Methodology for Recognizing Marine Creature by Using Neural Network Based Image Recognition in Shirahama Area: Example of *Dendronephthya gigantea*

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At the 10th Conference for the Convention on Biological Diversity (CBD / COP10) that was held in Nagoya, Aichi Prefecture in October 2010, some global goals were set that form the core of the Strategic Plan for Conserving Biodiversity 2011-2020. The meeting agreed to take urgent and effective action to halt the loss of biodiversity by 2020. One of the goals of Aichi is that by 2020, at least 17% of terrestrial and inland waters, and 10% of coastal and marine waters, especially those that are particularly important to biodiversity and ecosystem services. However, to achieve this goal, several problems need to be overcome. For example, it is unclear where to set up new protected areas and how to expand existing ones. When considering the spatial design of a protected area, it should be considered that protected areas should be located in areas where many species live or areas where valuable organisms are distributed. Therefore, it can be said that spatial distribution information of various species that constitute biodiversity is indispensable for the spatial design of protected areas. From the above background, it can be said that it is necessary to accumulate information on the spatial distribution of various species that constitute biodiversity from the viewpoint of ecosystem protection. It is especially required to collect and accumulate information on seawater environment from the viewpoint of ecosystem protection. Currently, the International Oceanographic Data and Information Exchange (IODE) is known as an international oceanographic data and information exchange system, and the Ocean Biographic Information System (OBIS) is responsible for the database part. OBIS is a database that holds records of the appearance of marine life, and data is collected from various parts of the world. However, OBIS has a problem which is the quantity of data is not enough. Specifically, of the 250,000 species of marine life that have been discovered, only about 120,000 species exist in this database, and only about 56,000 species out of about 33,000 species in the Sea of Japan. In addition, OBIS has spatial data bias because these data are difficult to obtain underwater position information. It has also been found that maintaining these databases requires a great deal of effort. Confirmation work by specialists is required to specify the species, and it is considered that the more data the data amount, the more difficult it becomes. Given this background, I would like to propose a method for identifying species using image recognition. Specifically, we hope to use machine learning to create a comprehensive species-specific model. Such a model reduces the time and effort required to maintain for specialists, and enables species to be confirmed in various regions. We believe that this will affect various areas such as strengthening the marine database, concomitant ecosystem maintenance, and fisheries. In this paper, a classification model of *Dendronephthya gigantea* was created by using underwater image data acquired in the Shirahama area and convolutional neural network. As a result, we observed 83% of accuracy for gray scaled image classification task for *Dendronephthya gigantea.* From our results, it was confirmed that the accuracy did not get better for 60 iterations. This behavior seems to have caused over-learning was confirmed. In particular, the reason why there is no change in accuracy in train step and accuracy in test is considered to be that certain image data is extremely difficult to recognize. Therefore, it is considered necessary to select the data to be used in order to achieve high accuracy.

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