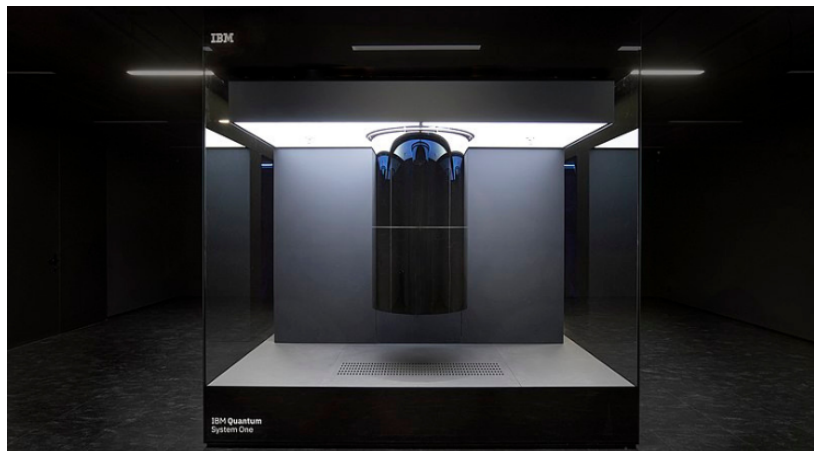


Quantum Machine Learning Technologies

ID# 2023-5598, 2023-5601, 2023-5606, 2023-5605,
2023-5615, 2023-5614, 2023-5613



PennState



Quantum computing

Technology Summary

A family of inventions covers various quantum computing & machine learning related topics. Quantum Machine Learning (QML) combines the benefits of quantum computing & machine learning. Two inventions propose solutions to improve performance of QML models, one by optimizing the shot allocation for training on real hardware, and another via a new embedding scheme using QRAM Memory. As the accessibility of quantum computing hardware grows, there is a concern for security, which are addressed in two of the inventions. One proposes a solution to model & simulate adversarial tampering on quantum circuits, another supports user distribution of their quantum computing tasks among trusted & untrusted quantum providers. Another proposes a method to prevent IP theft when using hybrid quantum classical algorithms. These inventions represent significant contributions to the field of quantum computing and its intersection with machine learning and cybersecurity.

Application & Market Utility

1. A novel method to speed up the convergence of QML models. This reduces the number epochs, providing speedup & reducing cost
2. A method for obfuscating quantum circuits to enhance security during compilation
3. An optimization method for QML models to reduce training time & cost
4. An embedding scheme using QRAM for machine learning applications
5. A solution to quantum computing insecurity by modeling adversarial tampering
6. A method to address QML security by de-risking untrusted or unreliable third-party tools and hardware

Next Steps

Prototype quantum circuits and emulations are available to share with prospective licensees.

TECHNOLOGY READINESS LEVEL

4-7

Seeking

Licensing | Research

Keywords

- Quantum Computing
- Quantum Machine Learning (QML)
- Cybersecurity
- Machine Learning

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