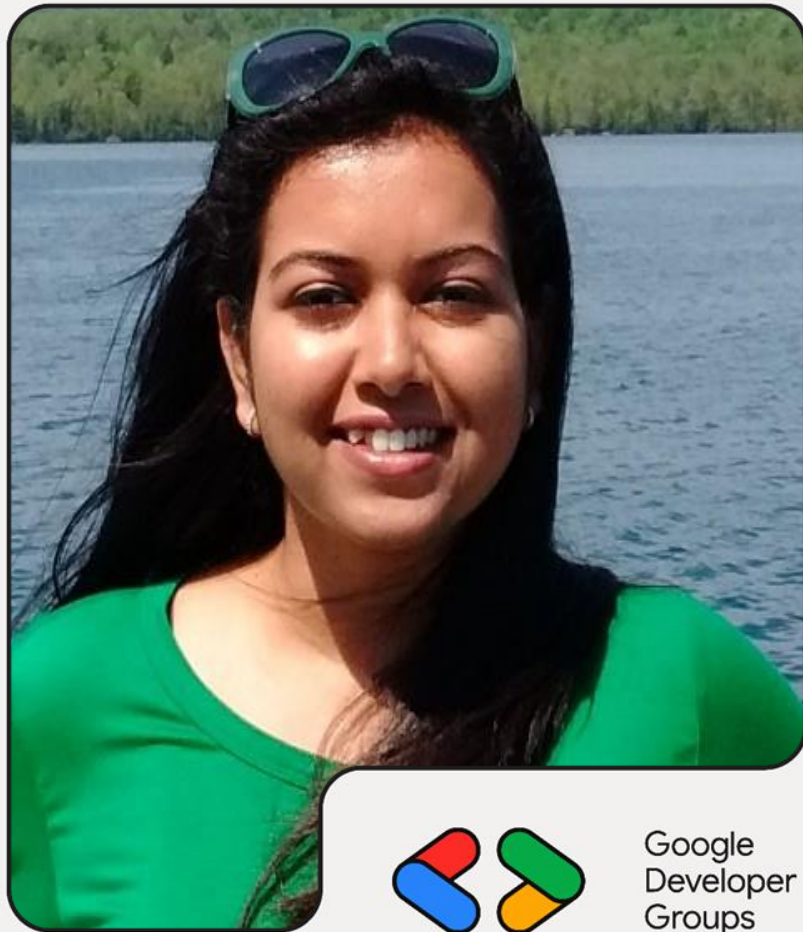


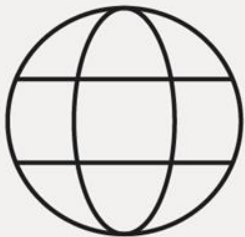
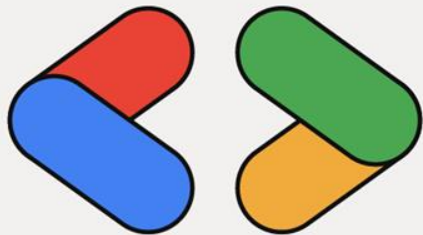


# Visualizing Neural Network Training with PyTorch.

**Ankita Guha**

Data Analyst Programmer II, Freudenberg e-Power System  
PyTorch Ambassador



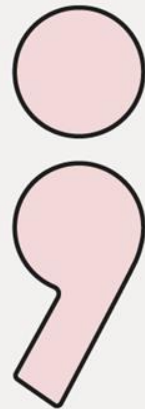


**\* Data Source:**

<https://github.com/zalandoresearch/fashion-mnist>

**\* GitHub Repo:**

<https://github.com/ankitaguhaokland/Google-Michigan-Dev-Fest-2025>



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# Next Steps

(1)

Download the Fashion-MNIST data source

(2)

Clone the Repo/Download the Jupyter Notebook

(3)

Make sure to create your own Virtual Environment

(4)

Activate your Environment

(5)

Install all Packages from “requirements.txt” file

# Virtual Env Creation & Activation

( 1 )

## Create a new conda environment

`conda create -n "VirtualEnvName"`

### If no Python:

`conda create -n "VirtualEnvName" Python 3.11.14`

( 2 )

