baseline 50

# TRAIN PHASE

2025-03-12 00:09:21.250568: E external/local\_xla/xla/stream\_executor/cuda/cuda\_fft.cc:477] Unable to register cuFFT factory: Attempting to register factory for plugin cuFFT when one has already been registered

WARNING: All log messages before absl::InitializeLog() is called are written to STDERR

E0000 00:00:1741738161.270500 3538 cuda\_dnn.cc:8310] Unable to register cuDNN factory: Attempting to register factory for plugin cuDNN when one has already been registered

E0000 00:00:1741738161.276673 3538 cuda\_blas.cc:1418] Unable to register cuBLAS factory: Attempting to register factory for plugin cuBLAS when one has already been registered

2025-03-12 00:09:21.298725: I tensorflow/core/platform/cpu\_feature\_guard.cc:210] This TensorFlow binary is optimized to use available CPU instructions in performance-critical operations.

To enable the following instructions: AVX2 AVX512F FMA, in other operations, rebuild TensorFlow with the appropriate compiler flags.

[2025-03-12 00:09:27,266][\_\_main\_\_][INFO] -

Config:

user: single\_user

dataset:

train:

- user: 89335547

session: 2021-06-03-1622765527-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-06-02-1622681518-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-06-04-1622863166-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-07-22-1627003020-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-07-21-1626916256-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-07-22-1627004019-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-06-05-1622885888-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-06-02-1622679967-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-06-03-1622764398-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-07-21-1626917264-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-06-05-1622889105-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-06-03-1622766673-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-06-04-1622861066-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-07-22-1627001995-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-06-05-1622884635-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-07-21-1626915176-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

val:

- user: 89335547

session: 2021-06-04-1622862148-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

test:

- user: 89335547

session: 2021-06-02-1622682789-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

root: ${hydra:runtime.cwd}/data

to\_tensor:

\_target\_: emg2qwerty.transforms.ToTensor

fields:

- emg\_left

- emg\_right

band\_rotation:

\_target\_: emg2qwerty.transforms.ForEach

transform:

\_target\_: emg2qwerty.transforms.RandomBandRotation

offsets:

- -1

- 0

- 1

temporal\_jitter:

\_target\_: emg2qwerty.transforms.TemporalAlignmentJitter

max\_offset: 120

logspec:

\_target\_: emg2qwerty.transforms.LogSpectrogram

n\_fft: 64

hop\_length: 16

specaug:

\_target\_: emg2qwerty.transforms.SpecAugment

n\_time\_masks: 3

time\_mask\_param: 25

n\_freq\_masks: 2

freq\_mask\_param: 4

transforms:

train:

- ${to\_tensor}

- ${band\_rotation}

- ${temporal\_jitter}

- ${logspec}

- ${specaug}

val:

- ${to\_tensor}

- ${logspec}

test: ${transforms.val}

module:

\_target\_: emg2qwerty.lightning.TDSConvCTCModule

in\_features: 528

mlp\_features:

- 384

block\_channels:

- 24

- 24

- 24

- 24

kernel\_width: 32

datamodule:

\_target\_: emg2qwerty.lightning.WindowedEMGDataModule

window\_length: 8000

padding:

- 1800

- 200

optimizer:

\_target\_: torch.optim.Adam

lr: 0.001

lr\_scheduler:

scheduler:

\_target\_: pl\_bolts.optimizers.lr\_scheduler.LinearWarmupCosineAnnealingLR

warmup\_epochs: 10

max\_epochs: ${trainer.max\_epochs}

warmup\_start\_lr: 1.0e-08

eta\_min: 1.0e-06

interval: epoch

decoder:

\_target\_: emg2qwerty.decoder.CTCGreedyDecoder

seed: 1501

batch\_size: 32

num\_workers: 4

train: true

checkpoint: null

monitor\_metric: val/CER

monitor\_mode: min

trainer:

accelerator: gpu

devices: 1

num\_nodes: 1

max\_epochs: 50

default\_root\_dir: ${hydra:runtime.output\_dir}

callbacks:

- \_target\_: pytorch\_lightning.callbacks.LearningRateMonitor

- \_target\_: pytorch\_lightning.callbacks.ModelCheckpoint

dirpath: ${hydra:runtime.output\_dir}/checkpoints

monitor: ${monitor\_metric}

mode: ${monitor\_mode}

save\_last: true

verbose: true

Global seed set to 1501

[2025-03-12 00:09:27,270][\_\_main\_\_][INFO] - Instantiating LightningModule {'\_target\_': 'emg2qwerty.lightning.TDSConvCTCModule', 'in\_features': 528, 'mlp\_features': [384], 'block\_channels': [24, 24, 24, 24], 'kernel\_width': 32}

[2025-03-12 00:09:27,355][\_\_main\_\_][INFO] - Instantiating LightningDataModule {'\_target\_': 'emg2qwerty.lightning.WindowedEMGDataModule', 'window\_length': 8000, 'padding': [1800, 200]}

GPU available: True (cuda), used: True

TPU available: False, using: 0 TPU cores

IPU available: False, using: 0 IPUs

HPU available: False, using: 0 HPUs

Missing logger folder: /content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/emg2qwerty-main/logs/2025-03-12/00-09-27/lightning\_logs

LOCAL\_RANK: 0 - CUDA\_VISIBLE\_DEVICES: [0]

/usr/local/lib/python3.11/dist-packages/pl\_bolts/\_\_init\_\_.py:11: FutureWarning: In the future `np.object` will be defined as the corresponding NumPy scalar.

if not hasattr(numpy, tp\_name):

/usr/local/lib/python3.11/dist-packages/pl\_bolts/\_\_init\_\_.py:11: FutureWarning: In the future `np.bool` will be defined as the corresponding NumPy scalar.

if not hasattr(numpy, tp\_name):

/usr/local/lib/python3.11/dist-packages/pl\_bolts/models/self\_supervised/amdim/amdim\_module.py:34: UnderReviewWarning: The feature generate\_power\_seq is currently marked under review. The compatibility with other Lightning projects is not guaranteed and API may change at any time. The API and functionality may change without warning in future releases. More details:<https://lightning-bolts.readthedocs.io/en/latest/stability.html>

"lr\_options": generate\_power\_seq(LEARNING\_RATE\_CIFAR, 11),

/usr/local/lib/python3.11/dist-packages/pl\_bolts/models/self\_supervised/amdim/amdim\_module.py:92: UnderReviewWarning: The feature FeatureMapContrastiveTask is currently marked under review. The compatibility with other Lightning projects is not guaranteed and API may change at any time. The API and functionality may change without warning in future releases. More details:<https://lightning-bolts.readthedocs.io/en/latest/stability.html>

contrastive\_task: Union[FeatureMapContrastiveTask] = FeatureMapContrastiveTask("01, 02, 11"),

/usr/local/lib/python3.11/dist-packages/pl\_bolts/losses/self\_supervised\_learning.py:228: UnderReviewWarning: The feature AmdimNCELoss is currently marked under review. The compatibility with other Lightning projects is not guaranteed and API may change at any time. The API and functionality may change without warning in future releases. More details:<https://lightning-bolts.readthedocs.io/en/latest/stability.html>

self.nce\_loss = AmdimNCELoss(tclip)

/usr/local/lib/python3.11/dist-packages/hydra/\_internal/instantiate/\_instantiate2.py:92: UnderReviewWarning: The feature LinearWarmupCosineAnnealingLR is currently marked under review. The compatibility with other Lightning projects is not guaranteed and API may change at any time. The API and functionality may change without warning in future releases. More details:<https://lightning-bolts.readthedocs.io/en/latest/stability.html>

return \_target\_(\*args, \*\*kwargs)

| Name | Type | Params

----------------------------------------

0 | model | Sequential | 5.3 M

1 | ctc\_loss | CTCLoss | 0

2 | metrics | ModuleDict | 0

----------------------------------------

5.3 M Trainable params

0 Non-trainable params

5.3 M Total params

21.173 Total estimated model params size (MB)

Sanity Checking: 0it [00:00, ?it/s]/usr/local/lib/python3.11/dist-packages/torch/utils/data/dataloader.py:558: UserWarning: This DataLoader will create 4 worker processes in total. Our suggested max number of worker in current system is 2, which is smaller than what this DataLoader is going to create. Please be aware that excessive worker creation might get DataLoader running slow or even freeze, lower the worker number to avoid potential slowness/freeze if necessary.

warnings.warn(\_create\_warning\_msg(

Sanity Checking DataLoader 0: 0% 0/2 [00:00<?, ?it/s]/usr/local/lib/python3.11/dist-packages/torch/nn/modules/conv.py:456: UserWarning: Plan failed with a cudnnException: CUDNN\_BACKEND\_EXECUTION\_PLAN\_DESCRIPTOR: cudnnFinalize Descriptor Failed cudnn\_status: CUDNN\_STATUS\_NOT\_SUPPORTED (Triggered internally at ../aten/src/ATen/native/cudnn/Conv\_v8.cpp:919.)

return F.conv2d(input, weight, bias, self.stride,

Epoch 0: 94% 120/127 [02:32<00:08, 1.27s/it, loss=122, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 0: 100% 127/127 [02:38<00:00, 1.25s/it, loss=122, v\_num=0]

Epoch 0: 100% 127/127 [02:38<00:00, 1.25s/it, loss=122, v\_num=0]Epoch 0, global step 120: 'val/CER' reached 1358.08594 (best 1358.08594), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/emg2qwerty-main/logs/2025-03-12/00-09-27/checkpoints/epoch=0-step=120.ckpt' as top 1

Epoch 1: 94% 120/127 [01:48<00:06, 1.11it/s, loss=3.43, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 1: 100% 127/127 [01:54<00:00, 1.11it/s, loss=3.43, v\_num=0]

Epoch 1: 100% 127/127 [01:54<00:00, 1.11it/s, loss=3.43, v\_num=0]Epoch 1, global step 240: 'val/CER' reached 100.00000 (best 100.00000), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/emg2qwerty-main/logs/2025-03-12/00-09-27/checkpoints/epoch=1-step=240.ckpt' as top 1

Epoch 2: 94% 120/127 [01:48<00:06, 1.10it/s, loss=3.25, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 2: 100% 127/127 [01:54<00:00, 1.11it/s, loss=3.25, v\_num=0]

Epoch 2: 100% 127/127 [01:54<00:00, 1.11it/s, loss=3.25, v\_num=0]Epoch 2, global step 360: 'val/CER' was not in top 1

Epoch 3: 94% 120/127 [01:45<00:06, 1.14it/s, loss=3.21, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 3: 100% 127/127 [01:50<00:00, 1.15it/s, loss=3.21, v\_num=0]

Epoch 3: 100% 127/127 [01:50<00:00, 1.15it/s, loss=3.21, v\_num=0]Epoch 3, global step 480: 'val/CER' was not in top 1

Epoch 4: 94% 120/127 [01:48<00:06, 1.11it/s, loss=3.19, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 4: 100% 127/127 [01:54<00:00, 1.11it/s, loss=3.19, v\_num=0]

Epoch 4: 100% 127/127 [01:54<00:00, 1.11it/s, loss=3.19, v\_num=0]Epoch 4, global step 600: 'val/CER' was not in top 1

Epoch 5: 94% 120/127 [01:46<00:06, 1.12it/s, loss=3.03, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 5: 100% 127/127 [01:52<00:00, 1.13it/s, loss=3.03, v\_num=0]

Epoch 5: 100% 127/127 [01:52<00:00, 1.13it/s, loss=3.03, v\_num=0]Epoch 5, global step 720: 'val/CER' was not in top 1

Epoch 6: 94% 120/127 [01:45<00:06, 1.13it/s, loss=2.99, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 6: 100% 127/127 [01:50<00:00, 1.15it/s, loss=2.99, v\_num=0]

Epoch 6: 100% 127/127 [01:50<00:00, 1.15it/s, loss=2.99, v\_num=0]Epoch 6, global step 840: 'val/CER' was not in top 1

Epoch 7: 94% 120/127 [01:47<00:06, 1.12it/s, loss=2.9, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 7: 100% 127/127 [01:53<00:00, 1.12it/s, loss=2.9, v\_num=0]

Epoch 7: 100% 127/127 [01:53<00:00, 1.12it/s, loss=2.9, v\_num=0]Epoch 7, global step 960: 'val/CER' was not in top 1

Epoch 8: 94% 120/127 [01:48<00:06, 1.10it/s, loss=2.92, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 8: 100% 127/127 [01:54<00:00, 1.11it/s, loss=2.92, v\_num=0]

Epoch 8: 100% 127/127 [01:54<00:00, 1.11it/s, loss=2.92, v\_num=0]Epoch 8, global step 1080: 'val/CER' was not in top 1

Epoch 9: 94% 120/127 [01:49<00:06, 1.10it/s, loss=2.68, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 9: 100% 127/127 [01:54<00:00, 1.11it/s, loss=2.68, v\_num=0]

Epoch 9: 100% 127/127 [01:54<00:00, 1.11it/s, loss=2.68, v\_num=0]Epoch 9, global step 1200: 'val/CER' reached 99.86708 (best 99.86708), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/emg2qwerty-main/logs/2025-03-12/00-09-27/checkpoints/epoch=9-step=1200.ckpt' as top 1

Epoch 10: 94% 120/127 [01:50<00:06, 1.09it/s, loss=2.5, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 10: 100% 127/127 [01:55<00:00, 1.10it/s, loss=2.5, v\_num=0]

Epoch 10: 100% 127/127 [01:55<00:00, 1.10it/s, loss=2.5, v\_num=0]Epoch 10, global step 1320: 'val/CER' reached 96.16748 (best 96.16748), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/emg2qwerty-main/logs/2025-03-12/00-09-27/checkpoints/epoch=10-step=1320.ckpt' as top 1

Epoch 11: 94% 120/127 [01:51<00:06, 1.07it/s, loss=2.32, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 11: 100% 127/127 [01:56<00:00, 1.09it/s, loss=2.32, v\_num=0]

Epoch 11: 100% 127/127 [01:56<00:00, 1.09it/s, loss=2.32, v\_num=0]Epoch 11, global step 1440: 'val/CER' reached 89.63226 (best 89.63226), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/emg2qwerty-main/logs/2025-03-12/00-09-27/checkpoints/epoch=11-step=1440.ckpt' as top 1

Epoch 12: 94% 120/127 [01:47<00:06, 1.11it/s, loss=2.29, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 12: 100% 127/127 [01:54<00:00, 1.11it/s, loss=2.29, v\_num=0]

Epoch 12: 100% 127/127 [01:54<00:00, 1.11it/s, loss=2.29, v\_num=0]Epoch 12, global step 1560: 'val/CER' reached 83.47364 (best 83.47364), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/emg2qwerty-main/logs/2025-03-12/00-09-27/checkpoints/epoch=12-step=1560.ckpt' as top 1

Epoch 13: 94% 120/127 [01:48<00:06, 1.10it/s, loss=2.05, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 13: 100% 127/127 [01:54<00:00, 1.11it/s, loss=2.05, v\_num=0]

Epoch 13: 100% 127/127 [01:54<00:00, 1.11it/s, loss=2.05, v\_num=0]Epoch 13, global step 1680: 'val/CER' reached 80.03988 (best 80.03988), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/emg2qwerty-main/logs/2025-03-12/00-09-27/checkpoints/epoch=13-step=1680.ckpt' as top 1

Epoch 14: 94% 120/127 [01:49<00:06, 1.10it/s, loss=1.92, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 14: 100% 127/127 [01:54<00:00, 1.11it/s, loss=1.92, v\_num=0]

Epoch 14: 100% 127/127 [01:54<00:00, 1.11it/s, loss=1.92, v\_num=0]Epoch 14, global step 1800: 'val/CER' reached 72.35268 (best 72.35268), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/emg2qwerty-main/logs/2025-03-12/00-09-27/checkpoints/epoch=14-step=1800.ckpt' as top 1

Epoch 15: 94% 120/127 [01:45<00:06, 1.13it/s, loss=1.86, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 15: 100% 127/127 [01:50<00:00, 1.15it/s, loss=1.86, v\_num=0]

Epoch 15: 100% 127/127 [01:50<00:00, 1.15it/s, loss=1.86, v\_num=0]Epoch 15, global step 1920: 'val/CER' reached 69.29552 (best 69.29552), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/emg2qwerty-main/logs/2025-03-12/00-09-27/checkpoints/epoch=15-step=1920.ckpt' as top 1

Epoch 16: 94% 120/127 [01:47<00:06, 1.12it/s, loss=1.82, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 16: 100% 127/127 [01:53<00:00, 1.12it/s, loss=1.82, v\_num=0]

Epoch 16: 100% 127/127 [01:53<00:00, 1.12it/s, loss=1.82, v\_num=0]Epoch 16, global step 2040: 'val/CER' reached 67.61188 (best 67.61188), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/emg2qwerty-main/logs/2025-03-12/00-09-27/checkpoints/epoch=16-step=2040.ckpt' as top 1

Epoch 17: 94% 120/127 [01:47<00:06, 1.12it/s, loss=1.64, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 17: 100% 127/127 [01:52<00:00, 1.13it/s, loss=1.64, v\_num=0]

Epoch 17: 100% 127/127 [01:52<00:00, 1.13it/s, loss=1.64, v\_num=0]Epoch 17, global step 2160: 'val/CER' reached 64.77625 (best 64.77625), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/emg2qwerty-main/logs/2025-03-12/00-09-27/checkpoints/epoch=17-step=2160.ckpt' as top 1

Epoch 18: 94% 120/127 [01:47<00:06, 1.12it/s, loss=1.5, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 18: 100% 127/127 [01:52<00:00, 1.13it/s, loss=1.5, v\_num=0]

