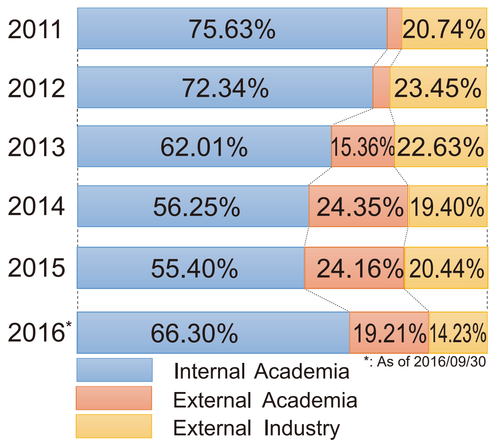
Industrial Use of TSUBAME2.5
Partnership Resource Allocations

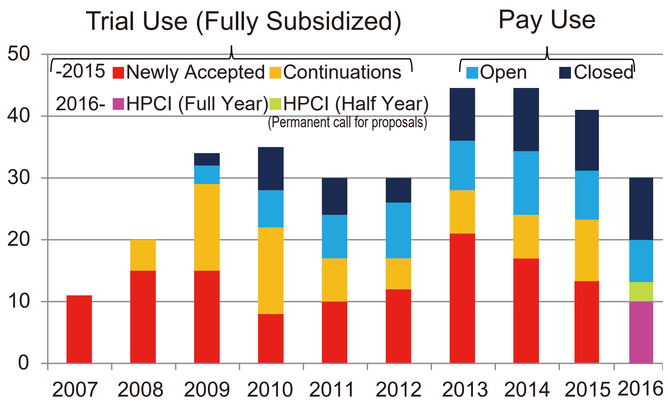
TSUBAME Industrial Use -Statistical Information-

TSUBAME is open to academia and industries. Industrial use started in FY2007.

TSUBAME Usage Profile



The Number of Industrial Projects



How to Use TSUBAME?

User types	Programs	Remarks column
Tokyo Tech Students and Professors		All students have TSUBAME accounts.
Non-Tokyo Tech Users	Partnership Resource Allocations	Academic and Industrial Use
	HPCI/JHPCN	Academic and Industrial Use Supported by MEXT
Industrial Users	Project for Creation of Research Platforms and Sharing of Advanced Research Infrastructure (-2015) HPCI/JHPCN (2016-)	Industrial Use Supported by MEXT
Foreign Researchers	International Collaboration	
Collaborators with Tokyo Tech Professors	Research Collaboration based on Research Fund or Industrial Contracts	

TSUBAME Services

Menu	Publicity	Price	Remarks
Trial Use	Open	Free	Supported by MEXT
Pay Use	Open	$0.39/NodeH	
	Closed	$1.57/NodeH	

Exchange rate is calculated with $1 = ¥102.

Intellectual properties are reserved completely by the users and are not required to be shared with Tokyo Tech.
"NodeH" is the unit for pricing. 1 NodeH is equivalent to 1 node for 1 hour.
For example, if you pay $39, you can use 100 nodes for 1 hour, or 1 node for 100 hours.
Each node has 2 Intel Xeon processors (12 cores) and 3 NVIDIA Tesla K20x GPUs, with 56GB Memory.
"Publicity: Open" requires company name, division, purpose to use and the report of result to be published.
"Publicity: Closed" only requires company name to be published.

Distributed Computing for Machine Learning on Large-Scale Image Dataset

Ikuro Sato, Ryutaro Watanabe*, Hiroki Nishimura**, Akihiro Nomura***, Satoshi Matsuoka*** (*DENSO IT LABORATORY, INC., **DENSO CORPORATION, ***Tokyo Institute of Technology)*
(This article is extracted from TSUBAME e-Science Journal Vol 14.)

Intensive researches have been revealing that machine-learning methods known as Deep Neural Networks (DNNs) show great classification capabilities through supervised training on massive datasets. This research aims to quantify a condition that primarily controls classification capabilities, and generate a high-performing ensemble classifier consisting of plural DNN models. As for the training, we used node-distributed machine-learning program that we developed from scratch. As many as 96 GPUs are used to train a single DNN model. Most models are trained during the TSUBAME Grand Challenge, using 1146 GPUs simultaneously at peak, reaching about 1 TFLOPS (single) per GPU in the cost derivative parts.

