

Search engine to help scientists power healthcare

Big data is becoming increasingly important to cutting-edge healthcare and medical research. As a result, a variety of researchers are harnessing the information technology strengths of Japan's most popular internet company, **YAHOO! JAPAN**.

Since its launch in 1996, **Yahoo! JAPAN** has dominated the country's internet landscape. Today, it is the most accessed Japanese portal, boasting roughly 90 million unique browsers per day.

Now, as part of its philanthropic mission, the company is expanding into the realm of healthcare. "Our goal is to respond to the needs of a rapidly ageing Japanese society and to help reduce the burden of medical care by providing advanced information about genetic predispositions," says Masahiro Inoue, service manager of Yahoo! JAPAN's Genome R&D division. "In doing so, we aim to tackle some of the biggest societal issues that confront us today."

Home-based genetic testing

In 2014, the company's healthcare division Yahoo! Healthcare launched a project called HealthData Lab (HDL), a genetic analysis service that enables users to find out their individual genetic predispositions and disease risk factors at home.

Simply by returning a saliva sample, the HDL kit (pictured, top right) and service provides information within weeks on 290 health-related items, including predispositions to 22 types of cancer, as well as risks related to heart

diseases, asthma, obesity and other conditions.

The analysis itself is performed by Tokyo-based biotech company Genequest, a rising start-up founded by researchers at the University of Tokyo, among others. Genequest's CEO, Shoko Takahashi has stated that her target was to create an Asian counterpart to big genetic databases becoming available in the US and Europe, which are being backed by similarly powerful technology companies.

**IT MAY BE
FEASIBLE TO
REACH THE
90 MILLION
CUSTOMERS
ACCESSING
YAHOO!
JAPAN'S
INTERNET
SERVICES ON A
DAILY BASIS**

Globally, it's becoming clear that having access to huge genomic sample sizes will enable researchers to identify risk factors and genetic diseases. As a result, upon user consent, the HDL project also shares their data with Japanese research institutes to be used to find new treatments for diseases and to identify the health implications of different

lifestyle choices. "Unlike most health services on the market, we are able to share genetic information for the purposes of further research, in strict compliance with Japanese laws and regulations," says Inoue. In Japan, genomic data is classified as sensitive and is protected by privacy laws, so companies must obtain informed consent from users to use their genetic data.

Tens of thousands of people in Japan are now using the kit. It is predicted that a million will be using the HDL service within three years. In the long-term, Inoue hints that it may be feasible to reach the 90 million customers accessing Yahoo! JAPAN's Internet services on a daily basis.

Wiring up local health systems

In September 2017, Yahoo! JAPAN began collaborating with Kyushu University Beppu Hospital in western Japan to set up a cloud network service connecting 13 local clinics.

This network has been designed to manage genetic and other medical data, initially relating to 50 cancer patients who have undergone surgery. Upon patient consent, the data is made available via a new system that facilitates doctor-to-doctor communication.