Epoch 18: 100% 127/127 [01:52<00:00, 1.13it/s, loss=1.5, v\_num=0]Epoch 18, global step 2280: 'val/CER' reached 51.55073 (best 51.55073), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/emg2qwerty-main/logs/2025-03-12/00-09-27/checkpoints/epoch=18-step=2280.ckpt' as top 1

Epoch 19: 94% 120/127 [01:46<00:06, 1.13it/s, loss=1.38, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 19: 100% 127/127 [01:53<00:00, 1.12it/s, loss=1.38, v\_num=0]

Epoch 19: 100% 127/127 [01:53<00:00, 1.12it/s, loss=1.38, v\_num=0]Epoch 19, global step 2400: 'val/CER' reached 38.19229 (best 38.19229), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/emg2qwerty-main/logs/2025-03-12/00-09-27/checkpoints/epoch=19-step=2400.ckpt' as top 1

Epoch 20: 94% 120/127 [01:48<00:06, 1.11it/s, loss=1.23, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 20: 100% 127/127 [01:52<00:00, 1.12it/s, loss=1.23, v\_num=0]

Epoch 20: 100% 127/127 [01:52<00:00, 1.12it/s, loss=1.23, v\_num=0]Epoch 20, global step 2520: 'val/CER' reached 34.71422 (best 34.71422), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/emg2qwerty-main/logs/2025-03-12/00-09-27/checkpoints/epoch=20-step=2520.ckpt' as top 1

Epoch 21: 94% 120/127 [01:52<00:06, 1.06it/s, loss=1.26, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 21: 100% 127/127 [01:57<00:00, 1.08it/s, loss=1.26, v\_num=0]

Epoch 21: 100% 127/127 [01:57<00:00, 1.08it/s, loss=1.26, v\_num=0]Epoch 21, global step 2640: 'val/CER' was not in top 1

Epoch 22: 94% 120/127 [01:51<00:06, 1.08it/s, loss=1.16, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 22: 100% 127/127 [01:56<00:00, 1.09it/s, loss=1.16, v\_num=0]

Epoch 22: 100% 127/127 [01:56<00:00, 1.09it/s, loss=1.16, v\_num=0]Epoch 22, global step 2760: 'val/CER' reached 32.47674 (best 32.47674), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/emg2qwerty-main/logs/2025-03-12/00-09-27/checkpoints/epoch=22-step=2760.ckpt' as top 1

Epoch 23: 94% 120/127 [01:48<00:06, 1.10it/s, loss=1.11, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 23: 100% 127/127 [01:53<00:00, 1.12it/s, loss=1.11, v\_num=0]

Epoch 23: 100% 127/127 [01:53<00:00, 1.12it/s, loss=1.11, v\_num=0]Epoch 23, global step 2880: 'val/CER' reached 29.37528 (best 29.37528), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/emg2qwerty-main/logs/2025-03-12/00-09-27/checkpoints/epoch=23-step=2880.ckpt' as top 1

Epoch 24: 94% 120/127 [01:48<00:06, 1.11it/s, loss=1.09, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 24: 100% 127/127 [01:54<00:00, 1.11it/s, loss=1.09, v\_num=0]

Epoch 24: 100% 127/127 [01:54<00:00, 1.11it/s, loss=1.09, v\_num=0]Epoch 24, global step 3000: 'val/CER' was not in top 1

Epoch 25: 94% 120/127 [01:51<00:06, 1.08it/s, loss=1.07, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 25: 100% 127/127 [01:57<00:00, 1.08it/s, loss=1.07, v\_num=0]

Epoch 25: 100% 127/127 [01:57<00:00, 1.08it/s, loss=1.07, v\_num=0]Epoch 25, global step 3120: 'val/CER' reached 29.02082 (best 29.02082), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/emg2qwerty-main/logs/2025-03-12/00-09-27/checkpoints/epoch=25-step=3120.ckpt' as top 1

Epoch 26: 94% 120/127 [01:45<00:06, 1.13it/s, loss=0.971, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 26: 100% 127/127 [01:50<00:00, 1.14it/s, loss=0.971, v\_num=0]

Epoch 26: 100% 127/127 [01:50<00:00, 1.14it/s, loss=0.971, v\_num=0]Epoch 26, global step 3240: 'val/CER' reached 26.34027 (best 26.34027), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/emg2qwerty-main/logs/2025-03-12/00-09-27/checkpoints/epoch=26-step=3240.ckpt' as top 1

Epoch 27: 94% 120/127 [01:46<00:06, 1.12it/s, loss=0.999, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 27: 100% 127/127 [01:52<00:00, 1.13it/s, loss=0.999, v\_num=0]

Epoch 27: 100% 127/127 [01:52<00:00, 1.13it/s, loss=0.999, v\_num=0]Epoch 27, global step 3360: 'val/CER' reached 26.22951 (best 26.22951), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/emg2qwerty-main/logs/2025-03-12/00-09-27/checkpoints/epoch=27-step=3360.ckpt' as top 1

Epoch 28: 94% 120/127 [01:47<00:06, 1.12it/s, loss=0.947, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 28: 100% 127/127 [01:53<00:00, 1.12it/s, loss=0.947, v\_num=0]

Epoch 28: 100% 127/127 [01:53<00:00, 1.12it/s, loss=0.947, v\_num=0]Epoch 28, global step 3480: 'val/CER' reached 25.60922 (best 25.60922), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/emg2qwerty-main/logs/2025-03-12/00-09-27/checkpoints/epoch=28-step=3480.ckpt' as top 1

Epoch 29: 94% 120/127 [01:50<00:06, 1.09it/s, loss=0.887, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 29: 100% 127/127 [01:55<00:00, 1.10it/s, loss=0.887, v\_num=0]

Epoch 29: 100% 127/127 [01:55<00:00, 1.10it/s, loss=0.887, v\_num=0]Epoch 29, global step 3600: 'val/CER' reached 25.27692 (best 25.27692), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/emg2qwerty-main/logs/2025-03-12/00-09-27/checkpoints/epoch=29-step=3600.ckpt' as top 1

Epoch 30: 94% 120/127 [01:48<00:06, 1.11it/s, loss=0.927, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 30: 100% 127/127 [01:52<00:00, 1.13it/s, loss=0.927, v\_num=0]

Epoch 30: 100% 127/127 [01:52<00:00, 1.13it/s, loss=0.927, v\_num=0]Epoch 30, global step 3720: 'val/CER' reached 25.18830 (best 25.18830), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/emg2qwerty-main/logs/2025-03-12/00-09-27/checkpoints/epoch=30-step=3720.ckpt' as top 1

Epoch 31: 94% 120/127 [01:51<00:06, 1.08it/s, loss=0.79, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 31: 100% 127/127 [01:56<00:00, 1.09it/s, loss=0.79, v\_num=0]

Epoch 31: 100% 127/127 [01:56<00:00, 1.09it/s, loss=0.79, v\_num=0]Epoch 31, global step 3840: 'val/CER' reached 24.32432 (best 24.32432), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/emg2qwerty-main/logs/2025-03-12/00-09-27/checkpoints/epoch=31-step=3840.ckpt' as top 1

Epoch 32: 94% 120/127 [01:48<00:06, 1.10it/s, loss=0.819, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 32: 100% 127/127 [01:55<00:00, 1.10it/s, loss=0.819, v\_num=0]

Epoch 32: 100% 127/127 [01:55<00:00, 1.10it/s, loss=0.819, v\_num=0]Epoch 32, global step 3960: 'val/CER' reached 23.52681 (best 23.52681), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/emg2qwerty-main/logs/2025-03-12/00-09-27/checkpoints/epoch=32-step=3960.ckpt' as top 1

Epoch 33: 94% 120/127 [01:52<00:06, 1.07it/s, loss=0.798, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 33: 100% 127/127 [01:57<00:00, 1.08it/s, loss=0.798, v\_num=0]

Epoch 33: 100% 127/127 [01:57<00:00, 1.08it/s, loss=0.798, v\_num=0]Epoch 33, global step 4080: 'val/CER' reached 22.70713 (best 22.70713), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/emg2qwerty-main/logs/2025-03-12/00-09-27/checkpoints/epoch=33-step=4080.ckpt' as top 1

Epoch 34: 94% 120/127 [01:48<00:06, 1.11it/s, loss=0.776, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 34: 100% 127/127 [01:52<00:00, 1.13it/s, loss=0.776, v\_num=0]

Epoch 34: 100% 127/127 [01:52<00:00, 1.13it/s, loss=0.776, v\_num=0]Epoch 34, global step 4200: 'val/CER' was not in top 1

Epoch 35: 94% 120/127 [01:50<00:06, 1.09it/s, loss=0.738, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 35: 100% 127/127 [01:55<00:00, 1.10it/s, loss=0.738, v\_num=0]

Epoch 35: 100% 127/127 [01:55<00:00, 1.10it/s, loss=0.738, v\_num=0]Epoch 35, global step 4320: 'val/CER' was not in top 1

Epoch 36: 94% 120/127 [01:47<00:06, 1.12it/s, loss=0.758, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 36: 100% 127/127 [01:53<00:00, 1.12it/s, loss=0.758, v\_num=0]

Epoch 36: 100% 127/127 [01:53<00:00, 1.12it/s, loss=0.758, v\_num=0]Epoch 36, global step 4440: 'val/CER' was not in top 1

Epoch 37: 94% 120/127 [01:47<00:06, 1.12it/s, loss=0.709, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 37: 100% 127/127 [01:52<00:00, 1.13it/s, loss=0.709, v\_num=0]

Epoch 37: 100% 127/127 [01:52<00:00, 1.13it/s, loss=0.709, v\_num=0]Epoch 37, global step 4560: 'val/CER' reached 21.66593 (best 21.66593), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/emg2qwerty-main/logs/2025-03-12/00-09-27/checkpoints/epoch=37-step=4560.ckpt' as top 1

Epoch 38: 94% 120/127 [01:50<00:06, 1.09it/s, loss=0.716, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 38: 100% 127/127 [01:54<00:00, 1.10it/s, loss=0.716, v\_num=0]

Epoch 38: 100% 127/127 [01:54<00:00, 1.10it/s, loss=0.716, v\_num=0]Epoch 38, global step 4680: 'val/CER' reached 21.37794 (best 21.37794), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/emg2qwerty-main/logs/2025-03-12/00-09-27/checkpoints/epoch=38-step=4680.ckpt' as top 1

Epoch 39: 94% 120/127 [01:48<00:06, 1.11it/s, loss=0.677, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 39: 100% 127/127 [01:54<00:00, 1.11it/s, loss=0.677, v\_num=0]

Epoch 39: 100% 127/127 [01:54<00:00, 1.11it/s, loss=0.677, v\_num=0]Epoch 39, global step 4800: 'val/CER' was not in top 1

Epoch 40: 94% 120/127 [01:51<00:06, 1.08it/s, loss=0.632, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 40: 100% 127/127 [01:57<00:00, 1.08it/s, loss=0.632, v\_num=0]

Epoch 40: 100% 127/127 [01:57<00:00, 1.08it/s, loss=0.632, v\_num=0]Epoch 40, global step 4920: 'val/CER' reached 21.28932 (best 21.28932), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/emg2qwerty-main/logs/2025-03-12/00-09-27/checkpoints/epoch=40-step=4920.ckpt' as top 1

Epoch 41: 94% 120/127 [01:48<00:06, 1.11it/s, loss=0.666, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 41: 100% 127/127 [01:56<00:00, 1.09it/s, loss=0.666, v\_num=0]

Epoch 41: 100% 127/127 [01:56<00:00, 1.09it/s, loss=0.666, v\_num=0]Epoch 41, global step 5040: 'val/CER' reached 20.15950 (best 20.15950), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/emg2qwerty-main/logs/2025-03-12/00-09-27/checkpoints/epoch=41-step=5040.ckpt' as top 1

Epoch 42: 94% 120/127 [01:49<00:06, 1.10it/s, loss=0.609, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 42: 100% 127/127 [01:53<00:00, 1.11it/s, loss=0.609, v\_num=0]

Epoch 42: 100% 127/127 [01:53<00:00, 1.11it/s, loss=0.609, v\_num=0]Epoch 42, global step 5160: 'val/CER' was not in top 1

Epoch 43: 94% 120/127 [01:53<00:06, 1.06it/s, loss=0.612, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 43: 100% 127/127 [01:58<00:00, 1.07it/s, loss=0.612, v\_num=0]

Epoch 43: 100% 127/127 [01:58<00:00, 1.07it/s, loss=0.612, v\_num=0]Epoch 43, global step 5280: 'val/CER' was not in top 1

Epoch 44: 94% 120/127 [01:54<00:06, 1.05it/s, loss=0.581, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 44: 100% 127/127 [01:59<00:00, 1.06it/s, loss=0.581, v\_num=0]

Epoch 44: 100% 127/127 [01:59<00:00, 1.06it/s, loss=0.581, v\_num=0]Epoch 44, global step 5400: 'val/CER' reached 20.07089 (best 20.07089), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/emg2qwerty-main/logs/2025-03-12/00-09-27/checkpoints/epoch=44-step=5400.ckpt' as top 1

Epoch 45: 94% 120/127 [01:49<00:06, 1.09it/s, loss=0.571, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 45: 100% 127/127 [01:54<00:00, 1.11it/s, loss=0.571, v\_num=0]

Epoch 45: 100% 127/127 [01:54<00:00, 1.11it/s, loss=0.571, v\_num=0]Epoch 45, global step 5520: 'val/CER' reached 19.98228 (best 19.98228), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/emg2qwerty-main/logs/2025-03-12/00-09-27/checkpoints/epoch=45-step=5520.ckpt' as top 1

Epoch 46: 94% 120/127 [01:54<00:06, 1.05it/s, loss=0.596, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 46: 100% 127/127 [01:59<00:00, 1.06it/s, loss=0.596, v\_num=0]

Epoch 46: 100% 127/127 [01:59<00:00, 1.06it/s, loss=0.596, v\_num=0]Epoch 46, global step 5640: 'val/CER' was not in top 1

Epoch 47: 94% 120/127 [01:51<00:06, 1.07it/s, loss=0.579, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 47: 100% 127/127 [01:56<00:00, 1.09it/s, loss=0.579, v\_num=0]

Epoch 47: 100% 127/127 [01:56<00:00, 1.09it/s, loss=0.579, v\_num=0]Epoch 47, global step 5760: 'val/CER' reached 19.87151 (best 19.87151), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/emg2qwerty-main/logs/2025-03-12/00-09-27/checkpoints/epoch=47-step=5760.ckpt' as top 1

Epoch 48: 94% 120/127 [01:51<00:06, 1.07it/s, loss=0.564, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 48: 100% 127/127 [01:57<00:00, 1.08it/s, loss=0.564, v\_num=0]

Epoch 48: 100% 127/127 [01:57<00:00, 1.08it/s, loss=0.564, v\_num=0]Epoch 48, global step 5880: 'val/CER' was not in top 1

Epoch 49: 94% 120/127 [01:49<00:06, 1.09it/s, loss=0.56, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 49: 100% 127/127 [01:56<00:00, 1.09it/s, loss=0.56, v\_num=0]

Epoch 49: 100% 127/127 [01:56<00:00, 1.09it/s, loss=0.56, v\_num=0]Epoch 49, global step 6000: 'val/CER' was not in top 1

`Trainer.fit` stopped: `max\_epochs=50` reached.

