A Survey Report on 2025 D

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D Research Institute is an industrial support organization established by Kyoto City, primarily engaged in activities to support regional and traditional industries. Nishijin textiles currently face a major challenge: their highly developed division of labor. The manufacturing process is extremely fragmented, with specialized artisans handling each step. While this system was efficient during the era of mass production, the current decline in output makes passing down the skills for each process difficult. If artisans for a single process disappear, it becomes impossible to produce the product itself. On the sales side, many companies lack direct sales channels and rely heavily on wholesalers, leading to low profit margins. Amidst these challenges, the research institute supports the industry from a technical perspective. For instance, when parts for old looms become unavailable, they use 3D printers and milling machines to create replacement parts and evaluate their durability. They also support machinery maintenance by exploring joint parts ordering and repurposing components from other industries. Furthermore, when control units in older equipment fail, the institute sometimes develops replacement units by combining existing electronic components. Such technologies are often developed through joint research with companies and subsequently transferred to the Nishijin Textile Industry Association to facilitate industry-wide adoption. The institute is also engaged in developing pattern paper design software. In textiles, designs must prevent tangling of the back threads, yet achieving this balance still relies heavily on artisan experience. Looms require stopping operations periodically to replace the shuttle, but increasing this frequency reduces efficiency. Achieving the right balance between preventing thread entanglement and maintaining production efficiency is extremely difficult, and fully replicating this with AI is challenging. However, considering the risk of losing this expertise, it is deemed important to retain some level of automated systems. Furthermore, as part of AI-driven initiatives, research and development is underway for a textile defect detection system. Weavers must constantly monitor the fabric's condition at the loom, which is labor-intensive. Therefore, a system using cameras and computers to automatically monitor the fabric's state is being developed. Traditionally, weavers used mirrors to check the reverse side of the fabric. This system replaces that by capturing images with cameras, where AI detects defects and alerts the craftsman. While issues like foreign particles or loose threads are relatively easy to detect, Nishijin textiles feature complex patterns, making it extremely difficult to distinguish between the design and defects. Therefore, the goal is to develop AI that can learn the characteristics of new designs quickly and detect abnormalities.

Currently, cameras and computers are installed on looms at actual Nishijin and Tango textile companies to collect image data and advance research. The future goal is a system where simply attaching a camera and laptop to a loom and launching the program automatically captures images, performs learning, and adapts automatically even when designs change. This technology is expected to reduce the burden on artisans and support quality control. In this way, Research Institute D conducts multifaceted activities—including R&D,

human resource development, and AI technology utilization—aimed at preserving traditional industrial techniques and supporting the industry. The ultimate goal is to connect traditional industries to the next generation through the coexistence of human artisan skills and AI technology.

The image generated by AI.