## Open Anaconda: Show List of Environments

`conda info --envs`

( 3 )

## Activate Environment

`conda activate "VirtualEnvName"`

( 4 )

## Install all the packages

`pip install -r requirements.txt`


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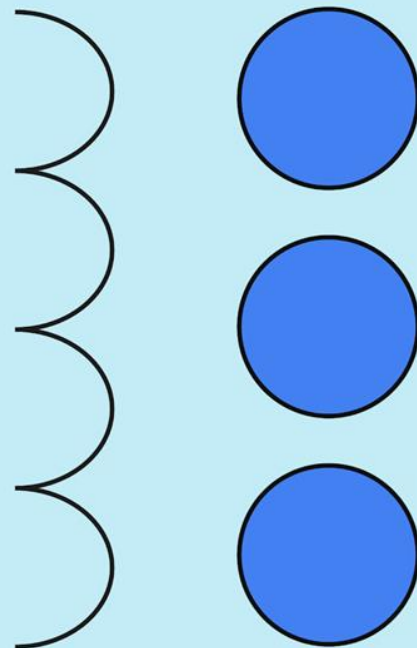


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# Setting Up the Data & Neural Network



- 
- Load, Process and Transform the Data (Image Sample).
  - Split the data into Training & Testing dataset.
  - Use “DataLoader” to build the Data Pipeline.
  - Label the Data to identify various Images.
  - Visualize few sample Data Images.
  - Architecture of CNN.
  - Define Learning Rate & Momentum.



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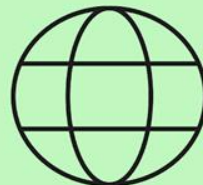
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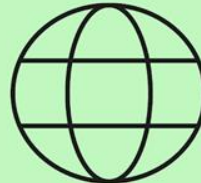
# TensorBoard: Model Training Visualization



- ❑ Set up the TensorBoard
- ✓ Make sure to install "tensorboard" & "TensorFlow" before running the "*tensorboard --logdir=runs*"
- ✓ To make localhost visible to everyone:  
"*tensorboard --logdir=runs --bind\_all*"
- ❑ Writing initial "Images" should be visible on TensorBoard
- ❑ Models Inspection: "Graphs" on TensorBoard
- ❑ Statistical Data Analysis: "Projector" on TensorBoard
- ❑ Model Performance Tracking: "Scalars" on TensorBoard
- ❑ Model Prediction: "Images" on TensorBoard
- ❑ Assessing Model Training: "PR Curves" on TensorBoard



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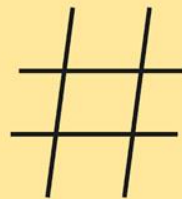


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# Initial Image Grid: IMAGES



TensorBoard

TIME SERIES

IMAGES

☐ Show actual image size

Brightness adjustment



RESET

Contrast adjustment



RESET

Runs

Write a regex to filter runs



fashion\_mnist\_experiment\_1

TOGGLE ALL RUNS

runs

🔍 Filter tags (regular expressions supported)