Epoch 49: 100% 127/127 [01:56<00:00, 1.09it/s, loss=0.56, v\_num=0]

LOCAL\_RANK: 0 - CUDA\_VISIBLE\_DEVICES: [0]

Validation DataLoader 0: 100% 7/7 [00:01<00:00, 4.52it/s]

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┃ **Runningstage.validating** ┃┃

┃ **metric** ┃ **DataLoader 0** ┃

┡━━━━━━━━━━━━━━━━━━━━━━━━━━━╇━━━━━━━━━━━━━━━━━━━━━━━━━━━┩

│ val/CER │ 19.871511459350586 │

│ val/DER │ 1.5064244270324707 │

│ val/IER │ 5.028799057006836 │

│ val/SER │ 13.336287498474121 │

│ val/loss │ 0.6893314719200134 │

└───────────────────────────┴───────────────────────────┘

LOCAL\_RANK: 0 - CUDA\_VISIBLE\_DEVICES: [0]

Testing DataLoader 0: 100% 1/1 [00:03<00:00, 3.92s/it]

┏━━━━━━━━━━━━━━━━━━━━━━━━━━━┳━━━━━━━━━━━━━━━━━━━━━━━━━━━┓

┃ **Runningstage.testing** ┃┃

┃ **metric** ┃ **DataLoader 0** ┃

┡━━━━━━━━━━━━━━━━━━━━━━━━━━━╇━━━━━━━━━━━━━━━━━━━━━━━━━━━┩

│ test/CER │ 23.25480842590332 │

│ test/DER │ 1.9018802642822266 │

│ test/IER │ 5.057272434234619 │

│ test/SER │ 16.295656204223633 │

│ test/loss │ 0.7394903898239136 │

└───────────────────────────┴───────────────────────────┘

{'val\_metrics': [{'val/loss': 0.6893314719200134,

'val/CER': 19.871511459350586,

'val/IER': 5.028799057006836,

'val/DER': 1.5064244270324707,

'val/SER': 13.336287498474121}],

'test\_metrics': [{'test/loss': 0.7394903898239136,

'test/CER': 23.25480842590332,

'test/IER': 5.057272434234619,

'test/DER': 1.9018802642822266,

'test/SER': 16.295656204223633}],

'best\_checkpoint': '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/emg2qwerty-main/logs/2025-03-12/00-09-27/checkpoints/epoch=47-step=5760.ckpt'}

# TEST PHASE

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]/usr/local/lib/python3.11/dist-packages/torch/nn/modules/conv.py:456: UserWarning: Plan failed with a cudnnException: CUDNN\_BACKEND\_EXECUTION\_PLAN\_DESCRIPTOR: cudnnFinalize Descriptor Failed cudnn\_status: CUDNN\_STATUS\_NOT\_SUPPORTED (Triggered internally at ../aten/src/ATen/native/cudnn/Conv\_v8.cpp:919.)

return F.conv2d(input, weight, bias, self.stride,

Validation DataLoader 0: 100% 7/7 [00:02<00:00, 2.61it/s]

┏━━━━━━━━━━━━━━━━━━━━━━━━━━━┳━━━━━━━━━━━━━━━━━━━━━━━━━━━┓

┃ **Runningstage.validating** ┃┃

┃ **metric** ┃ **DataLoader 0** ┃

┡━━━━━━━━━━━━━━━━━━━━━━━━━━━╇━━━━━━━━━━━━━━━━━━━━━━━━━━━┩

│ val/CER │ 20.02658462524414 │

│ val/DER │ 1.617190957069397 │

│ val/IER │ 4.740806579589844 │

│ val/SER │ 13.668586730957031 │

│ val/loss │ 0.6890256404876709 │

└───────────────────────────┴───────────────────────────┘

LOCAL\_RANK: 0 - CUDA\_VISIBLE\_DEVICES: [0]

Testing DataLoader 0: 100% 1/1 [00:02<00:00, 2.90s/it]

┏━━━━━━━━━━━━━━━━━━━━━━━━━━━┳━━━━━━━━━━━━━━━━━━━━━━━━━━━┓

┃ **Runningstage.testing** ┃┃

┃ **metric** ┃ **DataLoader 0** ┃

┡━━━━━━━━━━━━━━━━━━━━━━━━━━━╇━━━━━━━━━━━━━━━━━━━━━━━━━━━┩

│ test/CER │ 22.779338836669922 │

│ test/DER │ 1.9018802642822266 │

│ test/IER │ 4.689863681793213 │

│ test/SER │ 16.18759536743164 │

│ test/loss │ 0.7364456057548523 │

└───────────────────────────┴───────────────────────────┘

{'val\_metrics': [{'val/loss': 0.6890256404876709,

'val/CER': 20.02658462524414,

'val/IER': 4.740806579589844,

'val/DER': 1.617190957069397,

'val/SER': 13.668586730957031}],

'test\_metrics': [{'test/loss': 0.7364456057548523,

'test/CER': 22.779338836669922,

'test/IER': 4.689863681793213,

'test/DER': 1.9018802642822266,

'test/SER': 16.18759536743164}],

'best\_checkpoint': ''}

vanilla lstm 50

# TRAIN PHASE

2025-03-06 06:13:28.043907: E external/local\_xla/xla/stream\_executor/cuda/cuda\_fft.cc:477] Unable to register cuFFT factory: Attempting to register factory for plugin cuFFT when one has already been registered

WARNING: All log messages before absl::InitializeLog() is called are written to STDERR

E0000 00:00:1741241608.308079 5121 cuda\_dnn.cc:8310] Unable to register cuDNN factory: Attempting to register factory for plugin cuDNN when one has already been registered

E0000 00:00:1741241608.381821 5121 cuda\_blas.cc:1418] Unable to register cuBLAS factory: Attempting to register factory for plugin cuBLAS when one has already been registered

2025-03-06 06:13:28.954458: I tensorflow/core/platform/cpu\_feature\_guard.cc:210] This TensorFlow binary is optimized to use available CPU instructions in performance-critical operations.

To enable the following instructions: AVX2 FMA, in other operations, rebuild TensorFlow with the appropriate compiler flags.

[2025-03-06 06:13:43,618][\_\_main\_\_][INFO] -

Config:

user: single\_user

dataset:

train:

- user: 89335547

session: 2021-06-03-1622765527-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-06-02-1622681518-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-06-04-1622863166-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-07-22-1627003020-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-07-21-1626916256-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-07-22-1627004019-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-06-05-1622885888-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-06-02-1622679967-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-06-03-1622764398-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-07-21-1626917264-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-06-05-1622889105-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-06-03-1622766673-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-06-04-1622861066-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-07-22-1627001995-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-06-05-1622884635-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-07-21-1626915176-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

val:

- user: 89335547

session: 2021-06-04-1622862148-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

test:

- user: 89335547

session: 2021-06-02-1622682789-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

root: ${hydra:runtime.cwd}/data

to\_tensor:

\_target\_: emg2qwerty.transforms.ToTensor

fields:

- emg\_left

- emg\_right

band\_rotation:

\_target\_: emg2qwerty.transforms.ForEach

transform:

\_target\_: emg2qwerty.transforms.RandomBandRotation

offsets:

- -1

- 0

- 1

temporal\_jitter:

\_target\_: emg2qwerty.transforms.TemporalAlignmentJitter

max\_offset: 120

logspec:

\_target\_: emg2qwerty.transforms.LogSpectrogram

n\_fft: 64

hop\_length: 16

specaug:

\_target\_: emg2qwerty.transforms.SpecAugment

n\_time\_masks: 3

time\_mask\_param: 25

n\_freq\_masks: 2

freq\_mask\_param: 4

transforms:

train:

- ${to\_tensor}

- ${band\_rotation}

- ${temporal\_jitter}

- ${logspec}

- ${specaug}

val:

- ${to\_tensor}

- ${logspec}

test: ${transforms.val}

module:

\_target\_: emg2qwerty.lightning.TDSConvCTCModule

in\_features: 528

mlp\_features:

- 384

block\_channels:

- 24

- 24

- 24

- 24

kernel\_width: 32

datamodule:

\_target\_: emg2qwerty.lightning.WindowedEMGDataModule

window\_length: 8000

padding:

- 1800

- 200

optimizer:

\_target\_: torch.optim.Adam

lr: 0.001

lr\_scheduler:

scheduler:

\_target\_: pl\_bolts.optimizers.lr\_scheduler.LinearWarmupCosineAnnealingLR

warmup\_epochs: 10

max\_epochs: ${trainer.max\_epochs}

warmup\_start\_lr: 1.0e-08

eta\_min: 1.0e-06

interval: epoch

decoder:

\_target\_: emg2qwerty.decoder.CTCGreedyDecoder

seed: 1501

batch\_size: 32

num\_workers: 4

train: true

checkpoint: null

monitor\_metric: val/CER

monitor\_mode: min

trainer:

accelerator: gpu

devices: 1

num\_nodes: 1

max\_epochs: 150

default\_root\_dir: ${hydra:runtime.output\_dir}

callbacks:

- \_target\_: pytorch\_lightning.callbacks.LearningRateMonitor

- \_target\_: pytorch\_lightning.callbacks.ModelCheckpoint

dirpath: ${hydra:runtime.output\_dir}/checkpoints

monitor: ${monitor\_metric}

mode: ${monitor\_mode}

save\_last: true

verbose: true

Global seed set to 1501

[2025-03-06 06:13:43,625][\_\_main\_\_][INFO] - Instantiating LightningModule {'\_target\_': 'emg2qwerty.lightning.TDSConvCTCModule', 'in\_features': 528, 'mlp\_features': [384], 'block\_channels': [24, 24, 24, 24], 'kernel\_width': 32}

[2025-03-06 06:13:45,349][\_\_main\_\_][INFO] - Instantiating LightningDataModule {'\_target\_': 'emg2qwerty.lightning.WindowedEMGDataModule', 'window\_length': 8000, 'padding': [1800, 200]}

GPU available: True (cuda), used: True

TPU available: False, using: 0 TPU cores

IPU available: False, using: 0 IPUs

HPU available: False, using: 0 HPUs

Missing logger folder: /content/drive/MyDrive/147project/emg2qwerty-main/logs/2025-03-06/06-13-42/lightning\_logs

LOCAL\_RANK: 0 - CUDA\_VISIBLE\_DEVICES: [0]

/usr/local/lib/python3.11/dist-packages/pl\_bolts/\_\_init\_\_.py:11: FutureWarning: In the future `np.object` will be defined as the corresponding NumPy scalar.

if not hasattr(numpy, tp\_name):

/usr/local/lib/python3.11/dist-packages/pl\_bolts/\_\_init\_\_.py:11: FutureWarning: In the future `np.bool` will be defined as the corresponding NumPy scalar.

if not hasattr(numpy, tp\_name):

/usr/local/lib/python3.11/dist-packages/pl\_bolts/models/self\_supervised/amdim/amdim\_module.py:34: UnderReviewWarning: The feature generate\_power\_seq is currently marked under review. The compatibility with other Lightning projects is not guaranteed and API may change at any time. The API and functionality may change without warning in future releases. More details:<https://lightning-bolts.readthedocs.io/en/latest/stability.html>

"lr\_options": generate\_power\_seq(LEARNING\_RATE\_CIFAR, 11),

/usr/local/lib/python3.11/dist-packages/pl\_bolts/models/self\_supervised/amdim/amdim\_module.py:92: UnderReviewWarning: The feature FeatureMapContrastiveTask is currently marked under review. The compatibility with other Lightning projects is not guaranteed and API may change at any time. The API and functionality may change without warning in future releases. More details:<https://lightning-bolts.readthedocs.io/en/latest/stability.html>

contrastive\_task: Union[FeatureMapContrastiveTask] = FeatureMapContrastiveTask("01, 02, 11"),

/usr/local/lib/python3.11/dist-packages/pl\_bolts/losses/self\_supervised\_learning.py:228: UnderReviewWarning: The feature AmdimNCELoss is currently marked under review. The compatibility with other Lightning projects is not guaranteed and API may change at any time. The API and functionality may change without warning in future releases. More details:<https://lightning-bolts.readthedocs.io/en/latest/stability.html>

self.nce\_loss = AmdimNCELoss(tclip)

/usr/local/lib/python3.11/dist-packages/hydra/\_internal/instantiate/\_instantiate2.py:92: UnderReviewWarning: The feature LinearWarmupCosineAnnealingLR is currently marked under review. The compatibility with other Lightning projects is not guaranteed and API may change at any time. The API and functionality may change without warning in future releases. More details:<https://lightning-bolts.readthedocs.io/en/latest/stability.html>

return \_target\_(\*args, \*\*kwargs)

| Name | Type | Params

----------------------------------------

0 | model | Sequential | 2.9 M

1 | ctc\_loss | CTCLoss | 0

2 | metrics | ModuleDict | 0

----------------------------------------

2.9 M Trainable params

0 Non-trainable params

2.9 M Total params

11.669 Total estimated model params size (MB)

Sanity Checking: 0it [00:00, ?it/s]/usr/local/lib/python3.11/dist-packages/torch/utils/data/dataloader.py:558: UserWarning: This DataLoader will create 4 worker processes in total. Our suggested max number of worker in current system is 2, which is smaller than what this DataLoader is going to create. Please be aware that excessive worker creation might get DataLoader running slow or even freeze, lower the worker number to avoid potential slowness/freeze if necessary.

warnings.warn(\_create\_warning\_msg(

Epoch 0: 94% 120/127 [03:00<00:10, 1.50s/it, loss=173, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 0: 100% 127/127 [03:04<00:00, 1.46s/it, loss=173, v\_num=0]

Epoch 0: 100% 127/127 [03:04<00:00, 1.46s/it, loss=173, v\_num=0]Epoch 0, global step 120: 'val/CER' reached 100.02216 (best 100.02216), saving model to '/content/drive/MyDrive/147project/emg2qwerty-main/logs/2025-03-06/06-13-42/checkpoints/epoch=0-step=120.ckpt' as top 1

Epoch 1: 94% 120/127 [01:41<00:05, 1.18it/s, loss=3.78, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 1: 100% 127/127 [01:48<00:00, 1.17it/s, loss=3.78, v\_num=0]

Epoch 1: 100% 127/127 [01:48<00:00, 1.17it/s, loss=3.78, v\_num=0]Epoch 1, global step 240: 'val/CER' reached 100.00000 (best 100.00000), saving model to '/content/drive/MyDrive/147project/emg2qwerty-main/logs/2025-03-06/06-13-42/checkpoints/epoch=1-step=240.ckpt' as top 1

Epoch 2: 94% 120/127 [01:43<00:06, 1.16it/s, loss=3.41, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 2: 100% 127/127 [01:48<00:00, 1.17it/s, loss=3.41, v\_num=0]

Epoch 2: 100% 127/127 [01:48<00:00, 1.17it/s, loss=3.41, v\_num=0]Epoch 2, global step 360: 'val/CER' was not in top 1

Epoch 3: 94% 120/127 [01:41<00:05, 1.18it/s, loss=3.31, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 3: 100% 127/127 [01:48<00:00, 1.18it/s, loss=3.31, v\_num=0]

Epoch 3: 100% 127/127 [01:48<00:00, 1.18it/s, loss=3.31, v\_num=0]Epoch 3, global step 480: 'val/CER' was not in top 1

Epoch 4: 94% 120/127 [01:42<00:05, 1.17it/s, loss=3.29, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 4: 100% 127/127 [01:47<00:00, 1.18it/s, loss=3.29, v\_num=0]

Epoch 4: 100% 127/127 [01:47<00:00, 1.18it/s, loss=3.29, v\_num=0]Epoch 4, global step 600: 'val/CER' was not in top 1

Epoch 5: 94% 120/127 [01:40<00:05, 1.19it/s, loss=3.26, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 5: 100% 127/127 [01:45<00:00, 1.20it/s, loss=3.26, v\_num=0]

Epoch 5: 100% 127/127 [01:45<00:00, 1.20it/s, loss=3.26, v\_num=0]Epoch 5, global step 720: 'val/CER' was not in top 1

Epoch 6: 94% 120/127 [01:38<00:05, 1.22it/s, loss=3.21, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 6: 100% 127/127 [01:43<00:00, 1.23it/s, loss=3.21, v\_num=0]

Epoch 6: 100% 127/127 [01:43<00:00, 1.23it/s, loss=3.21, v\_num=0]Epoch 6, global step 840: 'val/CER' was not in top 1

Epoch 7: 94% 120/127 [01:39<00:05, 1.20it/s, loss=3.23, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 7: 100% 127/127 [01:46<00:00, 1.20it/s, loss=3.23, v\_num=0]

Epoch 7: 100% 127/127 [01:46<00:00, 1.20it/s, loss=3.23, v\_num=0]Epoch 7, global step 960: 'val/CER' was not in top 1

Epoch 8: 94% 120/127 [01:38<00:05, 1.22it/s, loss=3.24, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 8: 100% 127/127 [01:42<00:00, 1.23it/s, loss=3.24, v\_num=0]

Epoch 8: 100% 127/127 [01:42<00:00, 1.23it/s, loss=3.24, v\_num=0]Epoch 8, global step 1080: 'val/CER' was not in top 1

Epoch 9: 94% 120/127 [01:41<00:05, 1.19it/s, loss=3.15, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 9: 100% 127/127 [01:46<00:00, 1.20it/s, loss=3.15, v\_num=0]

Epoch 9: 100% 127/127 [01:46<00:00, 1.20it/s, loss=3.15, v\_num=0]Epoch 9, global step 1200: 'val/CER' was not in top 1

Epoch 10: 94% 120/127 [01:43<00:06, 1.16it/s, loss=3.09, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 10: 100% 127/127 [01:48<00:00, 1.17it/s, loss=3.09, v\_num=0]

Epoch 10: 100% 127/127 [01:48<00:00, 1.17it/s, loss=3.09, v\_num=0]Epoch 10, global step 1320: 'val/CER' was not in top 1

Epoch 11: 94% 120/127 [01:42<00:05, 1.17it/s, loss=2.99, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 11: 100% 127/127 [01:48<00:00, 1.17it/s, loss=2.99, v\_num=0]

Epoch 11: 100% 127/127 [01:48<00:00, 1.17it/s, loss=2.99, v\_num=0]Epoch 11, global step 1440: 'val/CER' was not in top 1

Epoch 12: 94% 120/127 [01:41<00:05, 1.18it/s, loss=2.9, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 12: 100% 127/127 [01:47<00:00, 1.18it/s, loss=2.9, v\_num=0]

Epoch 12: 100% 127/127 [01:47<00:00, 1.18it/s, loss=2.9, v\_num=0]Epoch 12, global step 1560: 'val/CER' was not in top 1

Epoch 13: 94% 120/127 [01:39<00:05, 1.21it/s, loss=2.67, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 13: 100% 127/127 [01:44<00:00, 1.22it/s, loss=2.67, v\_num=0]

Epoch 13: 100% 127/127 [01:44<00:00, 1.22it/s, loss=2.67, v\_num=0]Epoch 13, global step 1680: 'val/CER' reached 98.38281 (best 98.38281), saving model to '/content/drive/MyDrive/147project/emg2qwerty-main/logs/2025-03-06/06-13-42/checkpoints/epoch=13-step=1680.ckpt' as top 1

Epoch 14: 94% 120/127 [01:41<00:05, 1.18it/s, loss=2.37, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 14: 100% 127/127 [01:47<00:00, 1.18it/s, loss=2.37, v\_num=0]

Epoch 14: 100% 127/127 [01:48<00:00, 1.18it/s, loss=2.37, v\_num=0]Epoch 14, global step 1800: 'val/CER' reached 87.30616 (best 87.30616), saving model to '/content/drive/MyDrive/147project/emg2qwerty-main/logs/2025-03-06/06-13-42/checkpoints/epoch=14-step=1800.ckpt' as top 1

