CASE STUDY
SHIGA UNIVERSITY

EXPANDING THE POSSIBILITIES OF SPATIAL DATA UTILIZATION

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In recent years, spatial data has been attracting attention for its wide applications and ability to obtain useful information. Shiga University is conducting academic research on spatial data that is expected to see expanded use in the future. Powerful Z by HP workstations accelerate these ultra-heavy loads of arithmetic processing.

Aiming for sustainable city development

Shiga University is a national university in Japan nestled in a corner of the city wall overlooking Hikone Castle. It was established as a university in 1949 following a transition from Hikone Commercial School in 1911 and Hikone College of Economy in 1946.

Currently, the university has an economics faculty, the first faculty of data science in Japan, and a faculty of education on another campus. Katsuya Tanaka, a professor at the Center for Environmental Studies, Faculty of Economics at Shiga University, oversees lectures and seminars as both the Faculty of Economics and the Faculty of Data Science. The theme: spatial analysis of environmental problems.

Tanaka's research focuses on revitalizing the local economy while protecting the environment to create a city that is resilient in the face of disasters. At the center of his work is the analysis and research of spatial data using Geographic Information Systems (GIS).

"When analyzing something spatially, considering the interrelationship between the position of the target and the neighborhood is a heavy burden for the computer to calculate. We use a unit called mesh to divide the area. However, just changing from a 500m mesh to a 250m mesh will increase the arithmetic processing exponentially," Tanaka says. "I've been using HP's older workstations for some time, but in certain cases, it took a few days to complete one calculation, but it froze in the middle due to exhaustion of physical memory. There were times when I couldn't even do it."

High computing power and memory capacity

Those challenges prompted Tanaka to consult with HP to find a way to incorporate specifications essential for analysis using spatial data. It would require a large amount of memory to read the data in the first place.

"After consulting with HP, we introduced the HP Z8 G4 desktop workstation into our laboratory," Tanaka says.

The powerful Z8, with dual configurations of Intel® Xeon® processors, up to 1.5TB of memory, Two NVIDIA RTX graphics cards with NVLink, RAID management with up to five storage devices, can be equipped with advanced technologies and other cutting-edge platforms.

"The mobile workstation I was using before couldn't load a lot of memory. This time, I was able to load 384GB, so that alone improved my analytical ability by an order of magnitude," Tanaka adds.

Since the utilization of spatial data is a relatively new field, GPU acceleration is uncommon, and the tuning method is evolving toward improving the efficiency of thread processing by processor power.

"In the case of calculating with one city as a mesh, and if you expand it to the whole prefecture or the entire province, the memory and processing time will increase. Now the process, which took 10 days in the past, can be completed in one day, " Tanaka says.

The switch from HP's older workstations to the HP Z8 has significantly reduced computational time. As a result, the number of analyses has increased dramatically.

"Data analysis has been tried in every field. It's a process of trial and error. It's better to calculate repeatedly while determining the appropriate value that can be processed," Tanaka explains.

Conducting research remotely

He believes the HP Z8 is indispensable for spatial data analysis. Since computations can take several hours, Tanaka has found use in another HP offering: HP ZCentral Remote Boost.[1]

"I started using HP ZCentral Remote Boost to check the results from home. At the beginning, I didn't feel any delay and the image quality was so good that I sometimes couldn't tell if it was my desktop computer or remote access, "

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Tanaka says. “It is so easy to use that you feel like you are connected to the laboratory remotely because the functions assigned to the keys are different.”

"Due to the impact of COVID-19, the number of times I go to the campus has decreased. I can't take the Z8 desktop home, but I can maneuver the workstation freely from a remote environment, " Tanaka says.

Opening up the future with spatial data

Tanaka’s students, who are ready to graduate, are also examining the promise of spatial data analysis.

Mitsuo Matsumoto pursued research to link abandoned, cultivated land with Satoyama (socio-ecological production landscapes and seascapes) to the conservation of organisms endemic to Japan. He not only looked at the abandoned cultivated land, but also explained the reason why it was born to the region.

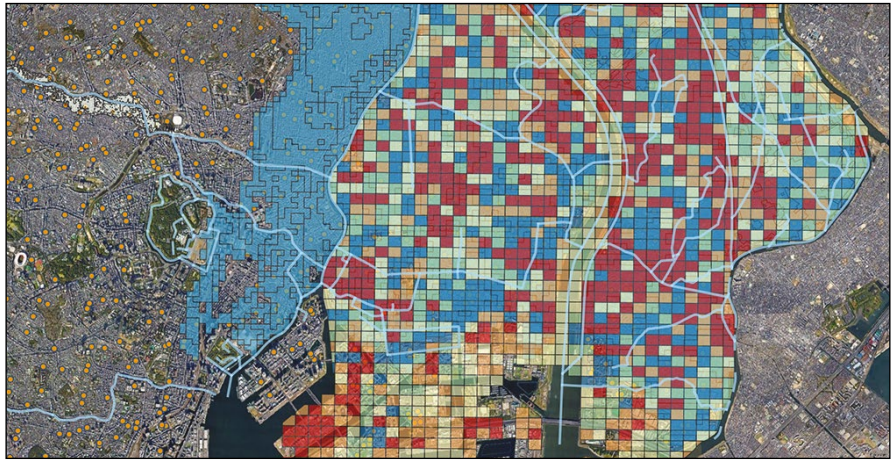
"What I learned here revealed that the use of spatial data can also be applied to biodiversity," Matsumoto says.

Kazune Matsunaga was able to obtain quantitative results with spatial data by analyzing evacuation behaviors during a typhoon in Edogawa-ku, Tokyo. He decided to work for a software developer in the field of disaster prevention.

"I had been researching disaster prevention since I entered the college, so I was hoping for a workplace where I could make use of it. I would like to utilize the experience I learned here to engage in public work in the future," says Mastunaga.

Mai Nimura says that she became interested in revitalization with research on "Shutter Town," a shopping district that is closing, while also considering the relationship between supporting nonprofit organizations and the population of the surrounding area.

"I was studying urban development so I chose a workplace where I could make use of it. I hope I can contribute to better urban planning and development in the future using GIS there as well," Nimura says.



Kazumi Yamamoto studied agricultural environmental policy and analyzed the data collected in economic experiments on performance-linked payment (PFS), which pays only when environmental conservation is successful.

"We found that PFS can protect the environment more efficiently than existing policies," Yamamoto says. By working with a consulting firm that handles big data, Yamamoto plans to use what he learned at Shiga University to support many different companies.

Tanaka expects to continue these analyses by expanding the target area and scope.

"We are also researching an analysis method that reduces the computational load in collaboration with members of the faculty of data science. If this is completed, the results will be more efficient. We are also working to improve the efficiency of processing with GPU computing," adds Tanaka, who is also analyzing point-of-sale data, in collaboration with a major local supermarket.

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[1] HP ZCentral Remote Boost Sender does not come preinstalled on Z Workstations but can be downloaded and run on all Z desktop and laptops without license purchase. With non-Z sender devices, purchase of perpetual individual license or perpetual floating license per simultaneously executing versions and purchase of ZCentral Remote Boost Software Support is required. ZCentral Remote Boost Sender for non-Z Hardware requires a license and Windows 10, RHEL/CentOS (7 or 8), or UBUNTU 18.04 or 20.04 LTS operating systems. macOS (10.14 or newer) operating system and ThinPro 7.2 are only supported on the receiver side. Requires network access. The software is available for download at hp.com/ZCentralRemoteBoost.

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