Quantum Computing Use Cases

Credit Scoring for SMEs

Singapore Management University, etc .



New Energy and Industrial Technology Development Organization (NEDO)

Singapore Management University, etc.: Credit Scoring for SMEs [2024/01] 1/2

Concept

Industry	Finance
Process	bank
Method	AI
Category	Gate*

Background

- credit scoring facilitates economic expansion by allowing companies to borrow capital at reasonable rates
- Large companies were given credit ratings by many analysts, but **small and medium-sized companies (SME) were less analyzed by rating agencies and credit scoring was based only on company and market data.**
- More recently, the use of machine learning approaches has enabled **automated credit scoring that combines enterprise, accounting, and socioeconomic information to provide broader coverage of SME attributes.**

Issues and motivation to be solved

- **Improving machine learning algorithms used in credit scoring is important to provide credit risk transparency.**
- The researchers, who include members of Singapore Management University, worked on **a machine learning algorithm that leverages quantum technology to enhance credit scoring for SMEs**.

Problem setting as a quantum computer

- To perform credit scoring for SMEs, one conducts **a quantum and classical hybrid model using quantum techniques on a real test dataset of Singapore companies**
- As test data, 246 defaulting companies and 2,000 healthy companies were used **for 2,246 companies incorporated between 1940 and 2016.**
- In order to compare the classical model with the model using quantum technology, we performed **accuracy comparison according to the number of repetitions (epochs) of the whole training data**
- The machine utilizes a **gate system (simulator)**

Reference: MDPI"Quantum Machine Learning for Credit Scoring" (https://www.mdpi.com/2227-7390/12/9/1391)
*Gate（gate-based）: A computing approach in which operations are applied sequentially to qubits to perform calculations. Similar in concept to logic circuits in classical computers, it can address a wide range of problems.

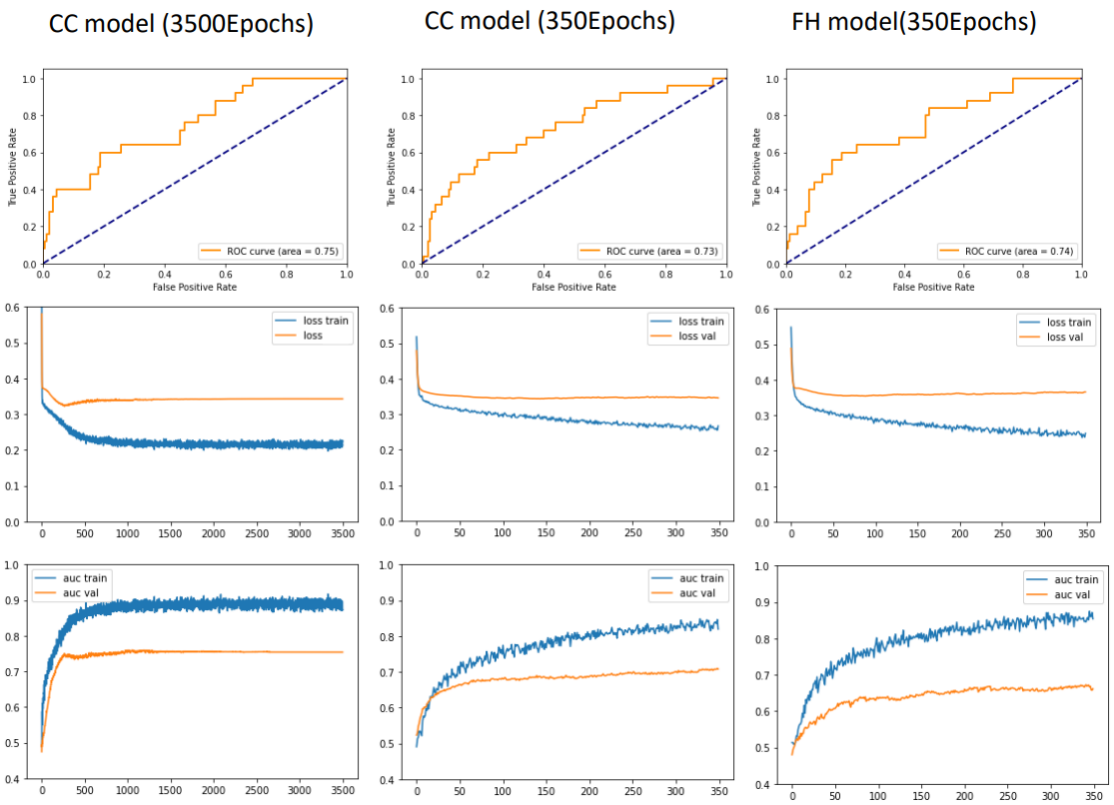
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Expected business benefits

- The quantum-classical hybrid model (FH model) achieved significantly less **similar prediction accuracy with 1/10 epochs** than the conventional CC model with 3,500 epochs
- When compared with the conventional method at the same number of epochs (350), it was found that **higher accuracy than the conventional method** was obtained.



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More use cases are available on our website. We invite you to explore them.
https://www.quantum-computing-use-cases.nedo.go.jp/english/

More Use Cases

New Energy and Industrial Technology Development Organization (NEDO)
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This collection of use cases was obtained as a result of the work commissioned by the New Energy and Industrial Technology Development Organization (NEDO) "Cyber-Physical Development Business of Quantum/Classical Hybrid Technology/Study of Use Case of Quantum Technology" and the “Post-5G Information and Communications System Infrastructure Reinforcement R & D Project (Quantum Industrialization)/Comprehensive Study for Promoting the Industrialization of Quantum Computers”.