Reliability and safety of artificial intelligence applications 2

● **Responsible Representative**

Shimizu Taro, Research and Development Directorate Research Unit 3

● **Contact Information**

kaneko Yasuyuki(kaneko.yasuyuki@jaxa.jp)

● **Members**

Yasuyuki Kaneko, Ito Koichiro, Ishihama Naoki

● **Abstract**

We have developed a Vision-Language Model (VLM) for automatic document analysis within JAXA, focusing on creating a local model capable of interactive dialogue, especially with diagrams. In our experiments, we explored new instruction learning methods for diagram recognition and submitted the initial results to the AI Society Conference.

Furthermore, in this project, we used a supercomputer to train and leverage local LLMs (Large Language Models) for internal use, examining their effectiveness within the organization. By using large-scale learning data, we conducted efficient model training and evaluated the performance of the trained models. Through the results and evaluation of this training, we were able to identify key challenges for the next fiscal year, establishing an important foundation for future research.

● **Reasons and benefits of using JAXA Supercomputer System**

The main reason for using JAXA's supercomputers is that they have the computing power to process extremely large datasets and can process highly confidential data. In addition to being able to perform efficient learning even using large, highly confidential datasets, JAXA's supercomputers can demonstrate stable performance when performing large-scale calculations over long periods of time.

● **Achievements of the Year**

This year, we utilized the JAXA supercomputer (JSS) to train and develop a local LLM, confirming its effectiveness compared to a closed-source model. Through this process, the development team gained valuable insights into the required libraries for LLM training, coding practices, and the behavior of the local LLM during the training phase. These insights will be a significant asset for future development initiatives. Moreover, as we discovered that models can be updated quickly, not only does this greatly contribute to improving internal operations, but it also suggests that it could serve as an important foundation for future research and development.

● **Publications**

N/A

● **Usage of JSS**

● **Computational Information**

Process Parallelization Methods	N/A
Thread Parallelization Methods	N/A
Number of Processes	1
Elapsed Time per Case	8 Hour(s)

● **JSS3 Resources Used**

Fraction of Usage in Total Resources[*1](%): 0.00

Details

Computational Resources		
System Name	CPU Resources Used (core x hours)	Fraction of Usage[*2](%)
TOKI-SORA	0.44	0.00
TOKI-ST	445.27	0.00
TOKI-GP	568.63	0.01
TOKI-XM	0.00	0.00
TOKI-LM	212.47	0.02
TOKI-TST	0.00	0.00
TOKI-TGP	0.00	0.00
TOKI-TLM	0.00	0.00

File System Resources		
File System Name	Storage Assigned (GiB)	Fraction of Usage[2] (%)
/home	245.00	0.17
/data and /data2	15,310.00	0.07
/ssd	2,510.00	0.13

Archiver Resources		
Archiver Name	Storage Used (TiB)	Fraction of Usage[2] (%)
J-SPACE	0.00	0.00

[1]: Fraction of Usage in Total Resources: Weighted average of three resource types (Computing, File System, and Archiver).

[2]: Fraction of Usage : Percentage of usage relative to each resource used in one year.

- **ISV Software Licenses Used**

ISV Software Licenses Resources		
	ISV Software Licenses Used (Hours)	Fraction of Usage[2] (%)
ISV Software Licenses (Total)	0.00	0.00

[2]: Fraction of Usage : Percentage of usage relative to each resource used in one year.