Epoch 15: 94% 120/127 [01:41<00:05, 1.18it/s, loss=2.1, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 15: 100% 127/127 [01:46<00:00, 1.19it/s, loss=2.1, v\_num=0]

Epoch 15: 100% 127/127 [01:46<00:00, 1.19it/s, loss=2.1, v\_num=0]Epoch 15, global step 1920: 'val/CER' reached 74.92246 (best 74.92246), saving model to '/content/drive/MyDrive/147project/emg2qwerty-main/logs/2025-03-06/06-13-42/checkpoints/epoch=15-step=1920.ckpt' as top 1

Epoch 16: 94% 120/127 [01:42<00:06, 1.17it/s, loss=1.85, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 16: 100% 127/127 [01:49<00:00, 1.16it/s, loss=1.85, v\_num=0]

Epoch 16: 100% 127/127 [01:49<00:00, 1.16it/s, loss=1.85, v\_num=0]Epoch 16, global step 2040: 'val/CER' reached 50.75321 (best 50.75321), saving model to '/content/drive/MyDrive/147project/emg2qwerty-main/logs/2025-03-06/06-13-42/checkpoints/epoch=16-step=2040.ckpt' as top 1

Epoch 17: 94% 120/127 [01:41<00:05, 1.18it/s, loss=1.56, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 17: 100% 127/127 [01:46<00:00, 1.19it/s, loss=1.56, v\_num=0]

Epoch 17: 100% 127/127 [01:46<00:00, 1.19it/s, loss=1.56, v\_num=0]Epoch 17, global step 2160: 'val/CER' reached 44.41737 (best 44.41737), saving model to '/content/drive/MyDrive/147project/emg2qwerty-main/logs/2025-03-06/06-13-42/checkpoints/epoch=17-step=2160.ckpt' as top 1

Epoch 18: 94% 120/127 [01:41<00:05, 1.18it/s, loss=1.51, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 18: 100% 127/127 [01:47<00:00, 1.18it/s, loss=1.51, v\_num=0]

Epoch 18: 100% 127/127 [01:47<00:00, 1.18it/s, loss=1.51, v\_num=0]Epoch 18, global step 2280: 'val/CER' was not in top 1

Epoch 19: 94% 120/127 [01:41<00:05, 1.18it/s, loss=1.44, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 19: 100% 127/127 [01:46<00:00, 1.20it/s, loss=1.44, v\_num=0]

Epoch 19: 100% 127/127 [01:46<00:00, 1.20it/s, loss=1.44, v\_num=0]Epoch 19, global step 2400: 'val/CER' reached 38.34736 (best 38.34736), saving model to '/content/drive/MyDrive/147project/emg2qwerty-main/logs/2025-03-06/06-13-42/checkpoints/epoch=19-step=2400.ckpt' as top 1

Epoch 20: 94% 120/127 [01:40<00:05, 1.19it/s, loss=1.35, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 20: 100% 127/127 [01:46<00:00, 1.19it/s, loss=1.35, v\_num=0]

Epoch 20: 100% 127/127 [01:46<00:00, 1.19it/s, loss=1.35, v\_num=0]Epoch 20, global step 2520: 'val/CER' was not in top 1

Epoch 21: 94% 120/127 [01:42<00:06, 1.17it/s, loss=1.35, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 21: 100% 127/127 [01:47<00:00, 1.18it/s, loss=1.35, v\_num=0]

Epoch 21: 100% 127/127 [01:47<00:00, 1.18it/s, loss=1.35, v\_num=0]Epoch 21, global step 2640: 'val/CER' was not in top 1

Epoch 22: 94% 120/127 [01:41<00:05, 1.19it/s, loss=1.29, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 22: 100% 127/127 [01:46<00:00, 1.19it/s, loss=1.29, v\_num=0]

Epoch 22: 100% 127/127 [01:46<00:00, 1.19it/s, loss=1.29, v\_num=0]Epoch 22, global step 2760: 'val/CER' reached 36.13203 (best 36.13203), saving model to '/content/drive/MyDrive/147project/emg2qwerty-main/logs/2025-03-06/06-13-42/checkpoints/epoch=22-step=2760.ckpt' as top 1

Epoch 23: 94% 120/127 [01:39<00:05, 1.21it/s, loss=1.21, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 23: 100% 127/127 [01:45<00:00, 1.21it/s, loss=1.21, v\_num=0]

Epoch 23: 100% 127/127 [01:45<00:00, 1.21it/s, loss=1.21, v\_num=0]Epoch 23, global step 2880: 'val/CER' reached 33.69517 (best 33.69517), saving model to '/content/drive/MyDrive/147project/emg2qwerty-main/logs/2025-03-06/06-13-42/checkpoints/epoch=23-step=2880.ckpt' as top 1

Epoch 24: 94% 120/127 [01:42<00:05, 1.18it/s, loss=1.28, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 24: 100% 127/127 [01:46<00:00, 1.19it/s, loss=1.28, v\_num=0]

Epoch 24: 100% 127/127 [01:46<00:00, 1.19it/s, loss=1.28, v\_num=0]Epoch 24, global step 3000: 'val/CER' was not in top 1

Epoch 25: 94% 120/127 [01:39<00:05, 1.20it/s, loss=1.16, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 25: 100% 127/127 [01:45<00:00, 1.20it/s, loss=1.16, v\_num=0]

Epoch 25: 100% 127/127 [01:45<00:00, 1.20it/s, loss=1.16, v\_num=0]Epoch 25, global step 3120: 'val/CER' was not in top 1

Epoch 26: 94% 120/127 [01:41<00:05, 1.19it/s, loss=1.12, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 26: 100% 127/127 [01:46<00:00, 1.20it/s, loss=1.12, v\_num=0]

Epoch 26: 100% 127/127 [01:46<00:00, 1.20it/s, loss=1.12, v\_num=0]Epoch 26, global step 3240: 'val/CER' reached 32.14444 (best 32.14444), saving model to '/content/drive/MyDrive/147project/emg2qwerty-main/logs/2025-03-06/06-13-42/checkpoints/epoch=26-step=3240.ckpt' as top 1

Epoch 27: 94% 120/127 [01:38<00:05, 1.21it/s, loss=1.09, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 27: 100% 127/127 [01:43<00:00, 1.22it/s, loss=1.09, v\_num=0]

Epoch 27: 100% 127/127 [01:43<00:00, 1.22it/s, loss=1.09, v\_num=0]Epoch 27, global step 3360: 'val/CER' reached 29.50820 (best 29.50820), saving model to '/content/drive/MyDrive/147project/emg2qwerty-main/logs/2025-03-06/06-13-42/checkpoints/epoch=27-step=3360.ckpt' as top 1

Epoch 28: 94% 120/127 [01:43<00:06, 1.16it/s, loss=1.11, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 28: 100% 127/127 [01:48<00:00, 1.18it/s, loss=1.11, v\_num=0]

Epoch 28: 100% 127/127 [01:48<00:00, 1.18it/s, loss=1.11, v\_num=0]Epoch 28, global step 3480: 'val/CER' was not in top 1

Epoch 29: 94% 120/127 [01:39<00:05, 1.21it/s, loss=1.06, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 29: 100% 127/127 [01:44<00:00, 1.22it/s, loss=1.06, v\_num=0]

Epoch 29: 100% 127/127 [01:44<00:00, 1.22it/s, loss=1.06, v\_num=0]Epoch 29, global step 3600: 'val/CER' was not in top 1

Epoch 30: 94% 120/127 [01:39<00:05, 1.20it/s, loss=0.978, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 30: 100% 127/127 [01:46<00:00, 1.20it/s, loss=0.978, v\_num=0]

Epoch 30: 100% 127/127 [01:46<00:00, 1.20it/s, loss=0.978, v\_num=0]Epoch 30, global step 3720: 'val/CER' was not in top 1

Epoch 31: 94% 120/127 [01:42<00:05, 1.17it/s, loss=1.01, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 31: 100% 127/127 [01:47<00:00, 1.18it/s, loss=1.01, v\_num=0]

Epoch 31: 100% 127/127 [01:47<00:00, 1.18it/s, loss=1.01, v\_num=0]Epoch 31, global step 3840: 'val/CER' reached 27.31502 (best 27.31502), saving model to '/content/drive/MyDrive/147project/emg2qwerty-main/logs/2025-03-06/06-13-42/checkpoints/epoch=31-step=3840.ckpt' as top 1

Epoch 32: 94% 120/127 [01:40<00:05, 1.20it/s, loss=0.968, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 32: 100% 127/127 [01:46<00:00, 1.19it/s, loss=0.968, v\_num=0]

Epoch 32: 100% 127/127 [01:46<00:00, 1.19it/s, loss=0.968, v\_num=0]Epoch 32, global step 3960: 'val/CER' was not in top 1

Epoch 33: 94% 120/127 [01:40<00:05, 1.20it/s, loss=0.893, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 33: 100% 127/127 [01:45<00:00, 1.21it/s, loss=0.893, v\_num=0]

Epoch 33: 100% 127/127 [01:45<00:00, 1.21it/s, loss=0.893, v\_num=0]Epoch 33, global step 4080: 'val/CER' reached 25.63137 (best 25.63137), saving model to '/content/drive/MyDrive/147project/emg2qwerty-main/logs/2025-03-06/06-13-42/checkpoints/epoch=33-step=4080.ckpt' as top 1

Epoch 34: 94% 120/127 [01:41<00:05, 1.19it/s, loss=0.925, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 34: 100% 127/127 [01:46<00:00, 1.20it/s, loss=0.925, v\_num=0]

Epoch 34: 100% 127/127 [01:46<00:00, 1.20it/s, loss=0.925, v\_num=0]Epoch 34, global step 4200: 'val/CER' was not in top 1

Epoch 35: 94% 120/127 [01:43<00:06, 1.16it/s, loss=0.938, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 35: 100% 127/127 [01:48<00:00, 1.17it/s, loss=0.938, v\_num=0]

Epoch 35: 100% 127/127 [01:48<00:00, 1.17it/s, loss=0.938, v\_num=0]Epoch 35, global step 4320: 'val/CER' was not in top 1

Epoch 36: 94% 120/127 [01:43<00:06, 1.16it/s, loss=0.853, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 36: 100% 127/127 [01:50<00:00, 1.15it/s, loss=0.853, v\_num=0]

Epoch 36: 100% 127/127 [01:50<00:00, 1.15it/s, loss=0.853, v\_num=0]Epoch 36, global step 4440: 'val/CER' reached 24.45724 (best 24.45724), saving model to '/content/drive/MyDrive/147project/emg2qwerty-main/logs/2025-03-06/06-13-42/checkpoints/epoch=36-step=4440.ckpt' as top 1

Epoch 37: 94% 120/127 [01:40<00:05, 1.20it/s, loss=0.928, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 37: 100% 127/127 [01:45<00:00, 1.21it/s, loss=0.928, v\_num=0]

Epoch 37: 100% 127/127 [01:45<00:00, 1.21it/s, loss=0.928, v\_num=0]Epoch 37, global step 4560: 'val/CER' was not in top 1

Epoch 38: 94% 120/127 [01:43<00:06, 1.16it/s, loss=0.86, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 38: 100% 127/127 [01:49<00:00, 1.16it/s, loss=0.86, v\_num=0]

Epoch 38: 100% 127/127 [01:49<00:00, 1.16it/s, loss=0.86, v\_num=0]Epoch 38, global step 4680: 'val/CER' was not in top 1

Epoch 39: 94% 120/127 [01:41<00:05, 1.18it/s, loss=0.836, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 39: 100% 127/127 [01:46<00:00, 1.19it/s, loss=0.836, v\_num=0]

Epoch 39: 100% 127/127 [01:46<00:00, 1.19it/s, loss=0.836, v\_num=0]Epoch 39, global step 4800: 'val/CER' was not in top 1

Epoch 40: 94% 120/127 [01:41<00:05, 1.18it/s, loss=0.812, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 40: 100% 127/127 [01:47<00:00, 1.19it/s, loss=0.812, v\_num=0]

Epoch 40: 100% 127/127 [01:47<00:00, 1.19it/s, loss=0.812, v\_num=0]Epoch 40, global step 4920: 'val/CER' reached 24.14710 (best 24.14710), saving model to '/content/drive/MyDrive/147project/emg2qwerty-main/logs/2025-03-06/06-13-42/checkpoints/epoch=40-step=4920.ckpt' as top 1

Epoch 41: 94% 120/127 [01:41<00:05, 1.18it/s, loss=0.866, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 41: 100% 127/127 [01:48<00:00, 1.17it/s, loss=0.866, v\_num=0]

Epoch 41: 100% 127/127 [01:48<00:00, 1.17it/s, loss=0.866, v\_num=0]Epoch 41, global step 5040: 'val/CER' was not in top 1

Epoch 42: 94% 120/127 [01:41<00:05, 1.19it/s, loss=0.816, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 42: 100% 127/127 [01:46<00:00, 1.19it/s, loss=0.816, v\_num=0]

Epoch 42: 100% 127/127 [01:46<00:00, 1.19it/s, loss=0.816, v\_num=0]Epoch 42, global step 5160: 'val/CER' reached 23.28312 (best 23.28312), saving model to '/content/drive/MyDrive/147project/emg2qwerty-main/logs/2025-03-06/06-13-42/checkpoints/epoch=42-step=5160.ckpt' as top 1

Epoch 43: 94% 120/127 [01:42<00:05, 1.17it/s, loss=0.788, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 43: 100% 127/127 [01:48<00:00, 1.17it/s, loss=0.788, v\_num=0]

Epoch 43: 100% 127/127 [01:48<00:00, 1.17it/s, loss=0.788, v\_num=0]Epoch 43, global step 5280: 'val/CER' reached 22.44129 (best 22.44129), saving model to '/content/drive/MyDrive/147project/emg2qwerty-main/logs/2025-03-06/06-13-42/checkpoints/epoch=43-step=5280.ckpt' as top 1

Epoch 44: 94% 120/127 [01:42<00:05, 1.17it/s, loss=0.75, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 44: 100% 127/127 [01:47<00:00, 1.18it/s, loss=0.75, v\_num=0]

Epoch 44: 100% 127/127 [01:47<00:00, 1.18it/s, loss=0.75, v\_num=0]Epoch 44, global step 5400: 'val/CER' was not in top 1

Epoch 45: 94% 120/127 [01:45<00:06, 1.14it/s, loss=0.729, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 45: 100% 127/127 [01:50<00:00, 1.15it/s, loss=0.729, v\_num=0]

Epoch 45: 100% 127/127 [01:50<00:00, 1.15it/s, loss=0.729, v\_num=0]Epoch 45, global step 5520: 'val/CER' reached 22.33053 (best 22.33053), saving model to '/content/drive/MyDrive/147project/emg2qwerty-main/logs/2025-03-06/06-13-42/checkpoints/epoch=45-step=5520.ckpt' as top 1

Epoch 46: 94% 120/127 [01:41<00:05, 1.18it/s, loss=0.719, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 46: 100% 127/127 [01:46<00:00, 1.19it/s, loss=0.719, v\_num=0]

Epoch 46: 100% 127/127 [01:46<00:00, 1.19it/s, loss=0.719, v\_num=0]Epoch 46, global step 5640: 'val/CER' reached 21.08994 (best 21.08994), saving model to '/content/drive/MyDrive/147project/emg2qwerty-main/logs/2025-03-06/06-13-42/checkpoints/epoch=46-step=5640.ckpt' as top 1

Epoch 47: 94% 120/127 [01:40<00:05, 1.19it/s, loss=0.717, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 47: 100% 127/127 [01:45<00:00, 1.20it/s, loss=0.717, v\_num=0]

Epoch 47: 100% 127/127 [01:45<00:00, 1.20it/s, loss=0.717, v\_num=0]Epoch 47, global step 5760: 'val/CER' was not in top 1

Epoch 48: 94% 120/127 [01:43<00:06, 1.16it/s, loss=0.718, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 48: 100% 127/127 [01:48<00:00, 1.17it/s, loss=0.718, v\_num=0]

Epoch 48: 100% 127/127 [01:48<00:00, 1.17it/s, loss=0.718, v\_num=0]Epoch 48, global step 5880: 'val/CER' was not in top 1

Epoch 49: 79% 100/127 [01:25<00:23, 1.16it/s, loss=0.695, v\_num=0]/usr/local/lib/python3.11/dist-packages/pytorch\_lightning/trainer/call.py:48: UserWarning: Detected KeyboardInterrupt, attempting graceful shutdown...

rank\_zero\_warn("Detected KeyboardInterrupt, attempting graceful shutdown...")