four\_fashion\_mnist\_images

four\_fashion\_mnist\_images

step 0

Wed Nov 05 2025 19:47:29 Eastern Standard Time

fashion\_mnist\_experiment\_1

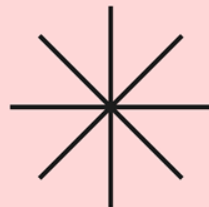


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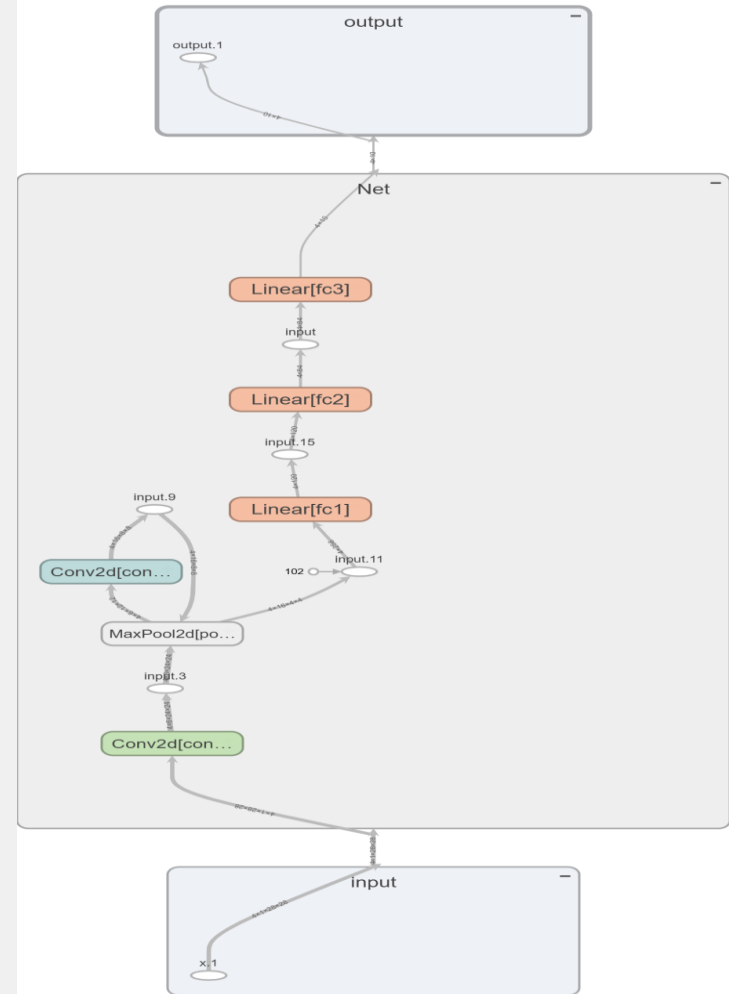
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# Models Inspection: GRAPHS



# NN Architecture – LeNet

1. Classical LeNet-like or LeNet-derived.
2. Simplification and modernization of the original LeNet-5 architecture developed by Yann LeCun.
3. Two Convolutional Blocks (Conv-Pool Sequence): Sequential Nature of alternating Convolution & Pooling Layer > Spatial Features.
4. Full Connectivity for Classification: Model flattens resulting feature maps into a single vector and uses three standard fully-connected (dense) layers for classification.

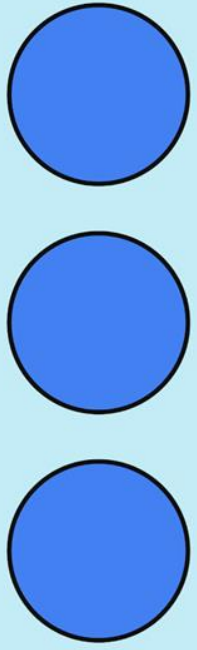


## TensorBoard - GRAPHS: TPU Compatibility

The screenshot displays the TensorBoard interface with the 'PROJECTOR' tab selected. The main area shows a computational graph with nodes and edges. A legend on the left explains the symbols: pink oval for 'Valid Op', blue oval for 'Invalid Op', black oval for 'Namespace', black oval with a question mark for 'OpNode', black oval with a question mark for 'Unconnected series', black oval with a question mark for 'Connected series', black oval with a question mark for 'Constant', black oval with a question mark for 'Summary', black arrow for 'Dataflow edge', black dashed arrow for 'Control dependency edge', and orange arrow for 'Reference edge'. The graph shows a central 'Net' node with various inputs and outputs. A 'TPU Compatibility' panel on the right indicates 0% compatibility, listing 51 incompatible operations. The operations listed include 'input/x.1', 'output/output.1', 'Net/input.3', 'Net/input.9', 'Net/input.11', 'Net/102', 'Net/input.15', 'Net/input', 'Net/Conv2d[conv1]/input.1', 'Net/Conv2d[conv1]/152', 'Net/Conv2d[conv1]/153', 'Net/Conv2d[conv1]/154', 'Net/Conv2d[conv1]/147', 'Net/Conv2d[conv1]/155', 'Net/Conv2d[conv1]/149', 'Net/Conv2d[conv1]/147', 'Net/Conv2d[conv1]/146', 'Net/MaxPool2d[pool]/input.5', and 'MaxPool2d[pool]/input.5'.



