

〈講 演〉

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精密医療の実現に向けた情報科学と生命医科学の新たな統合

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New Integration of Informatics and Biomedical Sciences for Realization of Precision Medicine

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Abstract

Biomedical science to date has created domain knowledge through typification using natural language, hypotheses based on causal models, and hypothesis testing using statistics. However, domain knowledge cannot be used to realize personalized medicine or preventive medicine based on life course data. This is because the life system is a nonlinear open system. To overcome this problem, we have developed discriminators and predictors using machine learning. Furthermore, to improve the reproducibility of machine learning predictions, we have developed a method to link the identification of targets by machine learning and domain knowledge systematized as a network structure through the concept of states. In addition to probabilistic predictive inference with reference to prior events, we are also investigating the integration of thermodynamics and information science to develop deductive inference based on the second law of thermodynamics.

Key words: open systems, machine learning, Ising model, thermodynamics, deep phenotyping.