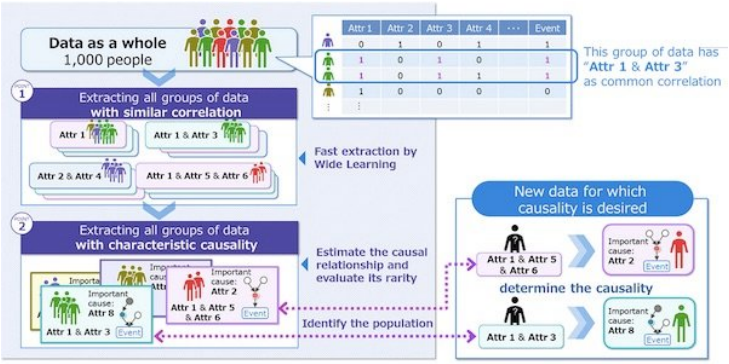
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Fujitsu analyzes relationship b/w data in healthcare and allied sectors

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Japan based Fujitsu Laboratories, Ltd. has successfully developed a technology that uses AI to discover the characteristic cause-and-effect relationships in various pieces of data relating to people and things in a variety of fields, with possible applications in medicine, marketing, manufacturing, and more.

The technology specifically addresses the need to isolate and identify characteristics from data in different real-world scenarios. In the medical field, for example, it is necessary to identify the characteristic genes that affect the development of cancer in individual patients. In the field of marketing, sales representatives need to find the characteristic factors that lead individual customers to make a purchase.

Fujitsu has developed a technology to discover the characteristic causality of individual pieces of data by quickly extracting all the groups of data that have a common correlation from an entire dataset, and evaluating the causality of each group of data to find the characteristic causality. In a recent trial demonstration, Fujitsu applied the technology to the gene expression data of colorectal cancer patients, estimating the characteristic causal relationship that appears in the data of each patient. Fujitsu's researchers succeeded in rediscovering the gene of interest in the colorectal cancer classification, offering a key to the development of a treatment plan individualized for each patient.

In addition to medical care and marketing, this technology enables use cases including customer credit scoring in finance and identification of the cause of product defects in manufacturing.

In order to accurately estimate the characteristic cause-and-effect relationship for each data item, researchers must compare the results of different operations and actions applied to the corresponding person or object under the same conditions. However, it is difficult to obtain, for example, the results of differing gene expression in a single cancer patient or implementing different promotion measures for one customer. Therefore, the challenge was how to discover the characteristic causality of each piece of data from the entire data of various patients and customers.

Newly Developed Technology

Fujitsu has succeeded in developing a new cause-and-effect search technology that can discover the characteristic cause-and-effect relationships of individual data items. The features of the developed technology are as follows.

1. Technique for extracting all groups of data with similar correlation

Focusing on correlations, which are less severe than causality, all groups of data with a common correlation from the entire data are extracted. When the number of data attributes exceeds 50, the maximum number of possible correlations exceeds 1,000 trillion(1). However, by using Fujitsu's "Wide Learning"(2) technology it is possible to determine the causes that contribute to the development of cancer. A group of patients

with a common correlation is extracted by searching for combinations of expressed genes, with the presence or absence of gene expression as an attribute.

2. Technique for extracting all groups of data with characteristic causality

Next, causality for the population of data is estimated and the attributes in each causality compared, as well as the strength of the causality, and the direction of the causality. This makes it possible to quantitatively evaluate the rarity of causality and to comprehensively discover those with high rarity scores as characteristic causality. Because these two techniques can extract all populations of data with characteristic causality, it is possible to determine the characteristic causality of each data by identifying the population that corresponds to the new data for which causality is desired.

Outcome

Previous genetic analysis studies have shown that there are several types of colorectal cancer, including those with a strong immune response and those with metabolic abnormalities, in addition to the conventionally-known common types, and that each type expresses a different gene. "This technology provides medical researchers with feedback, including the causal relationship that provides a concrete basis for the discovery, and enables the identification of carcinogenic factors in each patient. We hope that this technology will lead to the provision of optimal medical care for each, individual patient." Professor Kenzo Takahashi, a researcher from Fujitsu Laboratories who extracted gene expression data(4) from approximately 1,000 colorectal cancer tissues and normal colorectal tissues.