# Statistical Data Analysis: PROJECTOR



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# Statistical Data Analysis: PROJECTOR



# TensorBoard - PROJECTOR

TensorBoard

TIME SERIES

IMAGES

GRAPHS

PROJECTOR

INACTIVE



DATA

2 tensors found  
default:00000

Label by  
label

- Color by  
label
- Coat 7
  - T-shirt/top 10
  - Ankle Boot 13
  - Trouser 9
  - Dress 10
  - Sneaker 11
  - Bag 9

UMAP T-SNE PCA CUSTOM

X Component #1 Y Component #2

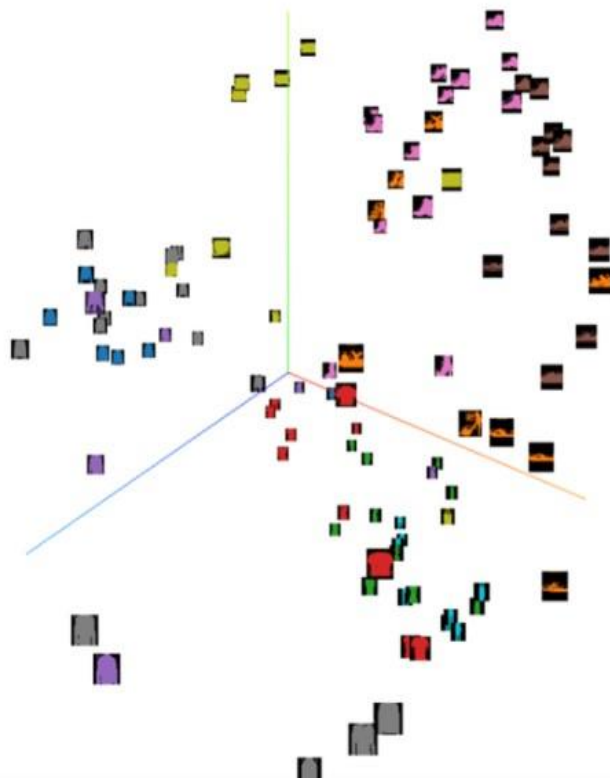
Z Component #3 ☒

PCA is approximate. ?

Total variance described: 54.7%.



Points: 100 | Dimension: 784



Show all data

Isolate selection

Clear selection

Search

By  
label

BOOKMARKS (0) ?

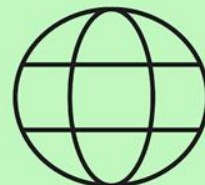


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# Model Performance Tracking: SCALARS



- ☐ Show data download links
- ☒ Ignore outliers in chart scaling

Tooltip sorting method: default

Smoothing

0.6

Horizontal Axis

STEP

RELATIVE

WALL

Runs

Write a regex to filter runs

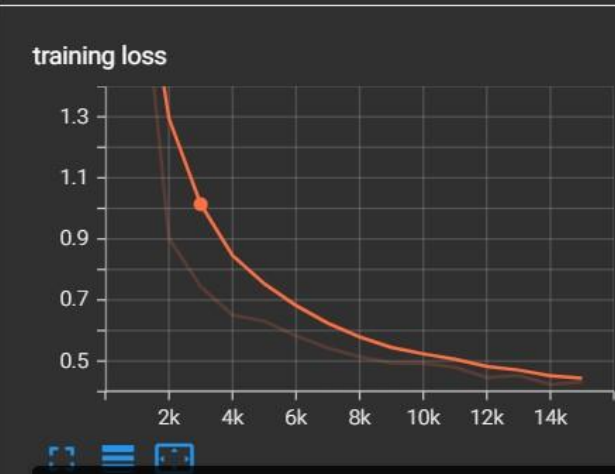
☒ ☐ fashion\_mnist\_experiment\_1

TOGGLE ALL RUNS

runs

Filter tags (regular expressions supported)

training loss



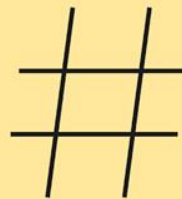
Name	Smoothed	Value	Step	Time	Relative
fashion_mnist_experiment_1	1.014	0.7435	2.999k	Sun Nov 16, 13:54:22	7s