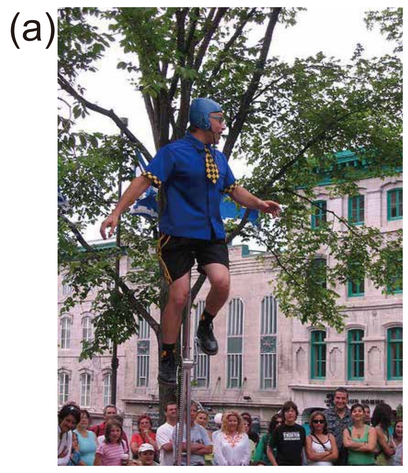
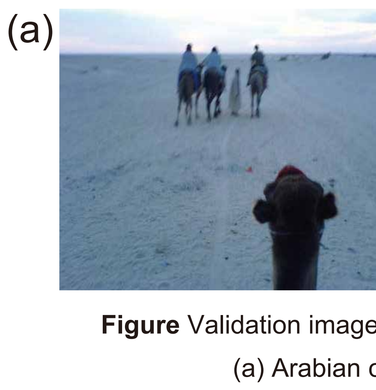


Figure Validation images correctly classified by our model.
(a) Unicycle, (b) paddle, (c) bubble.



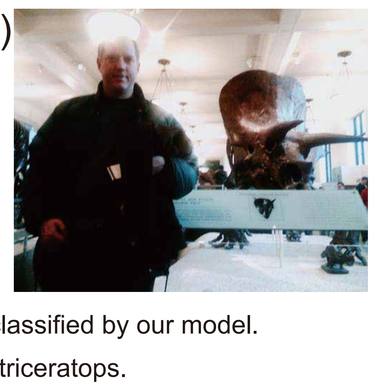


Figure Validation images falsely classified by our model.
(a) Arabian camel, (b) triceratops.

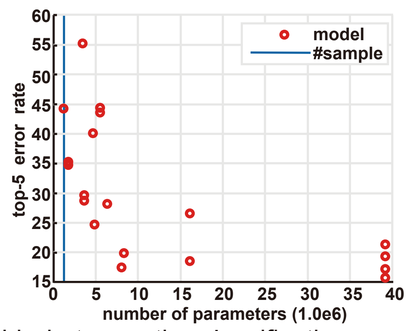


Figure The relationship between the classification accuracy and the number of training parameters. The blue line indicates the number of training samples.

Numerical simulation of air/water multiphase flows for ceramic sanitary ware design by multiple GPUs

Akio Ikebata, Shinya Yoshida*, Feng Xiao** (*TOTO LTD., **Tokyo Institute of Technology)* *(This article is extracted from TSUBAME e-Science Journal Vol 8.)*

We have been developing an in-house CAE air/water two-phase numerical code for various purposes in design and manufacturing of plumbing products such as ceramic sanitary wares. In order to re-produce the complex interfacial flows of air and water with adequate accuracy, large scale computations are required with reliable numerical model, which is of great challenge. To this end, we have made efforts to improve the numerical schemes and port the code to the GPU platforms to accelerate the large scale computations for real-case applications. We have implemented large-scale simulation on the TSUBAME2.0 supercomputer by making effective use of the GPGPU architecture, and achieved significant improvement in both computational performance and simulation results.

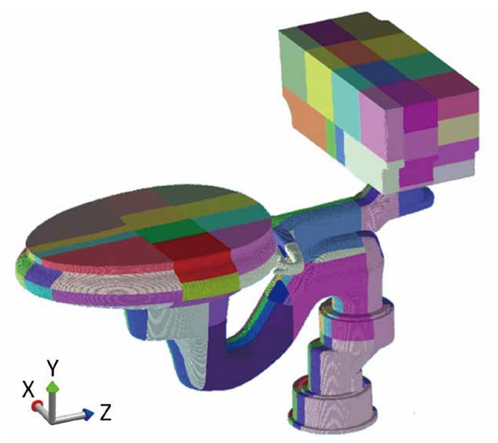


Figure Three dimensional parallel partition.
(conceptual rendering)

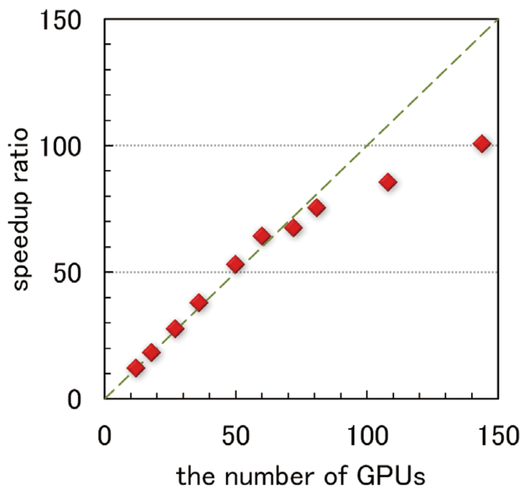


Figure Speedup of PCG solver by multi-GPUs.

Figure Real case simulation of Sanitary set by TSUBAME2.0 supercomputer.