LOCAL\_RANK: 0 - CUDA\_VISIBLE\_DEVICES: [0]

Validation DataLoader 0: 100% 7/7 [00:01<00:00, 4.98it/s]

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┃ **Runningstage.validating** ┃┃

┃ **metric** ┃ **DataLoader 0** ┃

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│ val/CER │ 21.089942932128906 │

│ val/DER │ 2.4147098064422607 │

│ val/IER │ 3.7882144451141357 │

│ val/SER │ 14.887018203735352 │

│ val/loss │ 0.6701233983039856 │

└───────────────────────────┴───────────────────────────┘

LOCAL\_RANK: 0 - CUDA\_VISIBLE\_DEVICES: [0]

Testing DataLoader 0: 100% 1/1 [00:04<00:00, 4.83s/it]

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┃ **Runningstage.testing** ┃┃

┃ **metric** ┃ **DataLoader 0** ┃

┡━━━━━━━━━━━━━━━━━━━━━━━━━━━╇━━━━━━━━━━━━━━━━━━━━━━━━━━━┩

│ test/CER │ 20.769397735595703 │

│ test/DER │ 2.2044520378112793 │

│ test/IER │ 3.090555429458618 │

│ test/SER │ 15.47438907623291 │

│ test/loss │ 0.647348940372467 │

└───────────────────────────┴───────────────────────────┘

{'val\_metrics': [{'val/loss': 0.6701233983039856,

'val/CER': 21.089942932128906,

'val/IER': 3.7882144451141357,

'val/DER': 2.4147098064422607,

'val/SER': 14.887018203735352}],

'test\_metrics': [{'test/loss': 0.647348940372467,

'test/CER': 20.769397735595703,

'test/IER': 3.090555429458618,

'test/DER': 2.2044520378112793,

'test/SER': 15.47438907623291}],

'best\_checkpoint': '/content/drive/MyDrive/147project/emg2qwerty-main/logs/2025-03-06/06-13-42/checkpoints/epoch=46-step=5640.ckpt'}

Epoch 49: 79% 100/127 [02:06<00:34, 1.26s/it, loss=0.695, v\_num=0]

## 48-50 epochs

2025-03-12 02:52:03.790949: E external/local\_xla/xla/stream\_executor/cuda/cuda\_fft.cc:477] Unable to register cuFFT factory: Attempting to register factory for plugin cuFFT when one has already been registered

WARNING: All log messages before absl::InitializeLog() is called are written to STDERR

E0000 00:00:1741747923.826367 44696 cuda\_dnn.cc:8310] Unable to register cuDNN factory: Attempting to register factory for plugin cuDNN when one has already been registered

E0000 00:00:1741747923.837063 44696 cuda\_blas.cc:1418] Unable to register cuBLAS factory: Attempting to register factory for plugin cuBLAS when one has already been registered

2025-03-12 02:52:03.873109: I tensorflow/core/platform/cpu\_feature\_guard.cc:210] This TensorFlow binary is optimized to use available CPU instructions in performance-critical operations.

To enable the following instructions: AVX2 AVX512F FMA, in other operations, rebuild TensorFlow with the appropriate compiler flags.

[2025-03-12 02:52:09,637][\_\_main\_\_][INFO] -

Config:

user: single\_user

dataset:

train:

- user: 89335547

session: 2021-06-03-1622765527-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-06-02-1622681518-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-06-04-1622863166-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-07-22-1627003020-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-07-21-1626916256-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-07-22-1627004019-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-06-05-1622885888-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-06-02-1622679967-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-06-03-1622764398-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-07-21-1626917264-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-06-05-1622889105-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-06-03-1622766673-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-06-04-1622861066-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-07-22-1627001995-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-06-05-1622884635-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-07-21-1626915176-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

val:

- user: 89335547

session: 2021-06-04-1622862148-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

test:

- user: 89335547

session: 2021-06-02-1622682789-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

root: ${hydra:runtime.cwd}/data

to\_tensor:

\_target\_: emg2qwerty.transforms.ToTensor

fields:

- emg\_left

- emg\_right

band\_rotation:

\_target\_: emg2qwerty.transforms.ForEach

transform:

\_target\_: emg2qwerty.transforms.RandomBandRotation

offsets:

- -1

- 0

- 1

temporal\_jitter:

\_target\_: emg2qwerty.transforms.TemporalAlignmentJitter

max\_offset: 120

logspec:

\_target\_: emg2qwerty.transforms.LogSpectrogram

n\_fft: 64

hop\_length: 16

specaug:

\_target\_: emg2qwerty.transforms.SpecAugment

n\_time\_masks: 3

time\_mask\_param: 25

n\_freq\_masks: 2

freq\_mask\_param: 4

transforms:

train:

- ${to\_tensor}

- ${band\_rotation}

- ${temporal\_jitter}

- ${logspec}

- ${specaug}

val:

- ${to\_tensor}

- ${logspec}

test: ${transforms.val}

module:

\_target\_: emg2qwerty.lightning.TDSConvCTCModule

in\_features: 528

mlp\_features:

- 384

block\_channels:

- 24

- 24

- 24

- 24

kernel\_width: 32

datamodule:

\_target\_: emg2qwerty.lightning.WindowedEMGDataModule

window\_length: 8000

padding:

- 1800

- 200

optimizer:

\_target\_: torch.optim.Adam

lr: 0.001

lr\_scheduler:

scheduler:

\_target\_: pl\_bolts.optimizers.lr\_scheduler.LinearWarmupCosineAnnealingLR

warmup\_epochs: 10

max\_epochs: ${trainer.max\_epochs}

warmup\_start\_lr: 1.0e-08

eta\_min: 1.0e-06

interval: epoch

decoder:

\_target\_: emg2qwerty.decoder.CTCGreedyDecoder

seed: 1501

batch\_size: 32

num\_workers: 4

train: true

checkpoint: /content/drive/MyDrive/147project/emg2qwerty-main/logs/2025-03-06/06-13-42/checkpoints/last.ckpt

monitor\_metric: val/CER

monitor\_mode: min

trainer:

accelerator: gpu

devices: 1

num\_nodes: 1

max\_epochs: 2

default\_root\_dir: ${hydra:runtime.output\_dir}

callbacks:

- \_target\_: pytorch\_lightning.callbacks.LearningRateMonitor

- \_target\_: pytorch\_lightning.callbacks.ModelCheckpoint

dirpath: ${hydra:runtime.output\_dir}/checkpoints

monitor: ${monitor\_metric}

mode: ${monitor\_mode}

save\_last: true

verbose: true

Global seed set to 1501

[2025-03-12 02:52:09,641][\_\_main\_\_][INFO] - Instantiating LightningModule {'\_target\_': 'emg2qwerty.lightning.TDSConvCTCModule', 'in\_features': 528, 'mlp\_features': [384], 'block\_channels': [24, 24, 24, 24], 'kernel\_width': 32}

[2025-03-12 02:52:10,366][\_\_main\_\_][INFO] - Loading module from checkpoint /content/drive/MyDrive/147project/emg2qwerty-main/logs/2025-03-06/06-13-42/checkpoints/last.ckpt

[2025-03-12 02:52:12,944][\_\_main\_\_][INFO] - Instantiating LightningDataModule {'\_target\_': 'emg2qwerty.lightning.WindowedEMGDataModule', 'window\_length': 8000, 'padding': [1800, 200]}

GPU available: True (cuda), used: True

TPU available: False, using: 0 TPU cores

IPU available: False, using: 0 IPUs

HPU available: False, using: 0 HPUs

Missing logger folder: /content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/emg2qwerty-main/logs/2025-03-12/02-52-09/lightning\_logs

LOCAL\_RANK: 0 - CUDA\_VISIBLE\_DEVICES: [0]

/usr/local/lib/python3.11/dist-packages/pl\_bolts/\_\_init\_\_.py:11: FutureWarning: In the future `np.object` will be defined as the corresponding NumPy scalar.

if not hasattr(numpy, tp\_name):

/usr/local/lib/python3.11/dist-packages/pl\_bolts/\_\_init\_\_.py:11: FutureWarning: In the future `np.bool` will be defined as the corresponding NumPy scalar.

if not hasattr(numpy, tp\_name):

/usr/local/lib/python3.11/dist-packages/pl\_bolts/models/self\_supervised/amdim/amdim\_module.py:34: UnderReviewWarning: The feature generate\_power\_seq is currently marked under review. The compatibility with other Lightning projects is not guaranteed and API may change at any time. The API and functionality may change without warning in future releases. More details:<https://lightning-bolts.readthedocs.io/en/latest/stability.html>

"lr\_options": generate\_power\_seq(LEARNING\_RATE\_CIFAR, 11),

/usr/local/lib/python3.11/dist-packages/pl\_bolts/models/self\_supervised/amdim/amdim\_module.py:92: UnderReviewWarning: The feature FeatureMapContrastiveTask is currently marked under review. The compatibility with other Lightning projects is not guaranteed and API may change at any time. The API and functionality may change without warning in future releases. More details:<https://lightning-bolts.readthedocs.io/en/latest/stability.html>

contrastive\_task: Union[FeatureMapContrastiveTask] = FeatureMapContrastiveTask("01, 02, 11"),

/usr/local/lib/python3.11/dist-packages/pl\_bolts/losses/self\_supervised\_learning.py:228: UnderReviewWarning: The feature AmdimNCELoss is currently marked under review. The compatibility with other Lightning projects is not guaranteed and API may change at any time. The API and functionality may change without warning in future releases. More details:<https://lightning-bolts.readthedocs.io/en/latest/stability.html>

self.nce\_loss = AmdimNCELoss(tclip)

/usr/local/lib/python3.11/dist-packages/hydra/\_internal/instantiate/\_instantiate2.py:92: UnderReviewWarning: The feature LinearWarmupCosineAnnealingLR is currently marked under review. The compatibility with other Lightning projects is not guaranteed and API may change at any time. The API and functionality may change without warning in future releases. More details:<https://lightning-bolts.readthedocs.io/en/latest/stability.html>

return \_target\_(\*args, \*\*kwargs)

| Name | Type | Params

----------------------------------------

0 | model | Sequential | 2.9 M

1 | ctc\_loss | CTCLoss | 0

2 | metrics | ModuleDict | 0

----------------------------------------

2.9 M Trainable params

0 Non-trainable params

2.9 M Total params

11.669 Total estimated model params size (MB)

Sanity Checking: 0it [00:00, ?it/s]/usr/local/lib/python3.11/dist-packages/torch/utils/data/dataloader.py:558: UserWarning: This DataLoader will create 4 worker processes in total. Our suggested max number of worker in current system is 2, which is smaller than what this DataLoader is going to create. Please be aware that excessive worker creation might get DataLoader running slow or even freeze, lower the worker number to avoid potential slowness/freeze if necessary.

warnings.warn(\_create\_warning\_msg(

Epoch 0: 94% 120/127 [01:47<00:06, 1.12it/s, loss=0.683, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 0: 100% 127/127 [01:52<00:00, 1.13it/s, loss=0.683, v\_num=0]

Epoch 0: 100% 127/127 [01:52<00:00, 1.13it/s, loss=0.683, v\_num=0]Epoch 0, global step 120: 'val/CER' reached 21.62162 (best 21.62162), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/emg2qwerty-main/logs/2025-03-12/02-52-09/checkpoints/epoch=0-step=120.ckpt' as top 1

Epoch 1: 94% 120/127 [01:48<00:06, 1.11it/s, loss=0.595, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 1: 100% 127/127 [01:55<00:00, 1.10it/s, loss=0.595, v\_num=0]

Epoch 1: 100% 127/127 [01:55<00:00, 1.10it/s, loss=0.595, v\_num=0]Epoch 1, global step 240: 'val/CER' reached 18.27647 (best 18.27647), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/emg2qwerty-main/logs/2025-03-12/02-52-09/checkpoints/epoch=1-step=240.ckpt' as top 1

`Trainer.fit` stopped: `max\_epochs=2` reached.

Epoch 1: 100% 127/127 [01:56<00:00, 1.09it/s, loss=0.595, v\_num=0]

LOCAL\_RANK: 0 - CUDA\_VISIBLE\_DEVICES: [0]

Validation DataLoader 0: 100% 7/7 [00:01<00:00, 3.72it/s]

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┃ **Runningstage.validating** ┃┃

┃ **metric** ┃ **DataLoader 0** ┃

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│ val/CER │ 18.276473999023438 │

│ val/DER │ 1.9494904279708862 │

│ val/IER │ 3.5445282459259033 │

│ val/SER │ 12.782454490661621 │

│ val/loss │ 0.5954235792160034 │

└───────────────────────────┴───────────────────────────┘

LOCAL\_RANK: 0 - CUDA\_VISIBLE\_DEVICES: [0]

Testing DataLoader 0: 100% 1/1 [00:04<00:00, 4.80s/it]

┏━━━━━━━━━━━━━━━━━━━━━━━━━━━┳━━━━━━━━━━━━━━━━━━━━━━━━━━━┓

┃ **Runningstage.testing** ┃┃

┃ **metric** ┃ **DataLoader 0** ┃

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│ test/CER │ 19.213314056396484 │

│ test/DER │ 1.7073698043823242 │

│ test/IER │ 2.6150853633880615 │

│ test/SER │ 14.890857696533203 │

│ test/loss │ 0.6128746867179871 │

└───────────────────────────┴───────────────────────────┘

{'val\_metrics': [{'val/loss': 0.5954235792160034,

'val/CER': 18.276473999023438,

'val/IER': 3.5445282459259033,

'val/DER': 1.9494904279708862,

'val/SER': 12.782454490661621}],

'test\_metrics': [{'test/loss': 0.6128746867179871,

'test/CER': 19.213314056396484,

'test/IER': 2.6150853633880615,

'test/DER': 1.7073698043823242,

'test/SER': 14.890857696533203}],

'best\_checkpoint': '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/emg2qwerty-main/logs/2025-03-12/02-52-09/checkpoints/epoch=1-step=240.ckpt'}

# TEST PHASE

┏━━━━━━━━━━━━━━━━━━━━━━━━━━━┳━━━━━━━━━━━━━━━━━━━━━━━━━━━┓

┃ **Runningstage.validating** ┃┃

┃ **metric** ┃ **DataLoader 0** ┃

┡━━━━━━━━━━━━━━━━━━━━━━━━━━━╇━━━━━━━━━━━━━━━━━━━━━━━━━━━┩

│ val/CER │ 18.276473999023438 │

│ val/DER │ 1.9494904279708862 │

│ val/IER │ 3.5445282459259033 │

│ val/SER │ 12.782454490661621 │

│ val/loss │ 0.5954235792160034 │

└───────────────────────────┴───────────────────────────┘

LOCAL\_RANK: 0 - CUDA\_VISIBLE\_DEVICES: [0]

Testing DataLoader 0: 100% 1/1 [00:04<00:00, 4.83s/it]

┏━━━━━━━━━━━━━━━━━━━━━━━━━━━┳━━━━━━━━━━━━━━━━━━━━━━━━━━━┓

┃ **Runningstage.testing** ┃┃

┃ **metric** ┃ **DataLoader 0** ┃

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│ test/CER │ 19.213314056396484 │

│ test/DER │ 1.7073698043823242 │

│ test/IER │ 2.6150853633880615 │

│ test/SER │ 14.890857696533203 │

│ test/loss │ 0.6128746867179871 │

└───────────────────────────┴───────────────────────────┘

{'val\_metrics': [{'val/loss': 0.5954235792160034,

'val/CER': 18.276473999023438,

'val/IER': 3.5445282459259033,

'val/DER': 1.9494904279708862,

'val/SER': 12.782454490661621}],

'test\_metrics': [{'test/loss': 0.6128746867179871,

'test/CER': 19.213314056396484,

'test/IER': 2.6150853633880615,

'test/DER': 1.7073698043823242,

'test/SER': 14.890857696533203}],

'best\_checkpoint': ''}

rerun cnn+lstm 50

# TRAIN PHASE

## FIRST 43 EPOCHS

2025-03-12 01:37:24.953051: E external/local\_xla/xla/stream\_executor/cuda/cuda\_fft.cc:477] Unable to register cuFFT factory: Attempting to register factory for plugin cuFFT when one has already been registered

WARNING: All log messages before absl::InitializeLog() is called are written to STDERR

E0000 00:00:1741743444.973815 6015 cuda\_dnn.cc:8310] Unable to register cuDNN factory: Attempting to register factory for plugin cuDNN when one has already been registered

E0000 00:00:1741743444.980081 6015 cuda\_blas.cc:1418] Unable to register cuBLAS factory: Attempting to register factory for plugin cuBLAS when one has already been registered

2025-03-12 01:37:25.000640: I tensorflow/core/platform/cpu\_feature\_guard.cc:210] This TensorFlow binary is optimized to use available CPU instructions in performance-critical operations.

To enable the following instructions: AVX2 FMA, in other operations, rebuild TensorFlow with the appropriate compiler flags.

