

Title	リスクマネジメントにおける機械学習と知識創造の統合アプローチ 機械参加型 (machine-in-the-loop) プロセスの提案
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Abstract

In a knowledge society where knowledge workers become core competence in economy, business and industrial environment has been drastically changing with the increasing diversification of customer needs in global markets and the rapid technological changes of the Internet, machine learning, and artificial intelligence (AI). In order to establish a sustainable competitive advantage in such a situation, manufacturers are urged to build the dynamic capability to correspond to unexpected changes by further enhancing project risk management. However, despite of the existence of the standardized risk management process and methods, it is observed that managers often struggle with the effective application of project risk management in practice.

In this study, we assume that the essential challenge of project risk management is "the difficulty of making decisions including trade-offs at the right time for various uncertain events and conditions within limited time, cost, and resources." We provide a new explanation of the difficulty from the point of view of transaction cost theory and prospect theory. Then, we propose "machine-in-the-loop" risk management framework, which uses complementary relationship between human and machine learning models.

Furthermore, we examine a machine learning technique that may support the proposed framework. In general, there is a trade-off relationship that a simple machine learning model with higher interpretability has lower prediction accuracy, while a complex machine learning model with higher prediction accuracy has lower interpretability. In this study, we propose a new machine learning technique called SNB (superposed naive Bayes), which uses a two-step approach, i.e., firstly builds a naive Bayes ensemble via stochastic boosting, and then transforms it into a simple naive Bayes model by linear approximation. The proposed model can provide an effective way for balancing the trade-off between accuracy and interpretability.

Keywords: Project Risk Management, Machine Learning, Knowledge Management, Transaction Cost, Cognitive Bias