SS31: Stochastic Optimization for Complex Adaptive Systems

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1 Short Description of the Session

This special session intends to discuss the recent development of Stochastic Optimization and various efforts to apply these methods to analysis or control of Complex Adaptive Systems. Stochastic optimization has firmly established its place as a useful tool for tackling massive and complex problem. On the other hand, there are still a lot of problems waiting to be solved in complex adaptive systems.

2 The Relevance of the Conference

Stochastic Optimization includes a lot of bio-inspired technique such as evolutionary computation, particle swarm, neural network, fuzzy control and so on. These are the major components of soft computing. Complex Adaptive Systems are very important not only as a optimization methods, but also as problems to be solved.

3 The Contribution to the Topic of the Papers

This session consists of the following five papers:

- **Deep Convolutional Networks for Human Sketches by means of the Evolutionary Deep Learning (ID: 219), Saya Fujino, Naoki Mori and Keinosuke Matsumoto**

  This paper proposes a novel method called evolutionary deep learning (evoDL) that uses a genetic algorithm in order to obtain effective deep learning networks. The generalization ability of the network structure obtained using the proposed method is confirmed by a computer experiment.

- **A proposal of a low-dimensional approach based on DIRECT method and t-SNE for single optimization problems with many variables (ID: 223), Takuya Kaihatsu and Shinya Watanabe**

This paper proposes a new low-dimensional approach for single optimization problems. The feature of its approach is the combination between DIRECT (DIviding RECTangle) algorithm and t-SNE. DIRECT algorithm is used as sampling and t-SNE is chosen as a reduction method.

- **Incremental Learning for SIRMs Fuzzy Systems by Adam method (ID: 228), Shu Matsumura and Tomoharu Nakashima**

  This paper proposes an incremental approach for training SIRMs fuzzy systems. This paper suggests to use the Adam method, which has the advantage of obtaining stable results by automatically adapting the learning rates in the training of model parameters.

- **Estimating the Effect of an External Factor behind an Input-Output Table (ID: 229), Kien Tran, Masao Kubo and Hiroshi Sato**

  This paper proposes a new approach to analyze the input-output network. By introducing imaginary node into the network so as not to change the current situation, we can obtain the hidden relation. The newly added links of the imaginary node represents the relation between the external factor and internal nodes.

- **Performance Comparison of EMO Algorithms on Test Problems with Different Search Space Shape (ID: 237), Yuki Tanigaki, Yusuke Nojima and Hisao Ishibuchi**

  This paper examines the performance of evolutionary multi-objective optimization (EMO) algorithms on various shapes of the search space in the objective space. To analyze EMOs, it proposes a meta-optimization method which can automatically create multi-objective optimization problems (MOPs) for clarifying the advantage and disadvantage of EMO algorithms.