[2025-03-12 01:37:29,714][\_\_main\_\_][INFO] -

Config:

user: single\_user

dataset:

train:

- user: 89335547

session: 2021-06-03-1622765527-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-06-02-1622681518-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-06-04-1622863166-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-07-22-1627003020-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-07-21-1626916256-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-07-22-1627004019-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-06-05-1622885888-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-06-02-1622679967-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-06-03-1622764398-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-07-21-1626917264-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-06-05-1622889105-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-06-03-1622766673-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-06-04-1622861066-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-07-22-1627001995-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-06-05-1622884635-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-07-21-1626915176-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

val:

- user: 89335547

session: 2021-06-04-1622862148-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

test:

- user: 89335547

session: 2021-06-02-1622682789-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

root: ${hydra:runtime.cwd}/data

to\_tensor:

\_target\_: emg2qwerty.transforms.ToTensor

fields:

- emg\_left

- emg\_right

band\_rotation:

\_target\_: emg2qwerty.transforms.ForEach

transform:

\_target\_: emg2qwerty.transforms.RandomBandRotation

offsets:

- -1

- 0

- 1

temporal\_jitter:

\_target\_: emg2qwerty.transforms.TemporalAlignmentJitter

max\_offset: 120

logspec:

\_target\_: emg2qwerty.transforms.LogSpectrogram

n\_fft: 64

hop\_length: 16

specaug:

\_target\_: emg2qwerty.transforms.SpecAugment

n\_time\_masks: 3

time\_mask\_param: 25

n\_freq\_masks: 2

freq\_mask\_param: 4

transforms:

train:

- ${to\_tensor}

- ${band\_rotation}

- ${temporal\_jitter}

- ${logspec}

- ${specaug}

val:

- ${to\_tensor}

- ${logspec}

test: ${transforms.val}

module:

\_target\_: emg2qwerty.lightning.TDSConvCTCModule

in\_features: 528

mlp\_features:

- 384

block\_channels:

- 24

- 24

- 24

- 24

kernel\_width: 32

datamodule:

\_target\_: emg2qwerty.lightning.WindowedEMGDataModule

window\_length: 8000

padding:

- 1800

- 200

optimizer:

\_target\_: torch.optim.Adam

lr: 0.001

lr\_scheduler:

scheduler:

\_target\_: pl\_bolts.optimizers.lr\_scheduler.LinearWarmupCosineAnnealingLR

warmup\_epochs: 10

max\_epochs: ${trainer.max\_epochs}

warmup\_start\_lr: 1.0e-08

eta\_min: 1.0e-06

interval: epoch

decoder:

\_target\_: emg2qwerty.decoder.CTCGreedyDecoder

seed: 1501

batch\_size: 32

num\_workers: 4

train: true

checkpoint: null

monitor\_metric: val/CER

monitor\_mode: min

trainer:

accelerator: gpu

devices: 1

num\_nodes: 1

max\_epochs: 50

default\_root\_dir: ${hydra:runtime.output\_dir}

callbacks:

- \_target\_: pytorch\_lightning.callbacks.LearningRateMonitor

- \_target\_: pytorch\_lightning.callbacks.ModelCheckpoint

dirpath: ${hydra:runtime.output\_dir}/checkpoints

monitor: ${monitor\_metric}

mode: ${monitor\_mode}

save\_last: true

verbose: true

Global seed set to 1501

[2025-03-12 01:37:29,718][\_\_main\_\_][INFO] - Instantiating LightningModule {'\_target\_': 'emg2qwerty.lightning.TDSConvCTCModule', 'in\_features': 528, 'mlp\_features': [384], 'block\_channels': [24, 24, 24, 24], 'kernel\_width': 32}

[2025-03-12 01:37:29,820][\_\_main\_\_][INFO] - Instantiating LightningDataModule {'\_target\_': 'emg2qwerty.lightning.WindowedEMGDataModule', 'window\_length': 8000, 'padding': [1800, 200]}

GPU available: True (cuda), used: True

TPU available: False, using: 0 TPU cores

IPU available: False, using: 0 IPUs

HPU available: False, using: 0 HPUs

Missing logger folder: /content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/rerun cnn+lstm/emg2qwerty/logs/2025-03-12/01-37-29/lightning\_logs

LOCAL\_RANK: 0 - CUDA\_VISIBLE\_DEVICES: [0]

/usr/local/lib/python3.11/dist-packages/pl\_bolts/\_\_init\_\_.py:11: FutureWarning: In the future `np.object` will be defined as the corresponding NumPy scalar.

if not hasattr(numpy, tp\_name):

/usr/local/lib/python3.11/dist-packages/pl\_bolts/\_\_init\_\_.py:11: FutureWarning: In the future `np.bool` will be defined as the corresponding NumPy scalar.

if not hasattr(numpy, tp\_name):

/usr/local/lib/python3.11/dist-packages/pl\_bolts/models/self\_supervised/amdim/amdim\_module.py:34: UnderReviewWarning: The feature generate\_power\_seq is currently marked under review. The compatibility with other Lightning projects is not guaranteed and API may change at any time. The API and functionality may change without warning in future releases. More details:<https://lightning-bolts.readthedocs.io/en/latest/stability.html>

"lr\_options": generate\_power\_seq(LEARNING\_RATE\_CIFAR, 11),

/usr/local/lib/python3.11/dist-packages/pl\_bolts/models/self\_supervised/amdim/amdim\_module.py:92: UnderReviewWarning: The feature FeatureMapContrastiveTask is currently marked under review. The compatibility with other Lightning projects is not guaranteed and API may change at any time. The API and functionality may change without warning in future releases. More details:<https://lightning-bolts.readthedocs.io/en/latest/stability.html>

contrastive\_task: Union[FeatureMapContrastiveTask] = FeatureMapContrastiveTask("01, 02, 11"),

/usr/local/lib/python3.11/dist-packages/pl\_bolts/losses/self\_supervised\_learning.py:228: UnderReviewWarning: The feature AmdimNCELoss is currently marked under review. The compatibility with other Lightning projects is not guaranteed and API may change at any time. The API and functionality may change without warning in future releases. More details:<https://lightning-bolts.readthedocs.io/en/latest/stability.html>

self.nce\_loss = AmdimNCELoss(tclip)

/usr/local/lib/python3.11/dist-packages/hydra/\_internal/instantiate/\_instantiate2.py:92: UnderReviewWarning: The feature LinearWarmupCosineAnnealingLR is currently marked under review. The compatibility with other Lightning projects is not guaranteed and API may change at any time. The API and functionality may change without warning in future releases. More details:<https://lightning-bolts.readthedocs.io/en/latest/stability.html>

return \_target\_(\*args, \*\*kwargs)

| Name | Type | Params

----------------------------------------

0 | model | Sequential | 7.7 M

1 | ctc\_loss | CTCLoss | 0

2 | metrics | ModuleDict | 0

----------------------------------------

7.7 M Trainable params

0 Non-trainable params

7.7 M Total params

30.913 Total estimated model params size (MB)

Sanity Checking: 0it [00:00, ?it/s]/usr/local/lib/python3.11/dist-packages/torch/utils/data/dataloader.py:558: UserWarning: This DataLoader will create 4 worker processes in total. Our suggested max number of worker in current system is 2, which is smaller than what this DataLoader is going to create. Please be aware that excessive worker creation might get DataLoader running slow or even freeze, lower the worker number to avoid potential slowness/freeze if necessary.

warnings.warn(\_create\_warning\_msg(

Sanity Checking DataLoader 0: 0% 0/2 [00:00<?, ?it/s]/usr/local/lib/python3.11/dist-packages/torch/nn/modules/conv.py:456: UserWarning: Plan failed with a cudnnException: CUDNN\_BACKEND\_EXECUTION\_PLAN\_DESCRIPTOR: cudnnFinalize Descriptor Failed cudnn\_status: CUDNN\_STATUS\_NOT\_SUPPORTED (Triggered internally at ../aten/src/ATen/native/cudnn/Conv\_v8.cpp:919.)

return F.conv2d(input, weight, bias, self.stride,

Epoch 0: 94% 120/127 [02:49<00:09, 1.41s/it, loss=127, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 0: 100% 127/127 [02:54<00:00, 1.38s/it, loss=127, v\_num=0]

Epoch 0: 100% 127/127 [02:54<00:00, 1.38s/it, loss=127, v\_num=0]Epoch 0, global step 120: 'val/CER' reached 182.25520 (best 182.25520), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/rerun cnn+lstm/emg2qwerty/logs/2025-03-12/01-37-29/checkpoints/epoch=0-step=120.ckpt' as top 1

Epoch 1: 94% 120/127 [01:46<00:06, 1.13it/s, loss=3.61, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 1: 100% 127/127 [01:51<00:00, 1.14it/s, loss=3.61, v\_num=0]

Epoch 1: 100% 127/127 [01:51<00:00, 1.14it/s, loss=3.61, v\_num=0]Epoch 1, global step 240: 'val/CER' reached 100.00000 (best 100.00000), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/rerun cnn+lstm/emg2qwerty/logs/2025-03-12/01-37-29/checkpoints/epoch=1-step=240.ckpt' as top 1

Epoch 2: 94% 120/127 [01:44<00:06, 1.15it/s, loss=3.43, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 2: 100% 127/127 [01:49<00:00, 1.16it/s, loss=3.43, v\_num=0]

Epoch 2: 100% 127/127 [01:49<00:00, 1.16it/s, loss=3.43, v\_num=0]Epoch 2, global step 360: 'val/CER' was not in top 1

Epoch 3: 94% 120/127 [01:45<00:06, 1.14it/s, loss=3.46, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 3: 100% 127/127 [01:49<00:00, 1.16it/s, loss=3.46, v\_num=0]

Epoch 3: 100% 127/127 [01:49<00:00, 1.16it/s, loss=3.46, v\_num=0]Epoch 3, global step 480: 'val/CER' was not in top 1

Epoch 4: 94% 120/127 [01:41<00:05, 1.18it/s, loss=3.33, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 4: 100% 127/127 [01:46<00:00, 1.20it/s, loss=3.33, v\_num=0]

Epoch 4: 100% 127/127 [01:46<00:00, 1.20it/s, loss=3.33, v\_num=0]Epoch 4, global step 600: 'val/CER' was not in top 1

Epoch 5: 94% 120/127 [01:43<00:06, 1.16it/s, loss=3.29, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 5: 100% 127/127 [01:48<00:00, 1.17it/s, loss=3.29, v\_num=0]

Epoch 5: 100% 127/127 [01:48<00:00, 1.17it/s, loss=3.29, v\_num=0]Epoch 5, global step 720: 'val/CER' was not in top 1

Epoch 6: 94% 120/127 [01:43<00:06, 1.16it/s, loss=3.21, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 6: 100% 127/127 [01:48<00:00, 1.17it/s, loss=3.21, v\_num=0]

Epoch 6: 100% 127/127 [01:48<00:00, 1.17it/s, loss=3.21, v\_num=0]Epoch 6, global step 840: 'val/CER' was not in top 1

Epoch 7: 94% 120/127 [01:43<00:06, 1.16it/s, loss=3.06, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 7: 100% 127/127 [01:48<00:00, 1.17it/s, loss=3.06, v\_num=0]

Epoch 7: 100% 127/127 [01:48<00:00, 1.17it/s, loss=3.06, v\_num=0]Epoch 7, global step 960: 'val/CER' was not in top 1

Epoch 8: 94% 120/127 [01:44<00:06, 1.15it/s, loss=2.99, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 8: 100% 127/127 [01:50<00:00, 1.15it/s, loss=2.99, v\_num=0]

Epoch 8: 100% 127/127 [01:50<00:00, 1.15it/s, loss=2.99, v\_num=0]Epoch 8, global step 1080: 'val/CER' was not in top 1

Epoch 9: 94% 120/127 [01:43<00:06, 1.16it/s, loss=3.05, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 9: 100% 127/127 [01:47<00:00, 1.18it/s, loss=3.05, v\_num=0]

Epoch 9: 100% 127/127 [01:47<00:00, 1.18it/s, loss=3.05, v\_num=0]Epoch 9, global step 1200: 'val/CER' was not in top 1

Epoch 10: 94% 120/127 [01:41<00:05, 1.18it/s, loss=2.88, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 10: 100% 127/127 [01:47<00:00, 1.18it/s, loss=2.88, v\_num=0]

Epoch 10: 100% 127/127 [01:47<00:00, 1.18it/s, loss=2.88, v\_num=0]Epoch 10, global step 1320: 'val/CER' was not in top 1

Epoch 11: 94% 120/127 [01:41<00:05, 1.18it/s, loss=2.64, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 11: 100% 127/127 [01:46<00:00, 1.20it/s, loss=2.64, v\_num=0]

Epoch 11: 100% 127/127 [01:46<00:00, 1.20it/s, loss=2.64, v\_num=0]Epoch 11, global step 1440: 'val/CER' was not in top 1

Epoch 12: 94% 120/127 [01:42<00:05, 1.17it/s, loss=2.35, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 12: 100% 127/127 [01:48<00:00, 1.18it/s, loss=2.35, v\_num=0]

Epoch 12: 100% 127/127 [01:48<00:00, 1.18it/s, loss=2.35, v\_num=0]Epoch 12, global step 1560: 'val/CER' was not in top 1

Epoch 13: 94% 120/127 [01:42<00:05, 1.17it/s, loss=2.08, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 13: 100% 127/127 [01:46<00:00, 1.19it/s, loss=2.08, v\_num=0]

Epoch 13: 100% 127/127 [01:46<00:00, 1.19it/s, loss=2.08, v\_num=0]Epoch 13, global step 1680: 'val/CER' reached 88.34737 (best 88.34737), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/rerun cnn+lstm/emg2qwerty/logs/2025-03-12/01-37-29/checkpoints/epoch=13-step=1680.ckpt' as top 1

Epoch 14: 94% 120/127 [01:44<00:06, 1.15it/s, loss=1.92, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 14: 100% 127/127 [01:49<00:00, 1.16it/s, loss=1.92, v\_num=0]

Epoch 14: 100% 127/127 [01:49<00:00, 1.16it/s, loss=1.92, v\_num=0]Epoch 14, global step 1800: 'val/CER' reached 87.28400 (best 87.28400), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/rerun cnn+lstm/emg2qwerty/logs/2025-03-12/01-37-29/checkpoints/epoch=14-step=1800.ckpt' as top 1

Epoch 15: 94% 120/127 [01:42<00:05, 1.17it/s, loss=1.64, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 15: 100% 127/127 [01:47<00:00, 1.18it/s, loss=1.64, v\_num=0]

Epoch 15: 100% 127/127 [01:47<00:00, 1.18it/s, loss=1.64, v\_num=0]Epoch 15, global step 1920: 'val/CER' reached 58.63979 (best 58.63979), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/rerun cnn+lstm/emg2qwerty/logs/2025-03-12/01-37-29/checkpoints/epoch=15-step=1920.ckpt' as top 1

Epoch 16: 94% 120/127 [01:45<00:06, 1.13it/s, loss=1.64, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 16: 100% 127/127 [01:50<00:00, 1.15it/s, loss=1.64, v\_num=0]

Epoch 16: 100% 127/127 [01:50<00:00, 1.15it/s, loss=1.64, v\_num=0]Epoch 16, global step 2040: 'val/CER' reached 50.88613 (best 50.88613), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/rerun cnn+lstm/emg2qwerty/logs/2025-03-12/01-37-29/checkpoints/epoch=16-step=2040.ckpt' as top 1

Epoch 17: 94% 120/127 [01:44<00:06, 1.15it/s, loss=1.57, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 17: 100% 127/127 [01:50<00:00, 1.15it/s, loss=1.57, v\_num=0]

Epoch 17: 100% 127/127 [01:50<00:00, 1.15it/s, loss=1.57, v\_num=0]Epoch 17, global step 2160: 'val/CER' was not in top 1

Epoch 18: 94% 120/127 [01:42<00:06, 1.17it/s, loss=1.47, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 18: 100% 127/127 [01:47<00:00, 1.18it/s, loss=1.47, v\_num=0]

Epoch 18: 100% 127/127 [01:47<00:00, 1.18it/s, loss=1.47, v\_num=0]Epoch 18, global step 2280: 'val/CER' reached 36.75233 (best 36.75233), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/rerun cnn+lstm/emg2qwerty/logs/2025-03-12/01-37-29/checkpoints/epoch=18-step=2280.ckpt' as top 1

Epoch 19: 94% 120/127 [01:44<00:06, 1.15it/s, loss=1.27, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 19: 100% 127/127 [01:49<00:00, 1.16it/s, loss=1.27, v\_num=0]

Epoch 19: 100% 127/127 [01:49<00:00, 1.16it/s, loss=1.27, v\_num=0]Epoch 19, global step 2400: 'val/CER' reached 33.16349 (best 33.16349), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/rerun cnn+lstm/emg2qwerty/logs/2025-03-12/01-37-29/checkpoints/epoch=19-step=2400.ckpt' as top 1

Epoch 20: 94% 120/127 [01:44<00:06, 1.15it/s, loss=1.26, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 20: 100% 127/127 [01:49<00:00, 1.16it/s, loss=1.26, v\_num=0]

Epoch 20: 100% 127/127 [01:49<00:00, 1.16it/s, loss=1.26, v\_num=0]Epoch 20, global step 2520: 'val/CER' was not in top 1

Epoch 21: 94% 120/127 [01:44<00:06, 1.14it/s, loss=1.16, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 21: 100% 127/127 [01:49<00:00, 1.16it/s, loss=1.16, v\_num=0]

Epoch 21: 100% 127/127 [01:49<00:00, 1.16it/s, loss=1.16, v\_num=0]Epoch 21, global step 2640: 'val/CER' reached 30.21710 (best 30.21710), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/rerun cnn+lstm/emg2qwerty/logs/2025-03-12/01-37-29/checkpoints/epoch=21-step=2640.ckpt' as top 1

Epoch 22: 94% 120/127 [01:45<00:06, 1.14it/s, loss=1.11, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 22: 100% 127/127 [01:51<00:00, 1.14it/s, loss=1.11, v\_num=0]

Epoch 22: 100% 127/127 [01:51<00:00, 1.14it/s, loss=1.11, v\_num=0]Epoch 22, global step 2760: 'val/CER' reached 28.17900 (best 28.17900), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/rerun cnn+lstm/emg2qwerty/logs/2025-03-12/01-37-29/checkpoints/epoch=22-step=2760.ckpt' as top 1

Epoch 23: 94% 120/127 [01:43<00:06, 1.16it/s, loss=1.11, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 23: 100% 127/127 [01:48<00:00, 1.17it/s, loss=1.11, v\_num=0]

Epoch 23: 100% 127/127 [01:48<00:00, 1.17it/s, loss=1.11, v\_num=0]Epoch 23, global step 2880: 'val/CER' reached 27.84670 (best 27.84670), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/rerun cnn+lstm/emg2qwerty/logs/2025-03-12/01-37-29/checkpoints/epoch=23-step=2880.ckpt' as top 1

Epoch 24: 94% 120/127 [01:44<00:06, 1.15it/s, loss=1.07, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 24: 100% 127/127 [01:48<00:00, 1.17it/s, loss=1.07, v\_num=0]

Epoch 24: 100% 127/127 [01:48<00:00, 1.17it/s, loss=1.07, v\_num=0]Epoch 24, global step 3000: 'val/CER' was not in top 1

