# Efficient Retrieval and Secure Distribution of Information about Nonwritten Cultural Materials

KINOSHITA Hirotsugu, SANO Kenji
NOTO Masato, MATSUZAWA Kazumitsu, MIYATA Sumiko
KOMATSU Daisuke, SUZUKI Kazuhiro

Our joint research is aimed at developing basic technology necessary for information about nonwritten cultural materials to be exchanged and shared among researchers or between researchers and non-experts, and at verifying the effectiveness of the technology by using a demonstration system targeting actual materials and researchers. We will offer a proposal for basic technology required to achieve these goals, and then develop a basic system for Tadami Town's *mingu* (folk implements) record cards. To improve the keyword search function of the Tadami Internet Eco-Museum, unseen relationships will be clarified by using the Web Ontology Language (OWL) for an ontology of nonwritten cultural materials. This will lead to the discovery of new relationships, and enable users to accurately retrieve information they really need. To design a user interface suitable to, for example, creating an ontology of nonwritten cultural materials and retrieving information about them, data will be made visually manageable by regarding each datum as swarm intelligence data that can self-organize, and controlling these data. The proposed management method can be applied to self-organizing methods according to the process of data management. We will propose two information retrieval methods that take the quality of the retrieval process into consideration: a method using ant colony optimization (ACO), a swarm intelligence algorithm; and a method using a so-called "recommender system." To create a system in which personal and confidential information are protected and copyright mediation is autonomously conducted when information about nonwritten cultural materials is retrieved and distributed, we will also propose a digital watermarking method for the copyright management of bilevel line images that embeds information in images, not pixel values, using Bézier curves. Our other proposals include: swarm intelligence that regards access control as "language games," and adapts to changing environments by using a concept of swarm and a concept of heredity; a value exchange system designed to facilitate the documentation, data processing and distribution of nonwritten cultural materials that can reflect a variety of values by taking advantage of a characteristic of community currencies — "value can be set independently"; and a model that uses game theory to satisfy each user under particular conditions.