

ZDC-Sim

Geant4 and ML progress
2024.08.05.

articles:

<https://vocus.cc/article/65ee9d51fd89780001eb4d59>

<https://www.eettaiwan.com/20200304nt02-ai-gets-its-own-system-of-numbers/>

Is my GPU suffice?

```
>>> import transformers
>>> transformers.utils.import_utils.is_torch_bf16_gpu_available()
```

True

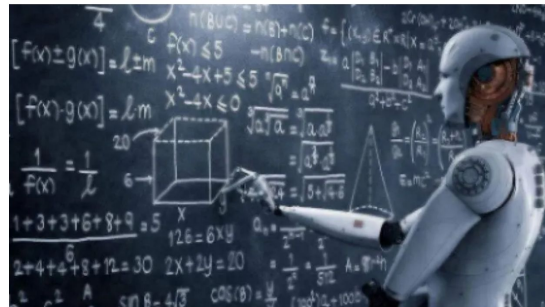
exactly supported range?

```
>>> import torch
>>> torch.finfo(torch.bfloat16)
finfo(resolution=0.01, min=-3.38953e+38, max=3.38953e+38, eps=0.0078125,
smallest_normal=1.17549e-38, tiny=1.17549e-38, dtype=bfloat16)
```

加速AI深度學習 BF16浮點格式應運而生

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為了加速AI深度學習(DL)的效能，包括Google、英特爾和Arm等越來越多公司開始導入BF16，但這種新的浮點格式可能成為深度學習運算主流？



全新的數字格式——‘BF16’，專為人工智慧(AI)/深度學習(DL)應用最佳化發展而來，有時也稱為‘BFloat16’或‘Brain Float 16’。它一開始是由Google Brain團隊發明，並用於其第三代Tensor Processing Unit (TPU)。如今已被Google、英特爾(Intel)、Arm等許多公司的AI加速器廣泛採用。

ConvL2LFlows Thesis : <https://arxiv.org/abs/2405.20407v2#>

indico.cern.ch(Abstract of ConvL2LFlows)

Code :

<https://github.com/FLC-QU-hep/ConvL2LFlow?tab=readme-ov-file>

DataSet3 :

<https://zenodo.org/records/6366324>

prepare data sets

```
python scripts/convert_challenge.py --shape 45 50 18 data/dataset_3_1.hdf5 data/dataset_3_2.hdf5  
data/dataset_3.h5
```

```
python scripts/convert_challenge.py --shape 45 50 18 data/dataset_3_3.hdf5 data/dataset_3_4.hdf5  
data/dataset_3_test.h5
```

```
python scripts/calc_layer_e.py -t 1.515e-5 data/dataset_3.h5
```

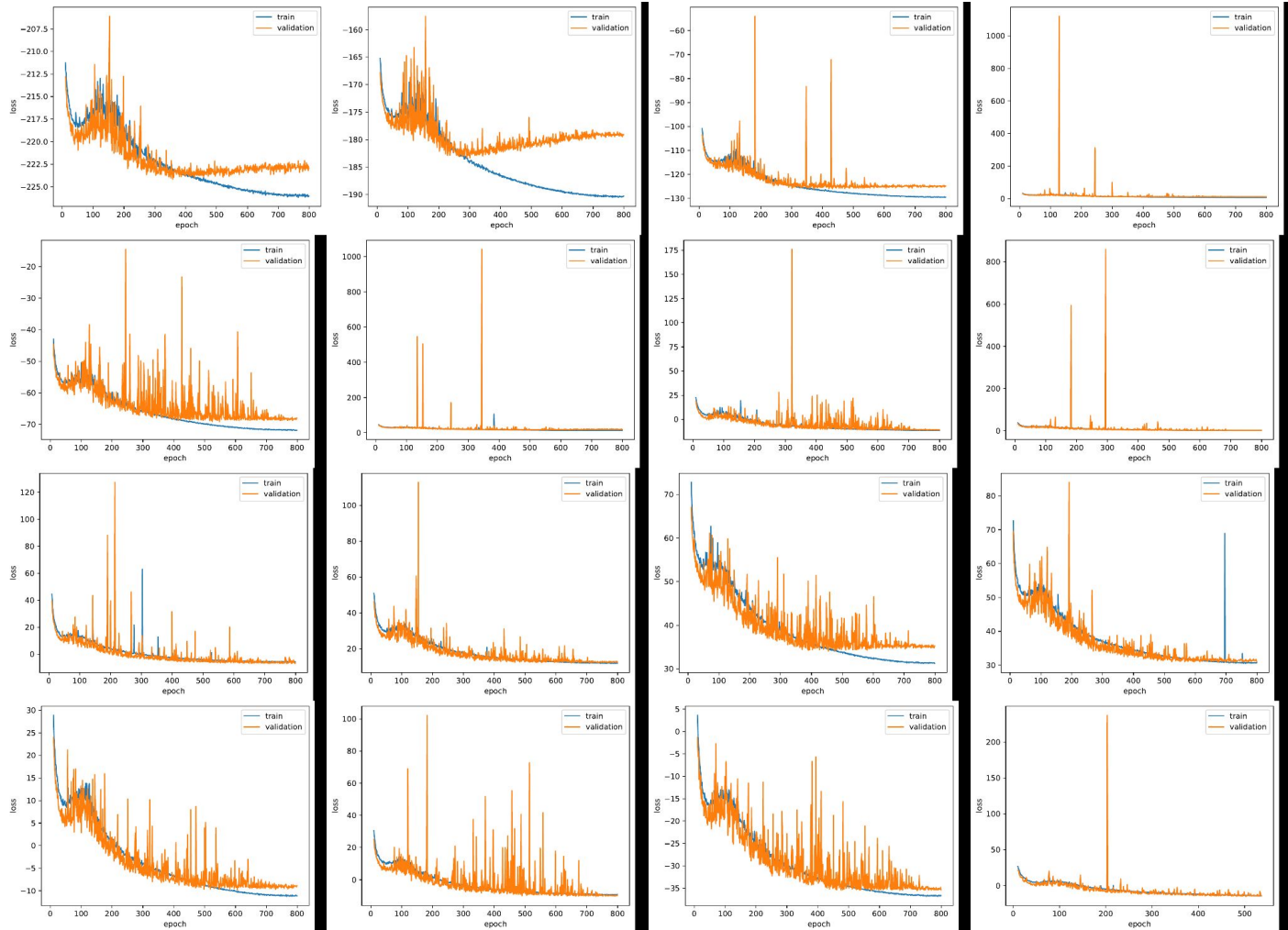
```
python scripts/calc_layer_e.py -t 1.515e-5 data/dataset_3_test.h5
```

```
data/dataset_3_1.hdf5: (50000, 45, 50, 18) data/dataset_3_2.hdf5: (50000, 45, 50, 18) (100000, 45, 18, 50)
```

```
data/dataset_3_3.hdf5: (50000, 45, 50, 18) data/dataset_3_4.hdf5: (50000, 45, 50, 18) (100000, 45, 18, 50)
```

```
process key: 18x50
```

```
process key: 18x50
```



