

June 27, 2019

FRONTEO Healthcare Launches AI Support System for Drug Discovery Research With Packaged Database

Covering 14 Million PubMed Documents and 1.7 Million Open Targets Data Items, the System Speeds Up Discovery of Target Drug Candidates – Cloud Service Available for Use in as Little as One Week

TOKYO, June 27, 2019 – FRONTEO Healthcare, Inc., a subsidiary of FRONTEO, Inc. (“FRONTEO”) (NASDAQ: FTEO) (TSE: 2518) that provides information analysis solutions utilizing artificial intelligence (AI) for healthcare and nursing care, announced today that it has launched an AI Support System for Drug Discovery Research using Concept Encoder (patent no. 6346367), an AI engine designed specifically for the healthcare industry whose features include objectivity, transparency, and reproducibility.

In November 2018, FRONTEO Healthcare [launched its Concept Encoder-based New Candidate Medications Discovery technology](#), which leverages natural language processing technology based on vector operation. This technology has already been adopted in a number of pharmaceutical companies (*see “User Feedback” on page 3). It is used by researchers engaged in developing new medical products to discover target drug candidates by investigating the relevance of new hypotheses to the descriptions of documentary records found in open databases and searching for diseases that could be relevant to hypotheses as well as correlation with drugs that change similar genes.

Based on this New Candidate Medications Discovery technology, the AI Support System for Drug Discovery Research using Concept Encoder packages databases that include documents and information such as genetic expressions. The packaged system is supplied via a cloud service, which enables simpler, faster discovery of drug candidate chemical compounds in drug development research at pharmaceutical companies.

The key features of the AI Support System for Drug Discovery Research are as follows:

1. It enables instantaneous searches and analysis by providing a database and having Concept Encoder learn this information in advance. The database contains 14 million PubMed^{*1} documents with MeSH^{*2} tags and 1.7 million Open Targets^{*3} data items, whose use is essential in the drug discovery research process.
2. It is possible to start using the system as a cloud service within a week. On-premises system and private cloud are also available.
3. Unlike word input-type AI, AI analysis is performed based on vector operations, which makes it user-friendly and as easy to use as search tools.
4. Since processing is light, an on-premises system may be run on a server costing several million yen^{*4}, with no need for heavy processing facilities such as supercomputers or large-scale servers.

5. It is expected to considerably shorten the time from hypothesis formulation to development approval in drug discovery research, which currently takes around 3 to 4 weeks (see diagram on next page).

Drug research and development divisions at pharmaceutical companies routinely check research papers and open databases to update information for discovering new candidate drugs. Updating development-related information is therefore vital. However, this means that researchers must spend considerable time and effort on keeping up to date with drug research trends at home and abroad, which is a significant issue.

The AI Support System for Drug Discovery Research learns the latest information from the regularly updated PubMed and Open Targets databases and text information from papers. Researchers simply have to formulate and input a hypothesis using natural language. The intensity of relevance between a hypothesis and the latest research papers, target gene networks, etc., will then be displayed in a visualized format as scores (numerical values). Moreover, it is possible to customize the system by feeding text data previously saved by pharmaceutical companies.

With the dictionary- and grammar induction-type AIs previously used in research paper analysis, researchers needed knowledge of coding in order to use them, and it was necessary to constantly update databases of terms and meanings. Furthermore, with these systems, initial trials and PoC (proof of concept) reportedly took several months and generated significant expenses.

Through the use of vector operations, which are a key feature of the Concept Encoder AI engine, the AI Support System for Drug Discovery Research can quantify the relevance or degree of similarity between terms or research papers. It is therefore able to express correlation based on vectorization even for ambiguous concepts that are difficult to define in a dictionary. There is also no need for frequent updating of databases. Since the system employs approximation formulae, analysis and updating of data may be completed without using much machine power, making it user-friendly. Another key feature is the system's ease of operation: users can perform analysis of a subject by inputting natural language, and the system will then remove unnecessary factors as desired (e.g., "excluding cancer") and extract differences—exactly like a search tool.

FRONTEO Healthcare will continue its efforts to contribute to the development of the healthcare industry as a whole by further expanding its range of information analysis solutions based on Concept Encoder.

*1 PubMed: A database that may be used to search for biology- and medicine-related documents. It is created by the National Center for Biotechnology Information (NCBI), which is part of the United States National Library of Medicine (NLM).

