Contribution ID: **109** Type: **not specified**

Quantum anomaly detection for the agriculture application

Thursday, 28 August 2025 16:45 (3 minutes)

We hypothesize that the expressive power of the quantum kernel space may be superior to that of the classical kernel space, and are studying quantum anomaly detection. Unlike factory products, quantum anomaly detection was applied to the image inspection process of various agricultural products with various standards. In this study, a learning model was constructed using various quantum kernel SVMs using a small number of agricultural product image datasets collected by a company. The quantum kernels prepared in this study consisted of a small number of rotation gates and control gates. The F1 score of each quantum kernel showed a significant effect of using CNOT gates. After confirming the results with a quantum simulator, the usefulness of the quantum kernel was confirmed on a quantum computer. Learning by SVMs incorporating specific quantum kernels showed significantly higher AUC values compared to classical kernels.

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Session Classification: Poster

Track Classification: Poster presentation