Epoch 25: 94% 120/127 [01:42<00:05, 1.17it/s, loss=1.1, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 25: 100% 127/127 [01:47<00:00, 1.18it/s, loss=1.1, v\_num=0]

Epoch 25: 100% 127/127 [01:47<00:00, 1.18it/s, loss=1.1, v\_num=0]Epoch 25, global step 3120: 'val/CER' reached 27.18210 (best 27.18210), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/rerun cnn+lstm/emg2qwerty/logs/2025-03-12/01-37-29/checkpoints/epoch=25-step=3120.ckpt' as top 1

Epoch 26: 94% 120/127 [01:45<00:06, 1.14it/s, loss=1, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 26: 100% 127/127 [01:50<00:00, 1.15it/s, loss=1, v\_num=0]

Epoch 26: 100% 127/127 [01:50<00:00, 1.15it/s, loss=1, v\_num=0]Epoch 26, global step 3240: 'val/CER' reached 26.49535 (best 26.49535), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/rerun cnn+lstm/emg2qwerty/logs/2025-03-12/01-37-29/checkpoints/epoch=26-step=3240.ckpt' as top 1

Epoch 27: 94% 120/127 [01:44<00:06, 1.15it/s, loss=0.961, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 27: 100% 127/127 [01:49<00:00, 1.16it/s, loss=0.961, v\_num=0]

Epoch 27: 100% 127/127 [01:49<00:00, 1.16it/s, loss=0.961, v\_num=0]Epoch 27, global step 3360: 'val/CER' was not in top 1

Epoch 28: 94% 120/127 [01:44<00:06, 1.15it/s, loss=0.894, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 28: 100% 127/127 [01:49<00:00, 1.16it/s, loss=0.894, v\_num=0]

Epoch 28: 100% 127/127 [01:49<00:00, 1.16it/s, loss=0.894, v\_num=0]Epoch 28, global step 3480: 'val/CER' reached 25.85290 (best 25.85290), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/rerun cnn+lstm/emg2qwerty/logs/2025-03-12/01-37-29/checkpoints/epoch=28-step=3480.ckpt' as top 1

Epoch 29: 94% 120/127 [01:45<00:06, 1.14it/s, loss=0.862, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 29: 100% 127/127 [01:49<00:00, 1.15it/s, loss=0.862, v\_num=0]

Epoch 29: 100% 127/127 [01:49<00:00, 1.15it/s, loss=0.862, v\_num=0]Epoch 29, global step 3600: 'val/CER' reached 23.57111 (best 23.57111), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/rerun cnn+lstm/emg2qwerty/logs/2025-03-12/01-37-29/checkpoints/epoch=29-step=3600.ckpt' as top 1

Epoch 30: 94% 120/127 [01:45<00:06, 1.14it/s, loss=0.812, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 30: 100% 127/127 [01:51<00:00, 1.14it/s, loss=0.812, v\_num=0]

Epoch 30: 100% 127/127 [01:51<00:00, 1.14it/s, loss=0.812, v\_num=0]Epoch 30, global step 3720: 'val/CER' was not in top 1

Epoch 31: 94% 120/127 [01:44<00:06, 1.15it/s, loss=0.817, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 31: 100% 127/127 [01:49<00:00, 1.16it/s, loss=0.817, v\_num=0]

Epoch 31: 100% 127/127 [01:49<00:00, 1.16it/s, loss=0.817, v\_num=0]Epoch 31, global step 3840: 'val/CER' reached 22.13115 (best 22.13115), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/rerun cnn+lstm/emg2qwerty/logs/2025-03-12/01-37-29/checkpoints/epoch=31-step=3840.ckpt' as top 1

Epoch 32: 94% 120/127 [01:46<00:06, 1.13it/s, loss=0.815, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 32: 100% 127/127 [01:51<00:00, 1.14it/s, loss=0.815, v\_num=0]

Epoch 32: 100% 127/127 [01:51<00:00, 1.14it/s, loss=0.815, v\_num=0]Epoch 32, global step 3960: 'val/CER' was not in top 1

Epoch 33: 94% 120/127 [01:45<00:06, 1.13it/s, loss=0.759, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 33: 100% 127/127 [01:50<00:00, 1.15it/s, loss=0.759, v\_num=0]

Epoch 33: 100% 127/127 [01:50<00:00, 1.15it/s, loss=0.759, v\_num=0]Epoch 33, global step 4080: 'val/CER' reached 21.77670 (best 21.77670), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/rerun cnn+lstm/emg2qwerty/logs/2025-03-12/01-37-29/checkpoints/epoch=33-step=4080.ckpt' as top 1

Epoch 34: 94% 120/127 [01:45<00:06, 1.14it/s, loss=0.718, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 34: 100% 127/127 [01:51<00:00, 1.14it/s, loss=0.718, v\_num=0]

Epoch 34: 100% 127/127 [01:51<00:00, 1.14it/s, loss=0.718, v\_num=0]Epoch 34, global step 4200: 'val/CER' reached 21.22286 (best 21.22286), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/rerun cnn+lstm/emg2qwerty/logs/2025-03-12/01-37-29/checkpoints/epoch=34-step=4200.ckpt' as top 1

Epoch 35: 94% 120/127 [01:45<00:06, 1.13it/s, loss=0.72, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 35: 100% 127/127 [01:50<00:00, 1.15it/s, loss=0.72, v\_num=0]

Epoch 35: 100% 127/127 [01:50<00:00, 1.15it/s, loss=0.72, v\_num=0]Epoch 35, global step 4320: 'val/CER' reached 20.13735 (best 20.13735), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/rerun cnn+lstm/emg2qwerty/logs/2025-03-12/01-37-29/checkpoints/epoch=35-step=4320.ckpt' as top 1

Epoch 36: 94% 120/127 [01:45<00:06, 1.14it/s, loss=0.687, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 36: 100% 127/127 [01:50<00:00, 1.15it/s, loss=0.687, v\_num=0]

Epoch 36: 100% 127/127 [01:50<00:00, 1.15it/s, loss=0.687, v\_num=0]Epoch 36, global step 4440: 'val/CER' was not in top 1

Epoch 37: 94% 120/127 [01:42<00:05, 1.17it/s, loss=0.635, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 37: 100% 127/127 [01:47<00:00, 1.18it/s, loss=0.635, v\_num=0]

Epoch 37: 100% 127/127 [01:47<00:00, 1.18it/s, loss=0.635, v\_num=0]Epoch 37, global step 4560: 'val/CER' was not in top 1

Epoch 38: 94% 120/127 [01:43<00:06, 1.16it/s, loss=0.618, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 38: 100% 127/127 [01:48<00:00, 1.17it/s, loss=0.618, v\_num=0]

Epoch 38: 100% 127/127 [01:48<00:00, 1.17it/s, loss=0.618, v\_num=0]Epoch 38, global step 4680: 'val/CER' reached 18.87461 (best 18.87461), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/rerun cnn+lstm/emg2qwerty/logs/2025-03-12/01-37-29/checkpoints/epoch=38-step=4680.ckpt' as top 1

Epoch 39: 94% 120/127 [01:42<00:06, 1.17it/s, loss=0.62, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 39: 100% 127/127 [01:47<00:00, 1.18it/s, loss=0.62, v\_num=0]

Epoch 39: 100% 127/127 [01:47<00:00, 1.18it/s, loss=0.62, v\_num=0]Epoch 39, global step 4800: 'val/CER' was not in top 1

Epoch 40: 94% 120/127 [01:44<00:06, 1.15it/s, loss=0.59, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 40: 100% 127/127 [01:49<00:00, 1.16it/s, loss=0.59, v\_num=0]

Epoch 40: 100% 127/127 [01:49<00:00, 1.16it/s, loss=0.59, v\_num=0]Epoch 40, global step 4920: 'val/CER' was not in top 1

Epoch 41: 94% 120/127 [01:43<00:06, 1.16it/s, loss=0.568, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 41: 100% 127/127 [01:49<00:00, 1.16it/s, loss=0.568, v\_num=0]

Epoch 41: 100% 127/127 [01:49<00:00, 1.16it/s, loss=0.568, v\_num=0]Epoch 41, global step 5040: 'val/CER' reached 18.65308 (best 18.65308), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/rerun cnn+lstm/emg2qwerty/logs/2025-03-12/01-37-29/checkpoints/epoch=41-step=5040.ckpt' as top 1

Epoch 42: 94% 120/127 [01:43<00:06, 1.15it/s, loss=0.536, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 42: 100% 127/127 [01:48<00:00, 1.17it/s, loss=0.536, v\_num=0]

Epoch 42: 100% 127/127 [01:48<00:00, 1.17it/s, loss=0.536, v\_num=0]Epoch 42, global step 5160: 'val/CER' reached 18.05494 (best 18.05494), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/rerun cnn+lstm/emg2qwerty/logs/2025-03-12/01-37-29/checkpoints/epoch=42-step=5160.ckpt' as top 1

Epoch 43: 94% 120/127 [01:42<00:05, 1.17it/s, loss=0.539, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 43: 100% 127/127 [01:48<00:00, 1.17it/s, loss=0.539, v\_num=0]

Epoch 43: 100% 127/127 [01:48<00:00, 1.17it/s, loss=0.539, v\_num=0]Epoch 43, global step 5280: 'val/CER' was not in top 1

Epoch 44: 63% 80/127 [01:09<00:41, 1.14it/s, loss=0.524, v\_num=0]

## 44-50 EPOCHS

Epoch 0: 94% 120/127 [01:54<00:06, 1.05it/s, loss=0.51, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 0: 100% 127/127 [02:01<00:00, 1.05it/s, loss=0.51, v\_num=0]

Epoch 0: 100% 127/127 [02:01<00:00, 1.05it/s, loss=0.51, v\_num=0]Epoch 0, global step 120: 'val/CER' reached 17.98848 (best 17.98848), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/rerun cnn+lstm/emg2qwerty/logs/2025-03-12/03-50-36/checkpoints/epoch=0-step=120.ckpt' as top 1

Epoch 1: 94% 120/127 [01:59<00:06, 1.01it/s, loss=0.542, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 1: 100% 127/127 [02:04<00:00, 1.02it/s, loss=0.542, v\_num=0]

Epoch 1: 100% 127/127 [02:04<00:00, 1.02it/s, loss=0.542, v\_num=0]Epoch 1, global step 240: 'val/CER' was not in top 1

Epoch 2: 94% 120/127 [01:59<00:06, 1.00it/s, loss=0.613, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 2: 100% 127/127 [02:04<00:00, 1.02it/s, loss=0.613, v\_num=0]

Epoch 2: 100% 127/127 [02:04<00:00, 1.02it/s, loss=0.613, v\_num=0]Epoch 2, global step 360: 'val/CER' was not in top 1

Epoch 3: 94% 120/127 [01:55<00:06, 1.04it/s, loss=0.693, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 3: 100% 127/127 [02:00<00:00, 1.05it/s, loss=0.693, v\_num=0]

Epoch 3: 100% 127/127 [02:00<00:00, 1.05it/s, loss=0.693, v\_num=0]Epoch 3, global step 480: 'val/CER' was not in top 1

Epoch 4: 94% 120/127 [01:58<00:06, 1.01it/s, loss=0.882, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 4: 100% 127/127 [02:03<00:00, 1.03it/s, loss=0.882, v\_num=0]

Epoch 4: 100% 127/127 [02:03<00:00, 1.03it/s, loss=0.882, v\_num=0]Epoch 4, global step 600: 'val/CER' was not in top 1

Epoch 5: 94% 120/127 [01:58<00:06, 1.01it/s, loss=0.883, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 5: 100% 127/127 [02:03<00:00, 1.03it/s, loss=0.883, v\_num=0]

Epoch 5: 100% 127/127 [02:03<00:00, 1.03it/s, loss=0.883, v\_num=0]Epoch 5, global step 720: 'val/CER' was not in top 1

Epoch 6: 94% 120/127 [01:54<00:06, 1.05it/s, loss=0.946, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 6: 100% 127/127 [01:59<00:00, 1.07it/s, loss=0.946, v\_num=0]

Epoch 6: 100% 127/127 [01:59<00:00, 1.07it/s, loss=0.946, v\_num=0]Epoch 6, global step 840: 'val/CER' was not in top 1

`Trainer.fit` stopped: `max\_epochs=7` reached.

Epoch 6: 100% 127/127 [01:59<00:00, 1.06it/s, loss=0.946, v\_num=0]

LOCAL\_RANK: 0 - CUDA\_VISIBLE\_DEVICES: [0]

Validation DataLoader 0: 100% 7/7 [00:01<00:00, 3.52it/s]

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┃ **Runningstage.validating** ┃┃

┃ **metric** ┃ **DataLoader 0** ┃

┡━━━━━━━━━━━━━━━━━━━━━━━━━━━╇━━━━━━━━━━━━━━━━━━━━━━━━━━━┩

│ val/CER │ 17.988479614257812 │

│ val/DER │ 1.6836508512496948 │

│ val/IER │ 3.0793087482452393 │

│ val/SER │ 13.225520133972168 │

│ val/loss │ 0.5962234735488892 │

└───────────────────────────┴───────────────────────────┘

LOCAL\_RANK: 0 - CUDA\_VISIBLE\_DEVICES: [0]

Testing DataLoader 0: 100% 1/1 [00:05<00:00, 5.90s/it]

┏━━━━━━━━━━━━━━━━━━━━━━━━━━━┳━━━━━━━━━━━━━━━━━━━━━━━━━━━┓

┃ **Runningstage.testing** ┃┃

┃ **metric** ┃ **DataLoader 0** ┃

┡━━━━━━━━━━━━━━━━━━━━━━━━━━━╇━━━━━━━━━━━━━━━━━━━━━━━━━━━┩

│ test/CER │ 18.932353973388672 │

│ test/DER │ 1.7938188314437866 │

│ test/IER │ 2.377350330352783 │

│ test/SER │ 14.761184692382812 │

│ test/loss │ 0.6126958727836609 │

└───────────────────────────┴───────────────────────────┘

{'val\_metrics': [{'val/loss': 0.5962234735488892,

'val/CER': 17.988479614257812,

'val/IER': 3.0793087482452393,

'val/DER': 1.6836508512496948,

'val/SER': 13.225520133972168}],

'test\_metrics': [{'test/loss': 0.6126958727836609,

'test/CER': 18.932353973388672,

'test/IER': 2.377350330352783,

'test/DER': 1.7938188314437866,

'test/SER': 14.761184692382812}],

'best\_checkpoint': '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/rerun '

'cnn+lstm/emg2qwerty/logs/2025-03-12/03-50-36/checkpoints/epoch=0-step=120.ckpt'}

# TEST PHASE

cnn+transformer 4 layers dropout

# TRAIN TIME

2025-03-11 21:43:58.982428: E external/local\_xla/xla/stream\_executor/cuda/cuda\_fft.cc:477] Unable to register cuFFT factory: Attempting to register factory for plugin cuFFT when one has already been registered

WARNING: All log messages before absl::InitializeLog() is called are written to STDERR

E0000 00:00:1741729439.015629 9303 cuda\_dnn.cc:8310] Unable to register cuDNN factory: Attempting to register factory for plugin cuDNN when one has already been registered

E0000 00:00:1741729439.027029 9303 cuda\_blas.cc:1418] Unable to register cuBLAS factory: Attempting to register factory for plugin cuBLAS when one has already been registered

2025-03-11 21:43:59.060752: I tensorflow/core/platform/cpu\_feature\_guard.cc:210] This TensorFlow binary is optimized to use available CPU instructions in performance-critical operations.

To enable the following instructions: AVX2 AVX512F FMA, in other operations, rebuild TensorFlow with the appropriate compiler flags.

