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Xanadu Unveils Open Source ML Software for Quantum Computers

By **Shweta Gupta** - November 17, 2018

PennyLane is a hardware-agnostic machine learning software with built-in support for existing qubit and photonic quantum hardware

Xanadu announced the release of a open-source machine learning software – PennyLane for quantum computers.

What is PennyLane?

PennyLane will allow programmers, researchers, and enthusiasts globally to take part in the cutting-edge field of quantum machine learning. This software can easily integrate with currently available APIs and quantum hardware from the biggest players in the field.

Purpose

Xanadu recognized the need to implement machine learning algorithms which can lead to quantum computers grow in size and therefore PennyLane was developed, envisioning it as the "TensorFlow of quantum computing."

Core Feature

PennyLane's core feature is that it implements a version of the backpropagation algorithm – the workhorse for training deep learning models – that is naturally compatible with quantum devices.

Quantum computers are getting more powerful with the time, which means new quantum hardware will be available in the market and PennyLane will integrate with them easily. Moreover, PennyLane can interact with quantum computers from different companies (such as the IBM Quantum Experience) in a hardware-agnostic way because of the plugin system. It can even combine quantum subroutines from different hardware together into a larger hybrid computation.

Xanadu's Strawberry Fields software stack, released earlier this year, was the first quantum software to incorporate a simulator built with the machine learning library TensorFlow. This allowed the rapid prototyping and optimization of quantum circuits using existing machine learning tools.

"Deep learning libraries like TensorFlow and PyTorch opened up artificial intelligence to the world by providing an interface to powerful GPU hardware. With PennyLane, Xanadu is now doing the same for machine learning on quantum hardware," said Seth Lloyd, Xanadu's chief scientific advisor, MIT professor and a founding figure in both quantum computing and quantum machine learning. "We're going to see an explosion of ideas, now that everyone can train quantum computers like they would train deep neural networks."

"We're really thrilled to introduce PennyLane to the world," said Nathan Killoran, head of development for PennyLane. "Even with ongoing intense R&D from groups at Xanadu and elsewhere, quantum machine learning is still a largely unexplored, fertile territory. By building a community around a common software platform, we will accelerate innovation in this exciting and important field."

Company Profile

Xanadu is a photonic quantum computing and advanced artificial intelligence company based in Toronto. Xanadu designs and integrates quantum silicon photonic chips into existing hardware to create truly full-stack quantum computing.

For more information click here.

Shweta Gupta

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