

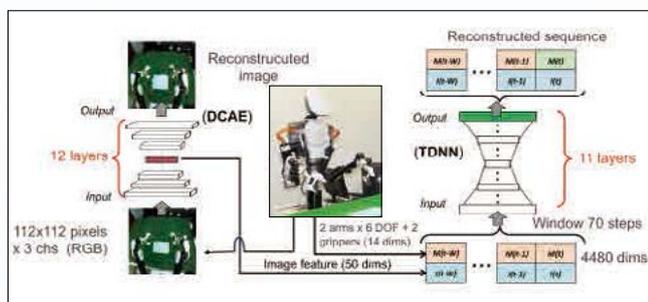
Drawing out the potential of robots with deep learning

AI Robot Capable of Handling Flexible Objects

■ A machine deep learning method for humanoid robots to perform repeated soft-object folding tasks.

Technical Solution

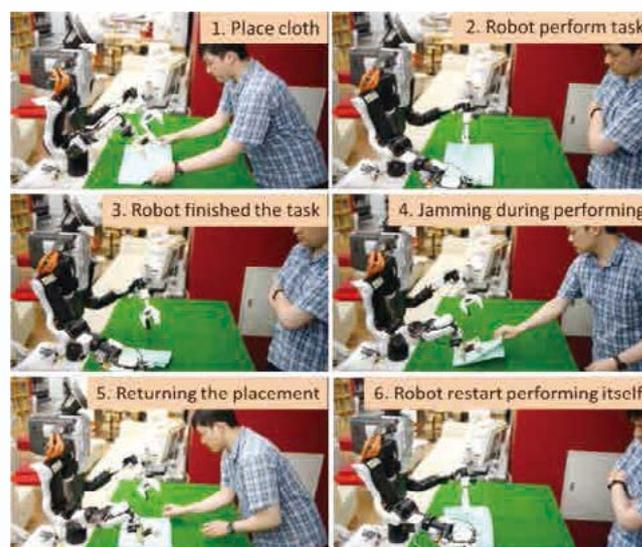
This R&D effort to develop robots that can handle flexible objects will contribute to solving labor shortage problems. This study aims to propose a practical state-of-the-art technology to create a machine-learning based humanoid robot that can perform as a production line worker. The approach should provide an intuitive way for collecting data and the robot worker should be able to learn the same skills as a human worker on a production line. The task design of robotic systems have the following fundamental limitations: (1) It is difficult to adapt to environmental change; and (2) A huge cost is required for motion teaching. Our approach includes (1) a robust motion control that can adapt to environmental change through deep learning with the robot's sensory motor information, and (2) a teleoperation system that can learn a human worker's actions. It is expected that our model will contribute to the introduction of robots into fields such as assembly work as well as other applications in daily life.



The architecture of a robot system with deep learning

Product and Technology Overview

We developed a user interface that displays in real time a first-person perspective projected onto a head mount display device. Using the interface, we propose a two-phase deep learning model: a deep learning convolutional layer auto-encoder that extracts image features and reconstructs images, and a fully connected deep time delay neural network that dynamically learns the operating process of the robot's task from the extracted image features and motion angle signals. This model is being applied to the humanoid robot "Nextage Open," which can learn to repeatedly fold flexible, soft articles.



Wiederholbare Zusammenarbeit bei Tuchfaltung mit Menschen

Overview of NEDO Project involved this innovation

Strategic Advancement in Multi-Purpose Ultra-Human Robot and Artificial Intelligence Technologies

From fiscal 2015, NEDO has been bringing together expert researchers in the field of artificial intelligence to conduct research & development at the National Institute of Advanced Industrial Science and Technology's Artificial Intelligence Research Center (AIRC) as the center of excellence. This R&D project is one of the themes at AIRC.

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