Progress so far.
This 4x4 png
collects 16 png
files from
losses00.pdf to
losses15.pdf in
direction leftup to
rightdown.

ConvL2LFlows Thesis :

 [arXiv.org Convolutional L2LFlows: Generating Accurate Showers in High...](#)

 [indico.cern.ch\(Abtract of ConvL2LFlows\)](#)

Code :

 [GitHub GitHub - FLC-QU-hep/ConvL2LFlow: A flow-based generative ML ...](#)

Dataset 3 :

 [Zenodo Fast Calorimeter Simulation Challenge 2022 - Dataset 3](#)

Progress Target —> setup environment and run code : (as note)

 [Installing Linux OS and CUDA for ML](#)

 [Four Steps to mount ML enviroment.](#)

 [Rerun the ML results from the convL2LFlows thesis.](#)

run code **progress so far**

<<There should be a folder named results containing two sub folders
one for the energy distribution flow and one for the causal flows.

Both contain a `run.sh` file which you can use to start the training.

After the training has finished you can generate new samples

using following command (you have to adapt the names of the result folders):> >

 **Information Technology Education**(note : run ML with CUDA)

Need to do: How to know the model scores ?What is ILD?

Anything I need to do , just let me know.

To see how the architecture on  [GitHub FLC-QU-hep](#)

Reference articles :

 [arXiv.org Deep Generative Models for Detector Signature Simulation: A...](#)

 [Machine Learning in High-Energy Physics](#)

 [arXiv.org L2LFlows: Generating High-Fidelity 3D Calorimeter Images](#)

 [indico.cern.ch\(Slide tell about ILD\)](#)

Get started.

[Geant4 Overview](#)

[What is Geant4 ?Detector4What?](#)

What is Monte Carlo Simulation ?

 [HEXP_C5.pdf](#) 6146.9KB

 [HEXP_C11.pdf](#) 3572.2KB

Download

 [Gabriele Cosmo](#) [Download Geant4-11.2.2](#)

Docs

[Physics Reference Manual](#)

 [Physics Reference Manual — Physics Reference Manual 11.2 do...](#)

 [Geant4 Advanced Examples](#)

Installing [Geant4 on Ubuntu OS.](#)

Helpful tools :

 [Home Page | HSF Training Center](#)

 [Geant4 Geant4 Tutorials](#)

 [Physics Matters Geant4 Tutorial 1: Installation and Testing of Geant4](#)

Surf from basic to advanced on [Geant4 examples.](#)

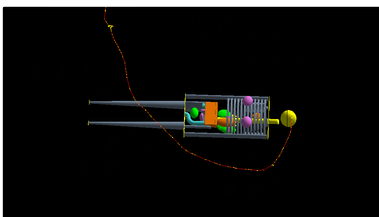
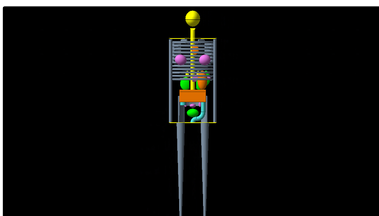
 [gitlab.cern.ch](#)

Rerun Basic B1:


 [Algorithm Bebras Chippy DataStructure - GEANT4 toolkit HEP](#)

Rerun Advanced:

 [Geant4 Advanced Example human_phantom](#)



Recent developments in Geant4  [www.sciencedirect.com](#)

 [和ChatGPT聊Geant4和機器學習以及FPGA.pdf](#) 152.0KB

Please make sure to cite the following papers if you use Geant4:[Permalink](#)

[Recent Developments in Geant4](#), J. Allison et al., Nucl. Instrum. Meth. A 835 (2016) 186-225

[Geant4 Developments and Applications](#), J. Allison et al., IEEE Trans. Nucl. Sci. 53 (2006) 270-278

[Geant4 - A Simulation Toolkit](#), S. Agostinelli et al., Nucl. Instrum. Meth. A 506 (2003) 250-303