December 9, 2025
Lion Corporation

Harnessing Cross-Disciplinary Data through Proprietary Transfer Learning Models (AI) to Achieve Highly Accurate Predictions and Shorten R&D Cycles
Lion Receives the Cheminformatics Symposium's Outstanding Poster Award for the Second Consecutive Year

As part of efforts to enhance corporate value, Lion Corporation (Representative Director, President and Executive Officer: Masayuki Takemori) is utilizing digital technology to elevate management standards, improve business efficiency and strengthen key areas. One such initiative being pursued by the R&D Division involves using materials informatics*1 to accelerate value creation. Having developed a machine learning model*2 capable of predicting the quality of body washes that contain newly developed ingredients, the Company has gone on to establish a new transfer learning model that applies body wash research data to the development of bath detergents. Enabling the cross-disciplinary utilization of more than 100 years of research data that we have accumulated across various product fields, this approach is particularly useful at the early stages of development when the data volume is limited. Consequently, we anticipate further improvements in productivity and an accelerated research and development process. This research methodology was presented at the 48th Chemoinformatics Symposium (Hiroshima Prefecture, Higashi Hiroshima Arts & Culture Hall Kurara) held from Wednesday, November 26 to Thursday, November 27, 2025, and received the Outstanding Poster Award. This marks the Company's second consecutive year of receiving this award.

*1 Technologies that utilize digital techniques to enhance the efficiency of composition and material development

*2 News Release from December 19, 2024: Highly Accurate Quality Prediction for Body Washes Containing New Ingredients – Establishing a New Machine Learning Model Integrating Data Science and Researcher Insights (https://doc.lion.co.jp/uploads/tmg_block_page_image/file/10358/20241219_01.pdf) (Japanese only)

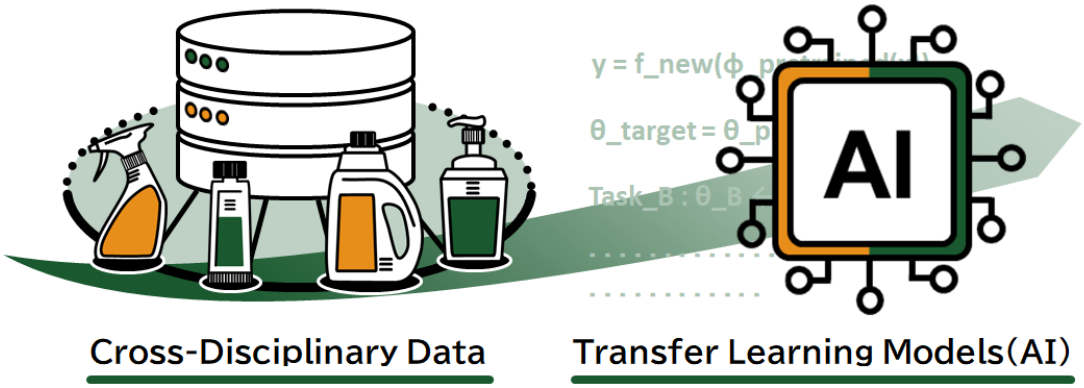

Figure 1: Enhanced R&D Productivity Through Transfer Learning Models (AI) Enabling the Integration of Cross-Disciplinary Research Data (Conceptual Diagram)

■ Research Background

Lion has designated "Manufacturing DX" as one of the key themes of Vision 2030 2nd STAGE, the medium-term management plan launched this year. Through the promotion of digital transformation (DX), we are building a system capable of rapidly introducing high-quality products that meet consumer needs. In recent years, consumers' expectations regarding product quality have grown in scope and sophistication, necessitating the acceleration of new

value creation in research and development. We have been leveraging machine learning*3 to enhance the productivity of our research and development. However, in the early stages of new product development, there are cases where the data required for machine learning is insufficient, making the improvement of prediction accuracy with limited data a challenge. Therefore, when developing bath detergents, we focused on developing AI technology that could effectively repurpose the body wash research data accumulated within the Company.

*3 Generally referred to as artificial intelligence (AI) technology, this involves statistically extracting patterns and rules from data to make judgments and inferences.

■ Research Details

When developing bath detergents, products must simultaneously meet multiple quality standards, such as for detergency and antibacterial efficacy. This makes the trial-and-error exploration of new ingredients and their combinations essential, particularly in the early stages of development, requiring significant time spent on experimentation. Therefore, we applied our proprietary method for creating distinctive features,*4*2 drawing on body wash research data to identify characteristics shared with bath detergents. Incorporating these features into the bath detergent machine learning model enhanced quality prediction. The resulting method enables the transfer of research data from different products—something previously considered difficult—and achieving highly accurate predictions of bath detergent quality despite data limitations (Figure 2).

*4 Numerical values obtained by processing and transforming the original data to quantitatively express features useful for analysis and prediction in the construction of a machine learning model.

