September 15, 2016

NTT Communications and Mitsui Chemicals Succeeded Quality Prediction of Chemical Products in the Production Process using Artificial Intelligence (AI)

Use of Deep Learning Model to precisely predict product quality

TOKYO, JAPAN — NTT Communications Corporation (NTT Com), the ICT solutions and international communications business within the NTT (NYSE: NTT) Group, and Mitsui Chemicals, Inc. (Mitsui Chemicals) today announced that they have successfully created a technique that accurately and speedily predicts the quality of gas products. The technique is based on the modeling of the relationship between the different data sets sourced from raw materials feeding into the reactor and reactor conditions, and X gas concentrations which represent gas product quality.

The data is analyzed using Deep Learning algorithms, an artificial intelligence (AI) methodology that automatically processes relevant factors in order to model and predict outcomes. In the gas production process, these factors are represented by 51 types of time-based process data such as temperature, pressure, and flow. The end result is a highly accurate forecast of the quality of the resulting gas products.

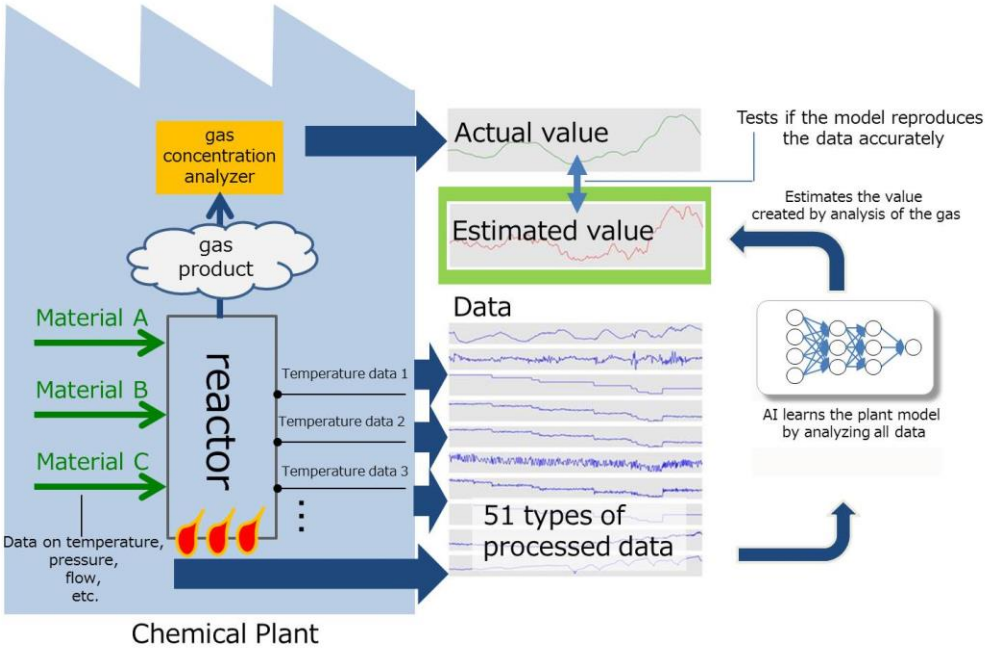

Figure1. How the process works

Using their new modeling process, the two companies have succeeded in keeping discrepancies between the concentration of X gases predicted by this model and the actual concentration of X gases within ∓3 percentage points in full scale.