Mobile  
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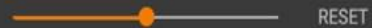
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# Model Prediction: IMAGES



☒ Show actual image size

Brightness adjustment



Contrast adjustment



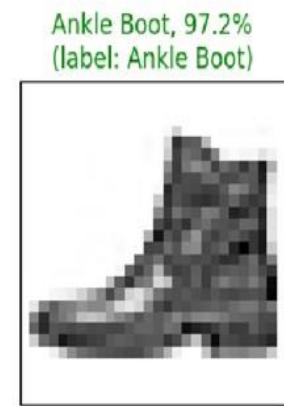
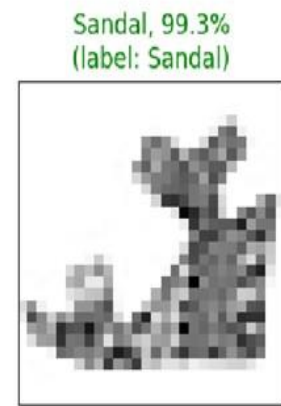
Runs

Write a regex to filter runs

☒ ☐ fashion\_mnist\_experiment\_1

TOGGLE ALL RUNS

runs

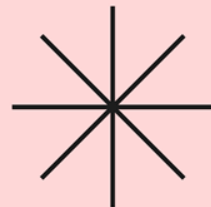


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# Assessing Models Training: PR CURVES



# TensorBoard - PR CURVES

TensorBoard

TIME SERIES

SCALARS

IMAGES

GRAPHS

PR CURVES

PROJECTOR

Time Display Type

STEP

RELATIVE

WALL

☒ fashion\_mnist\_experiment\_1  
step 0

Runs

Write a regex to filter runs

☒ ☐ fashion\_mnist\_experiment\_1

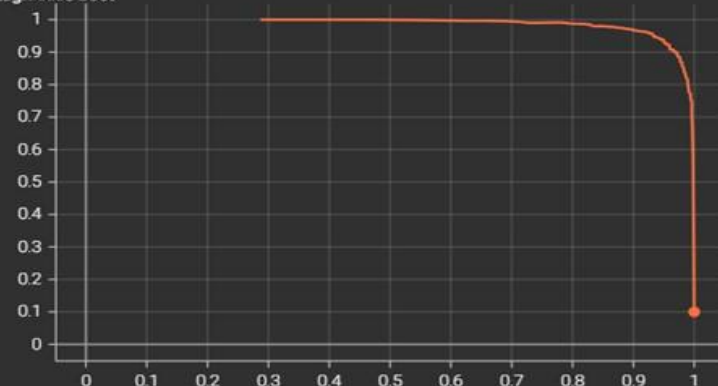
TOGGLE ALL RUNS

runs

Filter tags (regular expressions supported)

Ankle Boot

Ankle Boot  
tag: Ankle Boot



☒ fashion\_mnist\_experiment\_1 is at step 0  
(Sun Nov 16 2025 14:25:25 GMT-0500 (Eastern Standard Time))

Bag

Coat

Dress



## References

## Citations



- **PyTorch:**

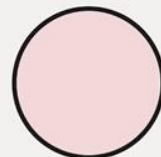
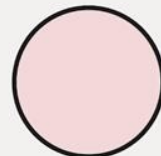
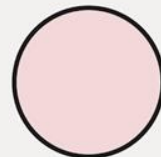
[https://docs.pytorch.org/tutorials/intermediate/tensorboard\\_tutorial.html](https://docs.pytorch.org/tutorials/intermediate/tensorboard_tutorial.html)

- **CNN Image Processing:**

<https://svitla.com/blog/cnn-for-image-processing/>

- **CNN Architecture Diagram:**

<https://www.linkedin.com/pulse/what-convolutional-neural-network-cnn-deep-learning-nafiz-shahriar/>



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 PyTorch **AMBASSADOR**



Ankita Guha

*Data Analyst Programmer II, Freudenberg*



Invitation to join PyTorch Community Michigan



# HAPPY TO CONNECT!



Ankita Guha

Data Analyst Programmer | PyTorch  
Ambassador '25 | Women Tech Makers Am...