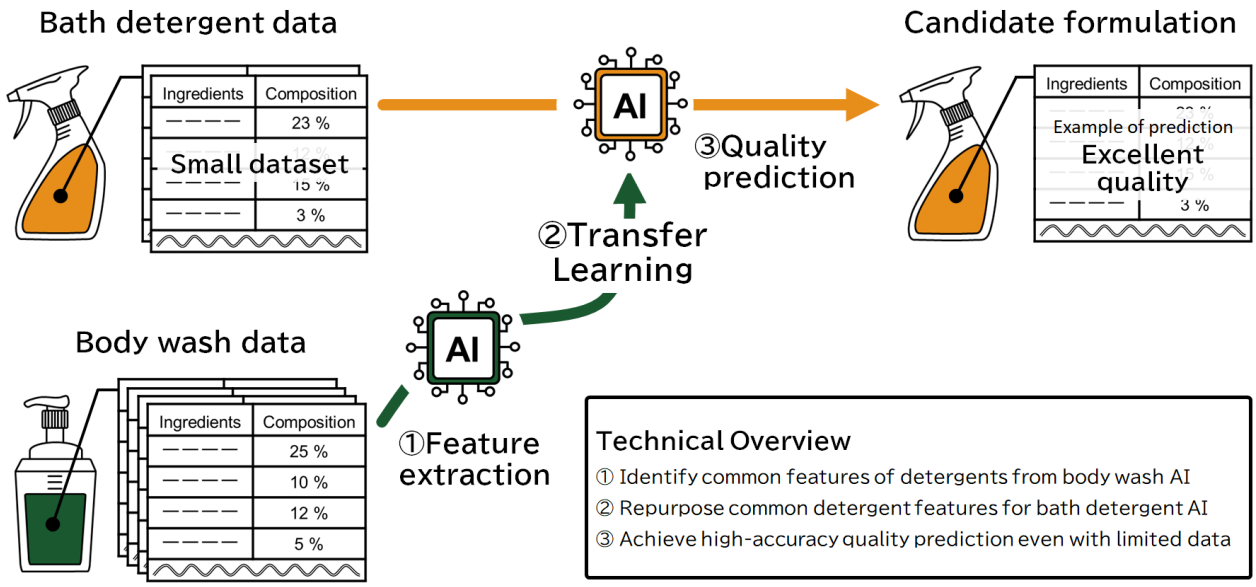

Figure 2: Overview of the Transfer Learning Model

■ Research Results

Using a transfer learning model, we successfully predicted the three key qualities of bath detergents. Compared to a conventional model trained solely on a small dataset of bath detergents, the transfer learning model—which incorporates body wash data—demonstrated higher accuracy in predicting the quality of candidate formulations. As shown in Figure 3, high prediction accuracy for unknown compositions is achieved even when compared against actual measurement data. Virtual screening using this model is expected to cut the number of experiments traditionally required by as much as 85%, promising a significant shortening of development time. Going forward, we will apply this methodology to various product development initiatives, aiming to enhance R&D productivity and shorten development cycles prior to market launch.

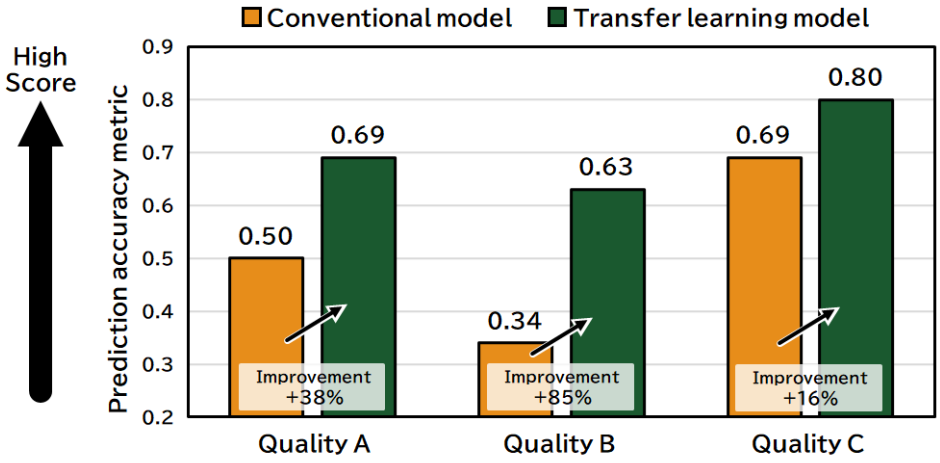

Figure 3: Accuracy of Quality Prediction for Bath Detergents

We presented our research findings as follows and received the Outstanding Poster Award.

【The 48th Chemoinformatics meeting, 2025】
- ○ Conference Period: 2025/11/26–27
- ○ Title: "Transfer Learning of Detergents Utilizing Self-Supervised Learning: Transferring Features of Body Washes to Bath Detergents"
- ○ Presenter: Eisuke Inagaki, Ryota Kamiizawa, Sota Watanabe, Research and Development Headquarters, Lion Corporation

Through the application of materials informatics, including the transfer learning model established in this research, we will further accelerate product development. We will dedicate the time saved to deepening our understanding of consumer needs and developing new products and technologies, thereby delivering unprecedented value. We will continue to maximize the use of digital technology to create products and services that contribute to forming better living habits, striving to enhance corporate value.

【Related information】
- ・LION DIGITAL TRANSFORMATION (Japanese only)
- ・Shorten Toothpaste Composition Development Time by About Half New Experiment Design Method Combining Researcher Knowledge and Data Science Established
- ・High-Precision Prediction of Quality in Body Washes Formulated with New Ingredients – Establishment of a New Machine Learning Model Integrating Data Science with Researchers' Expertise (Japanese only)
- ・Accelerating Manufacturing DX with Proprietary AI –Launch of Development of the Original Generative AI Model "LION LLM" with Researchers' Expertise (Japanese only)

LION Digital Transformation "The Science of Habits"

Inspired by the vision of using digital technology and data science that apply the science of human behavior to the creation of new products and services that foster better living habits, we have adopted "The Science of Habits" as our digital strategy slogan. By leveraging digital technology, we will elevate management standards, enhance operational efficiency and strengthen key areas, thereby contributing to the realization of "strengthening profitability" as outlined in our medium-term management plan, Vision 2030 2nd STAGE.