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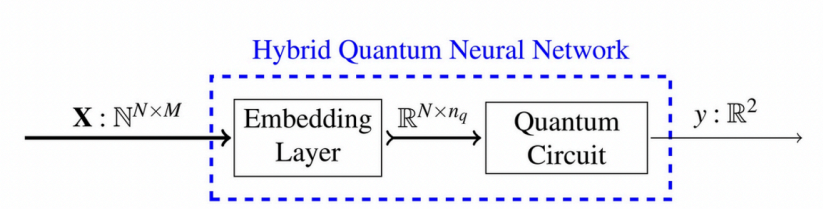
# NTU Q

## HYBRID QUANTUM NEURAL NETWORKS SHOW STRONGLY REDUCED NEED FOR FREE PARAMETERS IN ENTITY MATCHING

Hybrid quantum neural networks (HQNN) demonstrate significant potential in solving entity-matching problems while drastically reducing the number of required parameters compared to classical models. Entity matching, a crucial task in data integration, ensures that records referring to the same entity across different datasets are correctly linked.




Source: nature Scientific Reports

Traditional approaches rely on machine learning algorithms or rule-based methods, but quantum computing offers a new perspective. This study introduces a hybrid quantum neural network combining classical embedding layers with quantum layers, leveraging quantum circuits to classify entity pairs. The research compares HQNN with purely quantum neural networks (QNN) and classical models, such as TF-IDF with cosine similarity and Long Short-Term Memory (LSTM) networks.

Experimental results on IBM Quantum Cloud demonstrate that HQNN achieves performance comparable to classical models while requiring significantly fewer parameters. Moreover, HQNN models trained on quantum simulators can be effectively transferred to real quantum hardware, highlighting their practical feasibility. A key finding is that integrating HQNN with classical TF-IDF filtering further enhances accuracy by allowing classical methods to handle easy matches while quantum models focus on challenging cases. Although current quantum hardware limitations restrict dataset size, the study suggests that quantum machine learning could play an increasingly important role in natural language processing and data integration as quantum technology advances.

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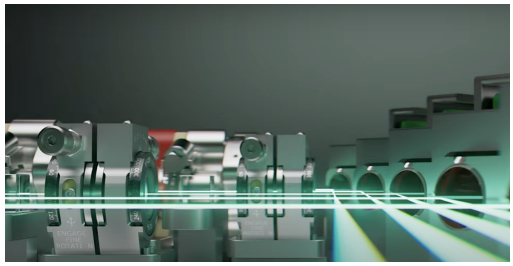
# QUANTINUUM TOUTS GENERATIVE QUANTUM AI'S MASSIVE COMMERCIAL POTENTIAL



Quantinuum has unveiled its Generative Quantum AI (Gen QAI) framework, leveraging quantum-generated data to revolutionize artificial intelligence across industries such as pharmaceuticals, finance, and logistics. Powered by the H2 quantum computer, Gen QAI surpasses classical computing limitations by generating highly precise training data, enabling AI models to solve previously intractable problems. The framework is already demonstrating commercial value through partnerships with firms like Merck KGaA and HPE Group, contributing to advances in drug discovery, battery development, and aerodynamic optimization.

Quantinuum's CEO, Dr. Raj Hazra, emphasized that this marks a shift from theoretical potential to real-world applications, highlighting how quantum computing is now actively enhancing AI. The upcoming Helios system, expected to launch in mid-2025, promises to expand Gen QAI's capabilities further, being a trillion times more powerful than H2 and targeting breakthroughs in areas like climate science and material research. Quantinuum is also pioneering quantum-specific AI techniques, such as quantum recurrent neural networks (qRNNs) and quantum tensor networks for natural language processing (NLP), which reduce computational complexity while maintaining high accuracy. Notably, these quantum AI models consume drastically less energy than classical supercomputers, addressing one of AI's most pressing challenges—sustainability. The ability to generate synthetic data with quantum precision enhances AI's applicability in domains where training data is scarce, lowering the barriers to AI adoption. As quantum computing becomes more powerful and accessible, Quantinuum is positioning itself at the forefront of this transformation, enabling businesses of all sizes to harness quantum-enhanced AI. The company's strategic partnership with SoftBank further signals the accelerating commercialization of quantum AI, setting the stage for widespread industry adoption in the near future.

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