How Is Artificial Intelligence And Machine Learning Used In Engineering?

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In brief

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Today Artificial Intelligence and Machine Learning (AIML) are virtually omnipresent. Since technology has penetrated every sphere of life, these technologies are behind almost every aspect of human life.

Engineering, which is about conceptualizing, planning, designing, building, and sustaining anything, for that matter, for human consumption, is no different.

In this article, we shall attempt to explore how AI and Machine Learning have been used to improve engineering processes and techniques and discuss the benefits of undergoing AI certification.

Before we start, let's briefly discuss Artificial Intelligence and Machine learning for a better contextual setting.

What are artificial intelligence and machine learning?

Although Artificial Intelligence is widely adapted in almost all walks of life, it is said that Artificial Intelligence is still in its nascent stage. Artificial Intelligence is increasing, with every research being carried out in the world incorporating AI someway or the other.

Artificial Intelligence is the ability of artificial machines or devices to carry out tasks that were only possible with human intervention. The general term 'smart' is ubiquitous these days with any new product. Such devices are intelligent enough to sense their environment and automatically respond to changes in their environment, requiring no input from humans.

Artificial intelligence can thus be described as a technology that allows various sensors to pick up signals about multiple aspects of the environment and feed all the data to the core algorithm that takes the final call on the action to be initiated. The same principle can be generalized across devices from mobile phones to big industrial machines to machinery, making it possible to send spacecraft to outer space.

Another well-advanced state of intelligence is to possess cognitive ability. The ability to reason, decipher emotions and provide appropriate inputs and responses. This is a deeper version of Artificial Intelligence, and as researchers put it, we are decades away from such technology.

Machine Learning is a tool or a building block for Artificial Intelligence. It allows programs or algorithms to eliminate noise and pick out valuable data. This valuable data can then be used to make decisions by the machine itself without human intervention.

It is like a human observing a pattern in a sequence of operations, understanding the relationships, and associating specific inputs with specific outcomes.

A good example would be a doctor examining an x-ray image and drawing conclusions.

There are many data points that a doctor looks at when looking at an x-ray and bases their decisions on the values of these data points. A machine learning system attempts to replace this function of a doctor by reading in an x-ray image, analyzing all the pixel information, drawing all data points, comparing it with known results, and storing this information in memory.

This is called learning from data, just like a human would. But in this case, this learning involves hundreds of thousands of cases. Once this learned data is stored in memory, various machine learning algorithms can establish associations among these data points and draw reasonably accurate conclusions.

So, a machine can now do what a doctor could do after learning from hundreds of thousands of known cases. Hence, many are aspiring to get into the job roles of AIML. Therefore, there is an exponential rise in the number of youngsters seeking to pursue Artificial Intelligence courses.

How are artificial intelligence and machine learning used in engineering?

Artificial Intelligence, now prevalent in the engineering sector, needs both software and hardware components to deliver AI-powered features.

From robots in an assembly line in a manufacturing facility to training autonomous vehicles, AI is everywhere in engineering. Artificial Intelligence will be increasingly used to improve efficiency in engineering without human intervention.

Simulations based on machine learning help design products that automatically adjust to usage conditions. These simulations took many manual hours. Now it can be powered by constant feedback data and historical data.

Computer-Aided Design (CAD) today is a fundamental tool in manufacturing, helping engineers design and develop superior products for today and the future.

With its inherent ability to deal with data from all aspects of its domain, AI brings in a strong interplay between various silos within an organization, opening up a whole new dimension waiting to be explored.

Lastly, engineers will be freed of many low-level tasks and concentrate their creative energies on higher skills. This will eventually help increase the pace with the technology that improves our lives.

Let’s now look at a few Artificial Intelligence and Machine Learning applications in Engineering.

Artificial Intelligence in Robotics

Extensive research is being spent on developing robots that can mimic human behavior in terms of learning and cognitive ability. However, although there is good progress, we are far from it as per experts in the field.

The ultimate goal is to have machines that can run systems and auto-correct them if there are deviations without any intervention. Although this is being done, the scope of tasks is limited. This needs to be scoped to a much bigger range for us to have humanoid robots indeed.

For now, intelligent robotics is helping at the assembly line picking up components with the dexterity of a human hand, placing them with pinpoint precision, cutting and drilling with hardly any deviations from the specifications. As a result, such systems have significantly reduced the risks of any errors in engineering.

Drawing inspiration from the strides made in intelligent robotics, the cannabis industry is witnessing a surge in innovation. Notably, the advent of the pre roll infusion machine is reshaping product consistency, enhancing efficiency, and setting new benchmarks in cannabis production.

Artificial Intelligence in Software Engineering

Don’t worry; it will take many more years for AI to start writing code valid enough for the real world. What is more plausible is that developers will not have to tinker with relatively small, repetitive tasks in software development.

Developers will spend more time on complex problems letting AI take care of the mundane. Thus, it is projected that AI will create more opportunities for developers.

Artificial Intelligence will also identify gaps in the current technologies and suggest new software updates or fix them well in time.

AI in Big Data

AI in the form of Machine Learning lends itself well to a business ecosystem equipped with big data. The data that runs through the business ecosystem can be tapped to take advantage of information that would otherwise be missed in a traditional system.

With powerful machine learning algorithms at play, businesses can even discover new revenue streams from the as yet untapped massive data. In addition, processes could be further optimized for an efficient and smooth running of business operations.

Engineers can now envision and develop large-scale urban projects using artificial intelligence and machine learning. Simulations of large-scale projects fed by artificial intelligence-powered synthetic data let engineers foresee design problems and correct them well in advance.

Internet of Things

Internet of Things (IoT) is bringing in smaller, intelligent, and networked modules to sense the environs, monitor business and industrial processes seamlessly and efficiently. This real-time information can also be used to make decisions on the fly and course-correct if necessary.

Engineering can use this wealth of information collected with time to make predictions for the foreseeable future. With details from predictive models, engineering can adapt products and services to the changing business environments and help the business mitigate any risks.

Communication with machines

In the past, the only possible way to communicate with the machine was in the language the machine could understand. Usually, a human-friendly interface passes on the instructions to the machine.

With Artificial Intelligence, engineers are designing machines capable of talking with humans in the language humans are good at, natural language. Natural Language Processing or NLP brings linguistic abilities to a machine, making it intelligent enough to understand conversations and interactions.

Engineers are improving such systems by the day and developing interactive machines like Amazon Echo or Google Assistant to convert speech input into an instruction to be executed.

Machine Learning in Engineering

Machine Learning systems help improve the performance of Computer-Aided Engineering systems by incorporating feedback received from input data either generated by artificial means or data acquired from organic sources.

CAE systems will see value in the feedback data received and suggest relevant changes to the design in the long run.

What happens to the role of an engineer?

Engineers today might start worrying about Artificial Intelligence taking over engineering jobs. This is true to some extent, but the impact that engineers fear is unfounded. Artificial Intelligence is here to stay and grow.

It will take up simple repetitive, unproductive tasks away from the engineer's plate and allow engineers to focus more on creative design thinking triggering further innovations. Thus, artificial intelligence will augment and facilitate innovation, but it cannot wholly replace engineers and human intelligence.

Conclusion

Artificial Intelligence in the form of Machine Learning, Neural Networks, Natural Language Processing, among others, will be the mainstay in using technology for running future businesses. Therefore, it only makes sense to upgrade your skills to include AI to stay one step ahead of the machines, if you will.

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