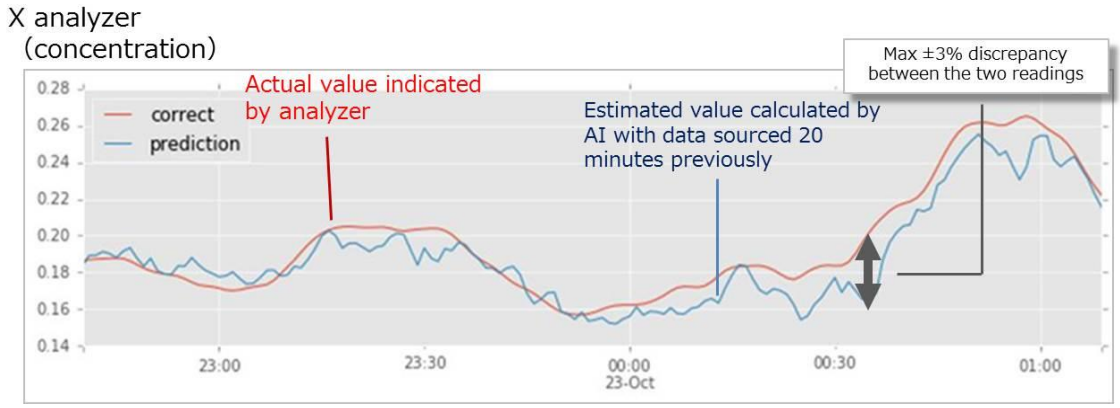

Figure2. Prediction accuracy of X gases concentration rate

Improving the prediction accuracy of X gases concentration by deploying this model, operators of chemical plants will be able to detect faulty sensors or measuring instruments and accurately assess the current and likely future condition of the plant, as well as any anomalies in the chemical product. This will improve the accuracy of alerts, leading to safer and more stable operation and to smarter maintenance of plants.

Mitsui Chemicals is studying feasibility of applying next generation production technology to smart plant maintenance, make operations safer and more stable, establish optimum multi-grade production systems required in high value-added strategy, and share operational knowledge required in globalization. Mitsui Chemicals will conduct researches of next generation production technology including IoT, big data, and AI for enhancement of equipment reliability and operating efficiency and continue to expand production technology infrastructures to respond flexibility to changes in the business environment.

In conjunction with the Virtual Engineering Community, NTT Com has been conducting verification tests to develop cloud and network environments that deliver improved plant productivity and more efficient maintenance procedures since March 2015. Though there are few cases where IoT data analyses deliver specific benefits in actual production so far, this achievement can be a key technology for efficient production.

NTT Com plans to tweak the AI methodologies used in the development of these latest techniques through the use of data sourced during production faults and data from other plants, allowing it to expand the scope of their application and improve their overall accuracy. In the future, NTT Com will combine various elements of its IoT and AI research and develop the resulting solutions under the NTT groups' AI brand corevo™.

NTT Com will additionally continue its research into ways of improving the operational efficiency of chemical plants through the use of AI models, including prevention of machine failures and the identification of quality abnormalities. The company also aims to leverage similar models in the development of its IoT solutions.

Chemical plants traditionally detect product quality issues by comparing production data with various benchmarks, and by the visual judgment of experienced employees. By thorough analysis of collected data and the accurate prediction of outcomes, this new joint development by NTT Com and Mitsui Chemicals aims to improve the accuracy of such fault detection across the chemical industry.

Note: corevo™ is a trademark of Nippon Telegraph and Telephone Corporation.

About NTT Communications Corporation
NTT Communications provides consultancy, architecture, security and cloud services to optimize the information and communications technology (ICT) environments of enterprises. These offerings are backed by the company's worldwide infrastructure, including the leading global tier-1 IP network, the Arcstar Universal One™ VPN network reaching 196 countries/regions, and over 140 secure data centers worldwide. NTT Communications' solutions leverage the global resources of NTT Group companies including Dimension Data, NTT DOCOMO and NTT DATA.
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About Mitsui Chemicals (Tokyo: 4183, ISIN: JP3888300005)
Mitsui Chemicals' roots can be traced back to 1912 when it began producing raw material for chemical fertilizers from coal gas byproducts, the first company in Japan to do so. This undertaking significantly contributed to increasing agricultural productivity, a major social issue at the time. Later, the company evolved its technology from coal chemicals to gas chemicals, and in 1958 it built Japan's first petrochemical complex and so provided impetus to Japan's industrial sector. Today, the company boasts many world-class products with over 135 companies in 27 countries. Its business portfolio includes environment-friendly materials for next-generation mobility, healthcare services to realize health and happiness in an ageing society, packaging that ensures the reliability and safety of food products, agrochemicals that contribute to increased production of food, electronic materials, and environment-friendly materials for the energy sector.
Mitsui Chemicals will continue to contribute to solving social challenges with its state-of-the-art technology and by "Creating New Customer Value through Innovation".
More information can be found at http://www.mitsuichem.com/index.htm

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