*2 MeSH: Medical Subject Headings. For PubMed documents, this indicates content whose subject matter is primarily medical.

*3 Open Targets: A public-private partnership-based database for identifying drug discovery targets.

*4 Example of server specifications capable of running the AI Support System for Drug Discovery Research: 8 core CPUs, 256 GB of memory, 6 TB storage capacity

**About Concept Encoder**URL: <https://www.fronteo-healthcare.com/conceptencoder>

Concept Encoder is the AI system developed by FRONTEO Healthcare specifically for the healthcare industry. The system was developed with the aim of effective, evidence-based analysis and utilization of healthcare-related big data, including large bodies of free-entry text data. The system incorporates significance tests and other crucial statistical methods for evidence-based medicine (EBM), the gold standard of practice among healthcare professionals, and applies this to natural language analysis. The Concept Encoder can also co-analyze non-textual data, and a research effort is underway to co-analyze the numerical data accumulated within the healthcare domain, such as genetic expression, vital data, and other test result values prevalent in the healthcare domain. Patent Number: 6346367

Overview of FRONTEO Healthcare, Inc.

Name: FRONTEO Healthcare, Inc.

Date of foundation: April 16, 2015

Capital amount: JPY 327,000 thousand

Representative: Kuniko Nishikawa, Chief Executive Officer

Area of business: Diagnosis support, healthcare operational support, pharmaceutical industry support, and other healthcare-related information analysis businesses

URL: <https://www.fronteo-healthcare.com/en/>**About FRONTEO, Inc.**

FRONTEO, Inc. ("FRONTEO") (NASDAQ: FTEO) (TSE: 2158) supports the analysis of big data based on behavior informatics by utilizing its technology, "KIBIT". FRONTEO's KIBIT technology is driven by FRONTEO artificial intelligence based on knowledge acquired through its litigation support services. KIBIT incorporates experts' tacit knowledge, including their experiences and intuitions, and utilizes that knowledge for big data analysis. FRONTEO continues to expand its business operations by applying KIBIT to new fields such as healthcare and marketing. FRONTEO was founded in 2003 as a provider of e-discovery and international litigation support services. These services include the preservation, investigation and analysis of evidence materials contained in electronic data, and computer forensic investigation. FRONTEO provides e-discovery and litigation support by making full use of its data analysis platform, "Lit i View", and its Predictive Coding technology adapted to Asian languages. The company name was changed from UBIC, Inc. to FRONTEO, Inc. as of July 1, 2016.

For more information about FRONTEO, contact global_pr@fronteo.com or visit <http://www.fronteo.com/global/>.

Safe Harbor Statement

This announcement contains forward-looking statements. These forward-looking statements are made under the "safe harbor" provisions of the U.S. Private Securities Litigation Reform Act of 1995. These statements can be identified by terminology such as "will," "expects," "anticipates," "future," "intends," "plans," "believes," "estimates" and similar statements. Among other things, the amount of data that FRONTEO expects to manage this year and the potential uses for FRONTEO's new service in intellectual property-related litigation, contain forward-looking statements. FRONTEO may also make written or oral forward-looking statements in its reports filed with, or furnished to, the U.S. Securities and Exchange



Commission, in its annual reports to shareholders, in press releases and other written materials and in oral statements made by its officers, directors or employees to third parties. Statements that are not historical facts, including statements about FRONTEO's beliefs and expectations, are forward-looking statements. Forward-looking statements involve inherent risks and uncertainties. A number of factors could cause actual results to differ materially from those contained in any forward-looking statement, including but not limited to the following: FRONTEO's goals and strategies; FRONTEO's expansion plans; the expected growth of the data center services market; expectations regarding demand for, and market acceptance of, FRONTEO's services; FRONTEO's expectations regarding keeping and strengthening its relationships with customers; FRONTEO's plans to invest in research and development to enhance its solution and service offerings; and general economic and business conditions in the regions where FRONTEO provides solutions and services. Further information regarding these and other risks is included in FRONTEO's reports filed with, or furnished to the Securities and Exchange Commission. FRONTEO does not undertake any obligation to update any forward-looking statement, except as required under applicable law. All information provided in this press release and in the attachments is as of the date of this press release, and FRONTEO undertakes no duty to update such information, except as required under applicable law.

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