

Multivariate time series data analysis

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● Abstract

Knowledge extraction techniques for large datasets are important because the computers and numerical simulation techniques have been highly developed and they are producing a huge amount of data. In this study, we have been developing knowledge extraction tools which extract patterns from large data obtained by unsteady fluid simulations and experiments.

● Reasons and benefits of using JAXA Supercomputer System

To perform large-scale data analysis utilizing the large memory capacity and massively parallel simulations.

● Achievements of the Year

A noise reduction method for high-dimensional time-series data such as the unsteady pressure-sensitive paint measurement data was proposed in this study and its performance was demonstrated by several analysis conducted using the JSS3.

● Publications

- Peer-reviewed papers

Ohmichi, Y., Takahashi, K. & Nakakita, K. Time-series image denoising of pressure-sensitive paint data by projected multivariate singular spectrum analysis. *Exp Fluids* 63, 181 (2022). <https://doi.org/10.1007/s00348-022-03523-5>

● Usage of JSS

● Computational Information

Process Parallelization Methods	N/A
Thread Parallelization Methods	OpenMP
Number of Processes	1
Elapsed Time per Case	12 Hour(s)

● JSS3 Resources Used

Fraction of Usage in Total Resources*1(%): 0.50

Details

Computational Resources		
System Name	CPU Resources Used (core x hours)	Fraction of Usage *2(%)
TOKI-SORA	12,077,263.81	0.53
TOKI-ST	22,297.44	0.02
TOKI-GP	3,152.45	0.13
TOKI-XM	23,981.62	15.00
TOKI-LM	4,483.76	0.30
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	358.10	0.32
/data and /data2	27,591.81	0.21
/ssd	167.62	0.02

Archiver Resources		
Archiver Name	Storage Used (TiB)	Fraction of Usage* ² (%)
J-SPACE	5.27	0.02

*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)	752.69	0.52

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