

2024.06.20

Mitsui Chemicals, Inc.

Mitsui Chemicals, blueqat Launch Project Using Quantum Computing and AI Technology for Discovery of New Applications

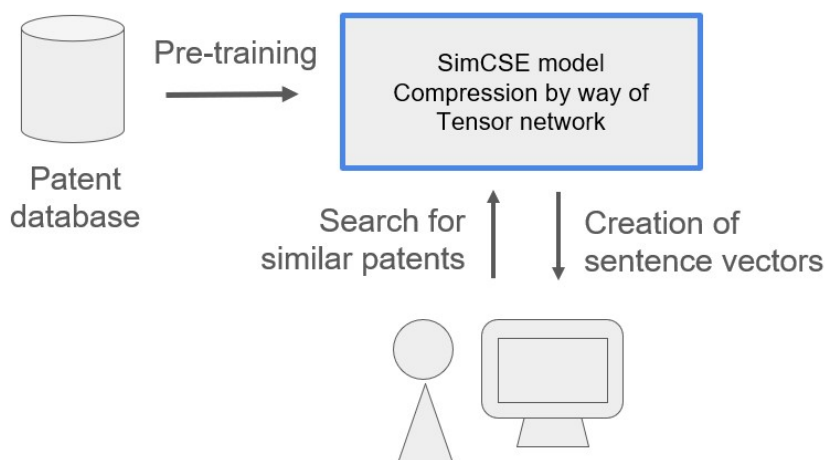
Improving patent searches to promote digital transformation

Mitsui Chemicals, Inc. (Tokyo: 4183; President & CEO: HASHIMOTO Osamu) today announced that it has begun a joint project with blueqat Inc. (Tokyo; CEO: MINATO Yuichiro) that combines the advanced technologies of natural language processing and quantum computing to speed up the search for new applications of Mitsui chemicals products.

This project uses a natural language processing model called Simple Contrastive Learning of Sentence Embeddings (SimCSE). SimCSE is a high-performance model that creates vector representations*¹ to grasp the meaning of documents and other texts. Capable of calculating high accuracy semantic similarity between different texts, the model is expected to find use in the likes of information retrieval and question-and-answer systems.

For this project, the companies will carry out pre-training for the SimCSE model based on a patent database to vectorize patent data documents, making it possible to then find similar patents with a high level of accuracy. The companies have already succeeded in efficient compression of the SimCSE model's data by utilizing tensor network*² technology.

This model is expected to find practical use in the likes of patent searches and the search for new applications of Mitsui chemicals products.



[Potential use case for the model]

The machine learning model compressed via tensor network is also compatible with quantum circuits, and the companies have hopes for its potential to be run on quantum computers in future.

Mitsui Chemicals will continue taking on the challenge to promote digital transformation by combining machine learning technologies – such as natural language models aimed toward use as large language models – with quantum technologies.

[blueqat | Quantum Computing Platform](#)

*1 Vector representations are a method of representing the meanings of words and sections of text as numerical vectors in natural language processing.

*2 Tensor networks are a method for parsing and efficiently representing huge tensors (multidimensional arrays of data). They are used for a variety of tasks in quantum computing, such as compressing quantum circuit data and carrying out quantum simulations..