The idea is to use this data to provide patients with highly

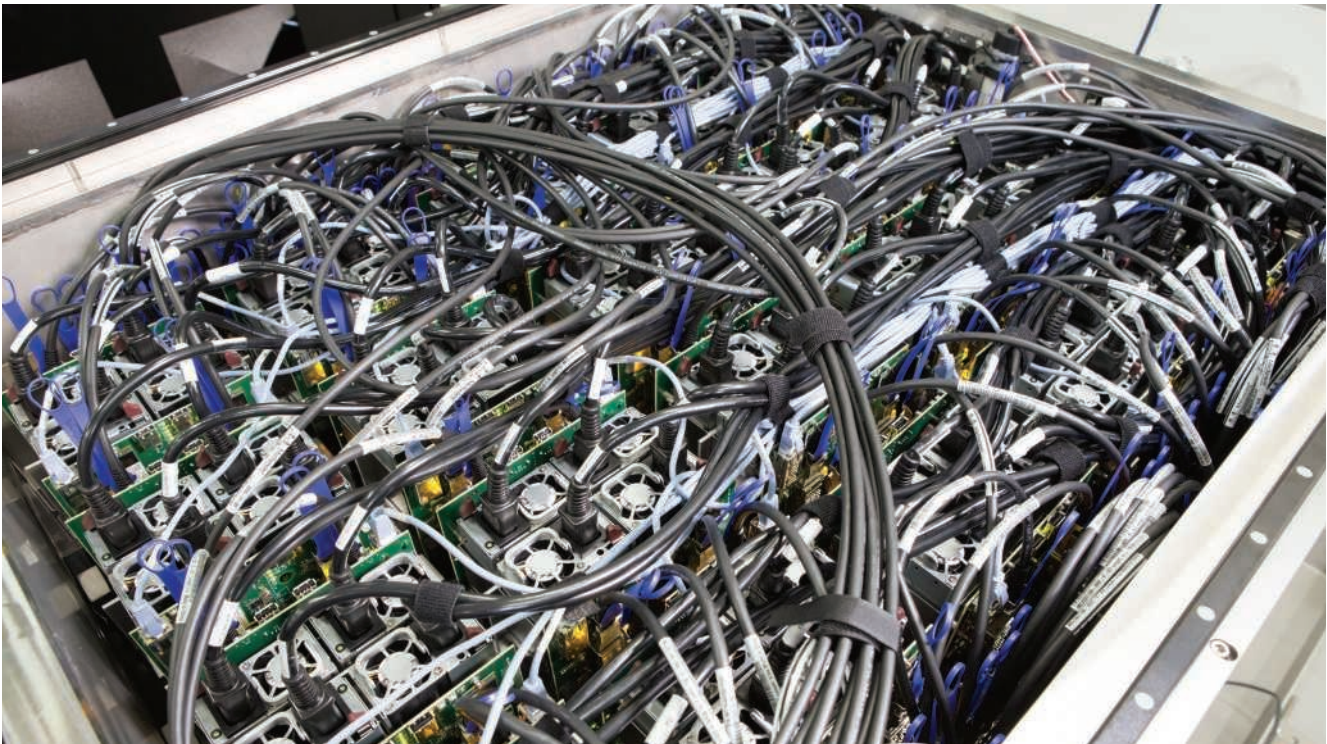
personalised information to enhance recommendations for the best follow-up treatment options, and advise them on how to help prevent recurrence. Inoue says that the project represents a step towards providing more personalised approaches to medical care. Plans are underway to expand the service to other universities and hospitals nationwide.

Privacy and big data

Inoue says that Yahoo! JAPAN's experience also gives it a significant edge in protecting the privacy of people offering up their genetic data for research. "It is our major strength," he says. "We're able to draw on our expertise in handling big data so that medical professionals can use our services safely."

Inevitably, large companies like Yahoo! JAPAN are accustomed to cyber-attack attempts, says Inoue. "We take rigorous measures. For example, by implementing a two-factor authentication, as opposed to a simple ID and password. We've also found that simple precautionary steps can be effective in limiting the damage that may result from computer viruses."

"Our aim is to create a platform that provides the best security and privacy — one that improves quality of



life for patients and enables researchers to concentrate on their research."

Getting quality medical data

Currently, supercomputing power with the capacity to process an avalanche of genetic data is needed to service the most ambitious desires of the medical community, particularly when it comes to identifying rare genetic diseases.

Yahoo! JAPAN has been lauded for its kukai supercomputer system (above),

which is used for deep learning, the process that underpins artificial intelligence (AI). AI is key to finding coherent insights from big data for the highest-level genomic healthcare analysis. Deep learning works best with huge amounts of data, which is why collecting data for research is important.

But this information must come from the most accurate sources. A global network of collaborations with universities, governmental bodies and

pharmaceutical companies is increasingly important to realizing the visions of Yahoo! JAPAN. To this end, the company now aims to widen its collaborations.

"We have so far been inundated with enquiries from Japanese universities," says Inoue. "We're now also interested in collaborating internationally, to, for example, conduct replication studies." These studies will identify international medical and genomic findings that can be

applied to Japan's population and vice versa.

The overarching vision of the company's president and CEO, Manabu Miyasaka, is for Yahoo! JAPAN to serve as a *kadaï kaiketsu enjin*, or "a problem-solving engine". ■

YAHOO!
JAPAN



Yahoo Japan Corporation

TEL: 03-6898-8200

URL: www.yahoo.co.jp

SNS: www.facebook.com/yahoojapan
Email: health-hdl-help@mail.yahoo.co.jp