

A Survey Report on 2025 E

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Company E is conducting experiments in collaboration with a research institute to use AI for detecting defects in the Nishijin-ori weaving process. In Nishijin-ori weaving, a single artisan may oversee about three looms simultaneously. If a defect occurs during weaving, the machine must be stopped immediately and the thread unraveled. Therefore, detecting defects as quickly as possible is crucial. In Nishijin weaving, the part facing the back during weaving becomes the front of the finished product. Traditionally, weavers use mirrors to check the back surface while working. Concerned about a decline in weavers due to an aging population, the idea emerged to install cameras instead of mirrors and use AI to detect defects. However, AI models were not sufficiently advanced at the time to make this feasible, so experiments were first conducted on a system using sensors to detect defects and stop the loom. The approach has now shifted from sensors to AI. Efforts are underway to photograph defects when they occur, send the images to a research institute, and train the AI with this data. Testing is currently focused on whether the AI can reliably extract only the defects.

In Nishijin weaving production, defects occur due to factors like loom and thread combinations, or threads sticking together from static electricity in winter. While the causes are often understood, preventing them completely is difficult. Thus, the challenges in Nishijin weaving cannot be solved by AI alone; various factors like machine structure and working environments are involved. Additionally, there is a problem with the declining number of technicians specializing in loom maintenance. Ideally, companies should research and accumulate operational methods and know-how before these technicians disappear. However, a dilemma exists: if companies acquire this technology and become capable of performing maintenance in-house, they risk taking work away from the specialized contractors who traditionally handled these tasks. Previously, attempts were made to prototype machine controllers using the Raspberry Pi microcomputer, but this raised concerns about undermining private industry. While such a device could enable data collection linking temperature, humidity, and defect occurrence, expanding such functionality on commercially available devices is difficult. Consequently, the practical approach moving forward is considered to be cataloging and preserving know-how, with the intention of making it publicly available should successors become unavailable. On the other hand, AI is being utilized not only in manufacturing but also in sales and planning. The company holds data on over 3,000 patterns, and including color combinations results in an enormous variety of products. Consequently, they have begun tagging each product and managing them using RFID. They created a system where scanning a QR code displays the product description, utilizing ChatGPT to generate these descriptions. Simply sending a product photo allows the description to be created, significantly improving efficiency compared to crafting text from scratch.

However, companies actively introducing computers and AI like this remain extremely rare within Nishijin weaving. Many firms are stretched thin just maintaining daily operations. With an increasin

g number of artisans going out of business within the division of labor system, some companies are forced to pursue in-house production. Consequently, many lack the capacity to challenge new technologies. Artisan training primarily occurs through hands-on practice in the workplace. While video-based learning is possible, the infrequency of actual troubleshooting scenarios makes it difficult for knowledge to solidify. This highlights the need for a database of artisan techniques.



The image generated by AI.