my beer by a human bartender – a pretty female human bartender if possible.

Self-Driving Cars What is a self-driving car?

A self-driving car is a vehicle that uses a combination of sensors, cameras, radar, and artificial intelligence (AI) to travel between destinations without a human operator. To qualify as fully autonomous, a vehicle must be able to navigate without human intervention to a predetermined destination over roads that have not been adapted for its use.



Companies developing and/or testing autonomous cars include Audi, BMW, Ford, Google, General Motors, Tesla, Volkswagen, and Volvo.

How self-driving cars work

AI technologies power self-driving car systems. Developers of self-driving cars use vast amounts of data from image recognition systems, along with machine learning and neural networks, to build systems that can drive autonomously.

The neural networks identify patterns in the data, which are fed to the machine learning algorithms. That data includes images from cameras on self-driving cars from which the neural network learns to identify traffic lights, trees, curbs, pedestrians, street signs and other parts of any given driving environment. For example, Google's self-driving car project, called Waymo, uses a mix of sensors, lidar (light detection and ranging -- a technology similar to RADAR) and cameras and combines all of the data those systems generate to identify everything around the vehicle and predict what those objects might do next. This happens in fractions of a second. Maturity is important for these systems. The more the system drives, the more data it can incorporate into its deep learning algorithms, enabling it to make more nuanced driving choices.

Speech Recognition

Some systems imparted with AI are designed to make them capable of hearing the voice and comprehending the language in order to understand the meaning of the words. This comprehension is not only in terms of the words but also in terms of sentences, their meanings, and the tone while human talks in various languages to the system. The software is built to recognize different accents, dialects, slang words, background noise, changes in voice modulation, changes in the voice due to pain, cold, etc.

Healthcare

5 Powerful Real-World Examples



When it comes to our health, especially in matters of life and death, the promise of artificial intelligence (AI) to improve outcomes is very intriguing. While there is still much to overcome to achieve AI-dependent health care, most notably data privacy concerns and fears of mismanaged care due to machine error and lack of human oversight, there is sufficient potential that governments, tech companies, and healthcare providers are willing to invest and test out AI-powered tools and solutions. Here are five of the AI advances in healthcare that appear to have the most potential.

1. AI-assisted robotic surgery

With an estimated value of \$40 billion to healthcare, robots can analyze data from pre-op medical records to guide a surgeon's instrument during surgery, which can lead to a 21% reduction in a patient's hospital stay. Robot-assisted surgery is considered "minimally invasive", so patients won't need to heal from large incisions. Via artificial intelligence, robots can use data from past operations to inform new surgical techniques. The positive results are indeed promising. One study that involved 379 orthopedic patients found that AIassisted robotic procedure resulted in five times fewer complications compared to surgeons operating alone. A robot was used on an eye surgery for the first time, and the most advanced surgical robot, the Da Vinci allows doctors to perform complex procedures with greater control than conventional approaches. Heart surgeons are assisted by Heartlander, a miniature robot, that enters a small incision on the chest to perform mapping and therapy over the surface of the heart.



Meet Angel: The World's First Virtual Nurse Assistant

From interacting with patients to directing patients to the most effective care setting, virtual nursing assistants could save the healthcare industry \$20 billion annually. Since virtual nurses are available 24/7, they can answer questions,

monitor patients, and provide quick answers. Most applications of virtual nursing assistants today allow for more regular communication between patients and care providers between office visits to prevent hospital readmission or unnecessary hospital visits. Care Angels virtual nurse assistant can even provide wellness checks through voice and AI.

3. Aid clinical judgment or diagnosis

Admittedly, using AI to diagnose patients is undoubtedly in its infancy, but there have been some exciting use cases. A Stanford University study tested an AI algorithm to detect skin cancers against dermatologists, and it performed at the level of the humans. A Danish AI software company tested its deep-learning program by having a computer eavesdrop while human dispatchers took emergency calls. The algorithm analyzed what a person says, the tone of voice and background noise and detected cardiac arrests with a 93% success rate compared to 73% for humans. Baidu Research recently announced that the results of early tests on its deep learning algorithm indicate that it can outperform humans when identifying breast cancer metastasis. Prime minister Theresa May announced an AI revolution would help the National Health Service (NHS), the UK's healthcare system, predict those in an early stage of cancer to ultimately prevent thousands of cancer-related deaths by 2033. The algorithms will examine medical records, habits and genetic information pooled from health charities, the NHS and AI.

4. Workflow and administrative tasks

Another way AI can impact healthcare is to automate administrative tasks. It is expected that this could result in \$18 billion in savings for the healthcare industry as machines can help doctors, nurses and other providers save time on tasks. Technology such as voice-to-text transcriptions could help order tests, prescribe medications and write chart notes. One example of using AI to support admin tasks is a partnership between the Cleveland Clinic and IBM that uses IBM's Watson to mine big data and help physicians provide a personalized and more efficient treatment experience. One way Watson supports physicians is being able to analyze thousands of medical papers using natural language processing to inform treatment plans.

5. Image analysis

Currently, image analysis is very time consuming for human providers, but an MIT-led research team developed a machine-learning algorithm that can analyze 3D scans up to 1,000 times faster than what is possible today. This near real-time assessment can provide critical input for surgeons who are operating.

