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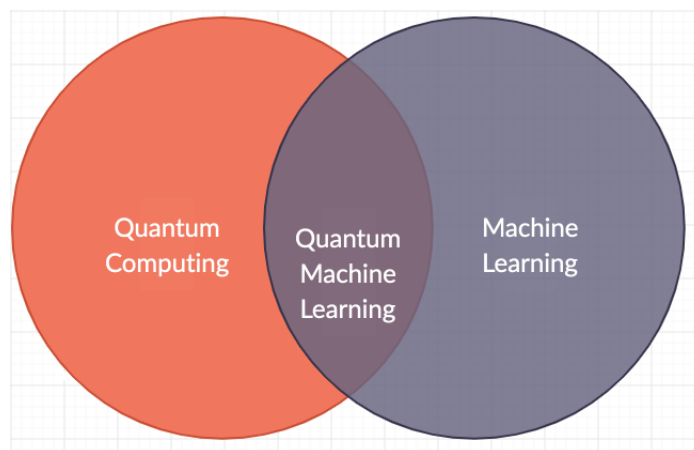
## Quantum Computing for Machine Learning

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Quantum machine learning uses the power of quantum mechanics and quantum computing to speed up and enhance the machine learning done on the “classical” computers we use every day. Quantum computers are designed using the often counter-intuitive laws of quantum physics and can store and process exponentially more information than the tablets, smartphones, and supercomputers that power much of the modern world.

But quantum computers have a long way to go before being used in our everyday lives. According to McKinsey and Company, only about 2,000 to 5,000 quantum computers will likely be operational by 2030, and those capable of handling the most complex problems may not even exist until 2035 or later. Nonetheless, several companies have already begun offering quantum devices accessible through the cloud, creating the opportunity for hybrid work that pairs quantum computing with classical machine learning.

In this article, you’ll learn more about quantum machine learning, quantum computers, and what they might be able to do in the future. At the end, you’ll also learn about cloud-based quantum computing tools available today and some courses to help you get started on your own machine learning journey.



## What is quantum machine learning?

Quantum machine learning uses algorithms run on quantum devices, such as quantum computers, to supplement, expedite, or support the work performed by a classical machine learning program. Also called quantum-enhanced machine learning, quantum machine learning leverages the information processing power of quantum technologies to enhance and speed up the work performed by a machine learning model.

While classical computers are constrained by limited storage and processing capacities, quantum-enabled ones allow for exponentially more storage and processing power. This ability to store and process huge amounts of information means that quantum computers can analyze massive data sets that would take classical methods significantly longer to perform. As a result, quantum machine learning leverages this out-sized processing power to expedite and improve the development of machine learning models, neural networks, and other forms of artificial intelligence (AI).

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## Quantum machine learning uses

From crunching massive amounts of big data to powering transformative technological advances, both quantum computing and machine learning stand to make waves in the future. While quantum machine learning is still in its infancy, researchers and professionals are already using it in numerous ways. Some of these applications include to:

- Develop new machine learning algorithms.
- Speed up already existing machine learning algorithms.
- Employ quantum-enhanced reinforcement learning, in which a machine learning algorithm learns based on its interactions within a quantum environment.
- Create quantum neural networks, which can operate at fewer steps and with greater processing speed than traditional neural networks.

Despite these intriguing applications, though, the field of quantum computing and machine learning is still growing and changing. As a result, many other applications used to solve real-world problems will likely develop in the near and distant future.

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