It is also hoped that AI can help to improve the next generation of radiology tools that don't rely on tissue samples. Additionally, AI image analysis could support remote areas that don't have easy access to healthcare providers and even make telemedicine more effective as patients can use their camera phones to send in pics of rashes, cuts or bruises to determine what care is necessary.



Image Analysis

In the very complex world of healthcare, AI tools can support human providers to provide faster service, diagnose issues and analyze data to identify trends or genetic information that would predispose someone to a particular disease. When saving minutes can mean saving lives, AI and machine learning can be transformative not only for healthcare but for every single patient.

Military

Military applications of AI have become a prominent topic of interest in the field of artificial intelligence, which holds significant potential to support U.S. warfighters in their missions. In the past year alone, the use of AI has made tremendous leaps forward in both capability and availability, such as in the field of generative AI. The military needs to keep pace with these developments in order to maintain security and a technological edge. With new ways of using AI constantly developing, it can be challenging to keep up with ways in which it can aid military operations. As AI becomes more essential, military dominance won't be defined by the size of an army, but by the performance of its algorithms, so it merits examination of how the military currently uses AI and how it may use AI in the future.



Military Applications of AI Include:

| • Warfare Systems | • Threat Monitoring |
|-----------------------|---------------------|
| • Strategic Decision | • Drone Swarms |
| Making | • Cybersecurity |
| • Data Processing and | • Transportation |
| Research | • Casualty Care and |
| • Combat Simulation | Evacuation |
| • Target Recognition | |

How can artificial intelligence be dangerous?



While we haven't achieved super-intelligent machines yet, the legal, political, societal, financial and regulatory issues are so complex and wide-reaching that it's necessary to take a look at them now, so we are prepared to safely operate among them when the time comes. Outside of preparing for a future with super-intelligent machines now, artificial intelligence can already pose dangers in its current form. Let's take a look at some key AI-related risks.



Social manipulation

Social media through its autonomous-powered algorithms is very effective at target marketing. They know who we are, what we like and are incredibly good at surmising what we think. Investigations are still underway to determine the fault of Cambridge Analytica and others associated with the firm who used the data from 50 million Facebook users to try to sway the outcome of the 2016 U.S. Presidential election and the U.K.'s Brexit referendum, but if the accusations are correct, it illustrates AI's power for social manipulation. By spreading propaganda to individuals identified through algorithms and personal data, AI can target them and spread whatever information they like, in whatever format they will find most convincing—fact or fiction.

Invasion of privacy and social grading

It is now possible to track and analyze an individual's every move online as well as when they are going about their daily business. Cameras are nearly everywhere, and facial recognition algorithms know who you are. In fact, this is the type of information that is going to power China's social credit system that is expected to give every one of its 1.4 billion citizens a personal score based on how they behave—things such as do they jaywalk, do they smoke in nonsmoking areas and how much time they spend playing video games. When Big Brother is watching you and then making decisions based on that intel, it's not only an invasion of privacy it can quickly turn to social oppression.

Discrimination

Since machines can collect, track and analyze so much about you, it's very possible for those machines to use that information against you. It's not hard to imagine an insurance company telling you you're not insurable based on the number of times you were caught on camera smoking. An employer might withhold a job offer based on your "Social Credit Score."



Have You Checked Your Social Credit Score Yet?

No, I don't want to know. I'm not sure one exists but every citizen in China has a Social Credit Score. It could be happening in the United States - Big Brother might be watching you!

Misalignment between our goals and the machine's

Part of what humans value in AI-powered machines is their efficiency and effectiveness. But, if we aren't clear with the goals we set for AI machines, it could be dangerous if a machine isn't armed with the same goals we have. For example, a command to "Get me to the airport as quickly as possible" might have dire consequences. Without specifying that the rules of the road must be respected because we value human life, a machine could quite effectively accomplish its goal of getting you to the airport as quickly as possible and do literally what you asked but leave behind a trail of accidents.

Autonomous weapons

AI programmed to do something dangerous, as is the case with autonomous weapons programmed to kill, is one way AI can pose risks. It might even be plausible to expect that the nuclear arms race will be replaced with a global autonomous weapons race.

Russia's president Vladimir Putin said: "Artificial intelligence is the future, not only for Russia, but for all humankind. It comes with enormous opportunities, but also threats that are difficult to predict. Whoever becomes the leader in this sphere will become the ruler of the world."

Aside from being concerned that autonomous weapons might gain a "mind of their own," a more imminent concern is the dangers autonomous weapons might have with an individual or government that doesn't value human life. Once deployed, they will likely be difficult to dismantle or combat.



Terminator (Killer) Robot Army



Robot Dogs are replacing the German Shepherd



AI Controlled Military Drone

I found an interesting article online providing information about how China, Russia, United States, India, and other countries are developing AI programmed military robots. Here is the title and URL:

Killer Robots: How AI-Programmed Military Robots Could Make Human Soldiers Completely Obsolete



March 24, 2023

<u>https://eurasiantimes.com/unstoppable-military-robots-watch-how-ai-programmed-killer-robots-could-make-human-soldiers-completely-obsolete/</u>

Conclusions

Any powerful technology can be misused. Today, artificial intelligence is used for many good causes including to help us make better medical diagnoses, find new ways to cure cancer and make our cars safer. Unfortunately, as our AI capabilities expand, we will also see it being used for dangerous or malicious purposes. Since AI technology is advancing so rapidly, it is vital for us to start to debate the best ways for AI to develop positively while minimizing its destructive potential.

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