[2025-03-11 21:44:04,278][\_\_main\_\_][INFO] -

Config:

user: single\_user

dataset:

train:

- user: 89335547

session: 2021-06-03-1622765527-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-06-02-1622681518-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-06-04-1622863166-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-07-22-1627003020-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-07-21-1626916256-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-07-22-1627004019-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-06-05-1622885888-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-06-02-1622679967-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-06-03-1622764398-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-07-21-1626917264-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-06-05-1622889105-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-06-03-1622766673-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-06-04-1622861066-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-07-22-1627001995-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-06-05-1622884635-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-07-21-1626915176-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

val:

- user: 89335547

session: 2021-06-04-1622862148-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

test:

- user: 89335547

session: 2021-06-02-1622682789-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

root: ${hydra:runtime.cwd}/data

to\_tensor:

\_target\_: emg2qwerty.transforms.ToTensor

fields:

- emg\_left

- emg\_right

band\_rotation:

\_target\_: emg2qwerty.transforms.ForEach

transform:

\_target\_: emg2qwerty.transforms.RandomBandRotation

offsets:

- -1

- 0

- 1

temporal\_jitter:

\_target\_: emg2qwerty.transforms.TemporalAlignmentJitter

max\_offset: 120

logspec:

\_target\_: emg2qwerty.transforms.LogSpectrogram

n\_fft: 64

hop\_length: 16

specaug:

\_target\_: emg2qwerty.transforms.SpecAugment

n\_time\_masks: 3

time\_mask\_param: 25

n\_freq\_masks: 2

freq\_mask\_param: 4

transforms:

train:

- ${to\_tensor}

- ${band\_rotation}

- ${temporal\_jitter}

- ${logspec}

- ${specaug}

val:

- ${to\_tensor}

- ${logspec}

test: ${transforms.val}

module:

\_target\_: emg2qwerty.lightning.TDSConvCTCModule

in\_features: 528

mlp\_features:

- 384

block\_channels:

- 24

- 24

- 24

- 24

kernel\_width: 32

optimizer: ${optimizer}

lr\_scheduler: ${lr\_scheduler}

decoder: ${decoder}

transformer:

dropout: 0.1

max\_len: 5000

nhead: 8

num\_encoder\_layers: 4

num\_decoder\_layers: 4

datamodule:

\_target\_: emg2qwerty.lightning.WindowedEMGDataModule

window\_length: 8000

padding:

- 1800

- 200

optimizer:

\_target\_: torch.optim.Adam

lr: 0.001

lr\_scheduler:

scheduler:

\_target\_: pl\_bolts.optimizers.lr\_scheduler.LinearWarmupCosineAnnealingLR

warmup\_epochs: 10

max\_epochs: ${trainer.max\_epochs}

warmup\_start\_lr: 1.0e-08

eta\_min: 1.0e-06

interval: epoch

decoder:

\_target\_: emg2qwerty.decoder.CTCGreedyDecoder

seed: 1501

batch\_size: 32

num\_workers: 4

train: true

checkpoint: null

monitor\_metric: val/CER

monitor\_mode: min

trainer:

accelerator: gpu

devices: 1

num\_nodes: 1

max\_epochs: 50

default\_root\_dir: ${hydra:runtime.output\_dir}

callbacks:

- \_target\_: pytorch\_lightning.callbacks.LearningRateMonitor

- \_target\_: pytorch\_lightning.callbacks.ModelCheckpoint

dirpath: ${hydra:runtime.output\_dir}/checkpoints

monitor: ${monitor\_metric}

mode: ${monitor\_mode}

save\_last: true

verbose: true

Global seed set to 1501

[2025-03-11 21:44:04,283][\_\_main\_\_][INFO] - Instantiating LightningModule {'\_target\_': 'emg2qwerty.lightning.TDSConvCTCModule', 'in\_features': 528, 'mlp\_features': [384], 'block\_channels': [24, 24, 24, 24], 'kernel\_width': 32, 'optimizer': '${optimizer}', 'lr\_scheduler': '${lr\_scheduler}', 'decoder': '${decoder}', 'transformer': {'dropout': 0.1, 'max\_len': 5000, 'nhead': 8, 'num\_encoder\_layers': 4, 'num\_decoder\_layers': 4}}

/usr/local/lib/python3.11/dist-packages/torch/nn/modules/transformer.py:306: UserWarning: enable\_nested\_tensor is True, but self.use\_nested\_tensor is False because encoder\_layer.self\_attn.batch\_first was not True(use batch\_first for better inference performance)

warnings.warn(f"enable\_nested\_tensor is True, but self.use\_nested\_tensor is False because {why\_not\_sparsity\_fast\_path}")

[2025-03-11 21:44:05,912][\_\_main\_\_][INFO] - Instantiating LightningDataModule {'\_target\_': 'emg2qwerty.lightning.WindowedEMGDataModule', 'window\_length': 8000, 'padding': [1800, 200]}

GPU available: True (cuda), used: True

TPU available: False, using: 0 TPU cores

IPU available: False, using: 0 IPUs

HPU available: False, using: 0 HPUs

Missing logger folder: /content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/RNN/logs/2025-03-11/21-44-04/lightning\_logs

LOCAL\_RANK: 0 - CUDA\_VISIBLE\_DEVICES: [0]

/usr/local/lib/python3.11/dist-packages/pl\_bolts/\_\_init\_\_.py:11: FutureWarning: In the future `np.object` will be defined as the corresponding NumPy scalar.

if not hasattr(numpy, tp\_name):

/usr/local/lib/python3.11/dist-packages/pl\_bolts/\_\_init\_\_.py:11: FutureWarning: In the future `np.bool` will be defined as the corresponding NumPy scalar.

if not hasattr(numpy, tp\_name):

/usr/local/lib/python3.11/dist-packages/pl\_bolts/models/self\_supervised/amdim/amdim\_module.py:34: UnderReviewWarning: The feature generate\_power\_seq is currently marked under review. The compatibility with other Lightning projects is not guaranteed and API may change at any time. The API and functionality may change without warning in future releases. More details:<https://lightning-bolts.readthedocs.io/en/latest/stability.html>

"lr\_options": generate\_power\_seq(LEARNING\_RATE\_CIFAR, 11),

/usr/local/lib/python3.11/dist-packages/pl\_bolts/models/self\_supervised/amdim/amdim\_module.py:92: UnderReviewWarning: The feature FeatureMapContrastiveTask is currently marked under review. The compatibility with other Lightning projects is not guaranteed and API may change at any time. The API and functionality may change without warning in future releases. More details:<https://lightning-bolts.readthedocs.io/en/latest/stability.html>

contrastive\_task: Union[FeatureMapContrastiveTask] = FeatureMapContrastiveTask("01, 02, 11"),

/usr/local/lib/python3.11/dist-packages/pl\_bolts/losses/self\_supervised\_learning.py:228: UnderReviewWarning: The feature AmdimNCELoss is currently marked under review. The compatibility with other Lightning projects is not guaranteed and API may change at any time. The API and functionality may change without warning in future releases. More details:<https://lightning-bolts.readthedocs.io/en/latest/stability.html>

self.nce\_loss = AmdimNCELoss(tclip)

/usr/local/lib/python3.11/dist-packages/hydra/\_internal/instantiate/\_instantiate2.py:92: UnderReviewWarning: The feature LinearWarmupCosineAnnealingLR is currently marked under review. The compatibility with other Lightning projects is not guaranteed and API may change at any time. The API and functionality may change without warning in future releases. More details:<https://lightning-bolts.readthedocs.io/en/latest/stability.html>

return \_target\_(\*args, \*\*kwargs)

| Name | Type | Params

-----------------------------------------------------------

0 | cnn | Sequential | 5.2 M

1 | pos\_encoder | PositionalEncoding | 0

2 | transformer\_encoder | TransformerEncoder | 22.1 M

3 | transformer\_decoder | TransformerDecoder | 31.5 M

4 | tgt\_embedding | Embedding | 76.0 K

5 | fc | Linear | 76.1 K

6 | log\_softmax | LogSoftmax | 0

7 | ctc\_loss | CTCLoss | 0

8 | metrics | ModuleDict | 0

-----------------------------------------------------------

58.9 M Trainable params

0 Non-trainable params

58.9 M Total params

235.747 Total estimated model params size (MB)

Sanity Checking: 0it [00:00, ?it/s]/usr/local/lib/python3.11/dist-packages/torch/utils/data/dataloader.py:558: UserWarning: This DataLoader will create 4 worker processes in total. Our suggested max number of worker in current system is 2, which is smaller than what this DataLoader is going to create. Please be aware that excessive worker creation might get DataLoader running slow or even freeze, lower the worker number to avoid potential slowness/freeze if necessary.

warnings.warn(\_create\_warning\_msg(

Sanity Checking DataLoader 0: 0% 0/2 [00:00<?, ?it/s]/usr/local/lib/python3.11/dist-packages/torch/nn/modules/conv.py:456: UserWarning: Plan failed with a cudnnException: CUDNN\_BACKEND\_EXECUTION\_PLAN\_DESCRIPTOR: cudnnFinalize Descriptor Failed cudnn\_status: CUDNN\_STATUS\_NOT\_SUPPORTED (Triggered internally at ../aten/src/ATen/native/cudnn/Conv\_v8.cpp:919.)

return F.conv2d(input, weight, bias, self.stride,

Epoch 0: 94% 120/127 [04:05<00:14, 2.05s/it, loss=114, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 0: 100% 127/127 [04:11<00:00, 1.98s/it, loss=114, v\_num=0]

Epoch 0: 100% 127/127 [04:11<00:00, 1.98s/it, loss=114, v\_num=0]Epoch 0, global step 120: 'val/CER' reached 1054.31995 (best 1054.31995), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/RNN/logs/2025-03-11/21-44-04/checkpoints/epoch=0-step=120.ckpt' as top 1

Epoch 1: 94% 120/127 [02:55<00:10, 1.46s/it, loss=3.47, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 1: 100% 127/127 [03:02<00:00, 1.44s/it, loss=3.47, v\_num=0]

Epoch 1: 100% 127/127 [03:02<00:00, 1.44s/it, loss=3.47, v\_num=0]Epoch 1, global step 240: 'val/CER' reached 100.00000 (best 100.00000), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/RNN/logs/2025-03-11/21-44-04/checkpoints/epoch=1-step=240.ckpt' as top 1

Epoch 2: 94% 120/127 [02:55<00:10, 1.47s/it, loss=3.35, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 2: 100% 127/127 [03:01<00:00, 1.43s/it, loss=3.35, v\_num=0]

Epoch 2: 100% 127/127 [03:01<00:00, 1.43s/it, loss=3.35, v\_num=0]Epoch 2, global step 360: 'val/CER' was not in top 1

Epoch 3: 94% 120/127 [02:54<00:10, 1.46s/it, loss=3.33, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 3: 100% 127/127 [03:01<00:00, 1.43s/it, loss=3.33, v\_num=0]

Epoch 3: 100% 127/127 [03:01<00:00, 1.43s/it, loss=3.33, v\_num=0]Epoch 3, global step 480: 'val/CER' was not in top 1

Epoch 4: 94% 120/127 [02:52<00:10, 1.44s/it, loss=3.4, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 4: 100% 127/127 [02:59<00:00, 1.41s/it, loss=3.4, v\_num=0]

Epoch 4: 100% 127/127 [02:59<00:00, 1.41s/it, loss=3.4, v\_num=0]Epoch 4, global step 600: 'val/CER' was not in top 1

Epoch 5: 94% 120/127 [02:54<00:10, 1.45s/it, loss=3.26, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 5: 100% 127/127 [03:00<00:00, 1.42s/it, loss=3.26, v\_num=0]

Epoch 5: 100% 127/127 [03:00<00:00, 1.42s/it, loss=3.26, v\_num=0]Epoch 5, global step 720: 'val/CER' was not in top 1

Epoch 6: 94% 120/127 [02:53<00:10, 1.44s/it, loss=3.14, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 6: 100% 127/127 [02:58<00:00, 1.41s/it, loss=3.14, v\_num=0]

Epoch 6: 100% 127/127 [02:58<00:00, 1.41s/it, loss=3.14, v\_num=0]Epoch 6, global step 840: 'val/CER' was not in top 1

Epoch 7: 94% 120/127 [02:53<00:10, 1.45s/it, loss=3.04, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 7: 100% 127/127 [02:59<00:00, 1.41s/it, loss=3.04, v\_num=0]

Epoch 7: 100% 127/127 [02:59<00:00, 1.41s/it, loss=3.04, v\_num=0]Epoch 7, global step 960: 'val/CER' was not in top 1

Epoch 8: 94% 120/127 [02:54<00:10, 1.46s/it, loss=2.95, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 8: 100% 127/127 [03:01<00:00, 1.43s/it, loss=2.95, v\_num=0]

Epoch 8: 100% 127/127 [03:01<00:00, 1.43s/it, loss=2.95, v\_num=0]Epoch 8, global step 1080: 'val/CER' was not in top 1

Epoch 9: 94% 120/127 [02:54<00:10, 1.45s/it, loss=2.93, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 9: 100% 127/127 [03:01<00:00, 1.43s/it, loss=2.93, v\_num=0]

Epoch 9: 100% 127/127 [03:01<00:00, 1.43s/it, loss=2.93, v\_num=0]Epoch 9, global step 1200: 'val/CER' was not in top 1

Epoch 10: 94% 120/127 [02:54<00:10, 1.45s/it, loss=2.59, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 10: 100% 127/127 [02:59<00:00, 1.42s/it, loss=2.59, v\_num=0]

Epoch 10: 100% 127/127 [02:59<00:00, 1.42s/it, loss=2.59, v\_num=0]Epoch 10, global step 1320: 'val/CER' was not in top 1

Epoch 11: 94% 120/127 [02:53<00:10, 1.44s/it, loss=2.28, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 11: 100% 127/127 [02:59<00:00, 1.41s/it, loss=2.28, v\_num=0]

Epoch 11: 100% 127/127 [02:59<00:00, 1.41s/it, loss=2.28, v\_num=0]Epoch 11, global step 1440: 'val/CER' reached 98.87018 (best 98.87018), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/RNN/logs/2025-03-11/21-44-04/checkpoints/epoch=11-step=1440.ckpt' as top 1

Epoch 12: 94% 120/127 [02:54<00:10, 1.46s/it, loss=2.06, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 12: 100% 127/127 [03:00<00:00, 1.42s/it, loss=2.06, v\_num=0]

Epoch 12: 100% 127/127 [03:00<00:00, 1.42s/it, loss=2.06, v\_num=0]Epoch 12, global step 1560: 'val/CER' reached 86.81879 (best 86.81879), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/RNN/logs/2025-03-11/21-44-04/checkpoints/epoch=12-step=1560.ckpt' as top 1

Epoch 13: 94% 120/127 [02:54<00:10, 1.46s/it, loss=1.83, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 13: 100% 127/127 [03:00<00:00, 1.42s/it, loss=1.83, v\_num=0]

Epoch 13: 100% 127/127 [03:00<00:00, 1.42s/it, loss=1.83, v\_num=0]Epoch 13, global step 1680: 'val/CER' reached 77.73593 (best 77.73593), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/RNN/logs/2025-03-11/21-44-04/checkpoints/epoch=13-step=1680.ckpt' as top 1

Epoch 14: 94% 120/127 [02:55<00:10, 1.47s/it, loss=1.72, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 14: 100% 127/127 [03:02<00:00, 1.43s/it, loss=1.72, v\_num=0]

Epoch 14: 100% 127/127 [03:02<00:00, 1.43s/it, loss=1.72, v\_num=0]Epoch 14, global step 1800: 'val/CER' reached 65.92822 (best 65.92822), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/RNN/logs/2025-03-11/21-44-04/checkpoints/epoch=14-step=1800.ckpt' as top 1

Epoch 15: 94% 120/127 [02:54<00:10, 1.45s/it, loss=1.55, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 15: 100% 127/127 [03:00<00:00, 1.42s/it, loss=1.55, v\_num=0]

Epoch 15: 100% 127/127 [03:00<00:00, 1.42s/it, loss=1.55, v\_num=0]Epoch 15, global step 1920: 'val/CER' reached 52.74701 (best 52.74701), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/RNN/logs/2025-03-11/21-44-04/checkpoints/epoch=15-step=1920.ckpt' as top 1

Epoch 16: 94% 120/127 [02:54<00:10, 1.45s/it, loss=1.46, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 16: 100% 127/127 [03:00<00:00, 1.42s/it, loss=1.46, v\_num=0]

Epoch 16: 100% 127/127 [03:00<00:00, 1.42s/it, loss=1.46, v\_num=0]Epoch 16, global step 2040: 'val/CER' reached 38.98981 (best 38.98981), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/RNN/logs/2025-03-11/21-44-04/checkpoints/epoch=16-step=2040.ckpt' as top 1

Epoch 17: 94% 120/127 [02:54<00:10, 1.46s/it, loss=1.29, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 17: 100% 127/127 [03:00<00:00, 1.42s/it, loss=1.29, v\_num=0]

Epoch 17: 100% 127/127 [03:00<00:00, 1.42s/it, loss=1.29, v\_num=0]Epoch 17, global step 2160: 'val/CER' reached 34.02747 (best 34.02747), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/RNN/logs/2025-03-11/21-44-04/checkpoints/epoch=17-step=2160.ckpt' as top 1

Epoch 18: 94% 120/127 [02:55<00:10, 1.46s/it, loss=1.23, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 18: 100% 127/127 [03:00<00:00, 1.42s/it, loss=1.23, v\_num=0]

Epoch 18: 100% 127/127 [03:00<00:00, 1.42s/it, loss=1.23, v\_num=0]Epoch 18, global step 2280: 'val/CER' reached 32.76473 (best 32.76473), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/RNN/logs/2025-03-11/21-44-04/checkpoints/epoch=18-step=2280.ckpt' as top 1

Epoch 19: 94% 120/127 [02:55<00:10, 1.46s/it, loss=1.18, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 19: 100% 127/127 [03:02<00:00, 1.43s/it, loss=1.18, v\_num=0]

Epoch 19: 100% 127/127 [03:02<00:00, 1.43s/it, loss=1.18, v\_num=0]Epoch 19, global step 2400: 'val/CER' reached 30.43863 (best 30.43863), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/RNN/logs/2025-03-11/21-44-04/checkpoints/epoch=19-step=2400.ckpt' as top 1

Epoch 20: 94% 120/127 [02:56<00:10, 1.47s/it, loss=1.18, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 20: 100% 127/127 [03:03<00:00, 1.45s/it, loss=1.18, v\_num=0]

Epoch 20: 100% 127/127 [03:03<00:00, 1.45s/it, loss=1.18, v\_num=0]Epoch 20, global step 2520: 'val/CER' reached 29.24236 (best 29.24236), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/RNN/logs/2025-03-11/21-44-04/checkpoints/epoch=20-step=2520.ckpt' as top 1

Epoch 21: 94% 120/127 [02:57<00:10, 1.48s/it, loss=1.06, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 21: 100% 127/127 [03:04<00:00, 1.45s/it, loss=1.06, v\_num=0]

Epoch 21: 100% 127/127 [03:04<00:00, 1.45s/it, loss=1.06, v\_num=0]Epoch 21, global step 2640: 'val/CER' reached 28.11254 (best 28.11254), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/RNN/logs/2025-03-11/21-44-04/checkpoints/epoch=21-step=2640.ckpt' as top 1

Epoch 22: 94% 120/127 [02:54<00:10, 1.46s/it, loss=0.99, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 22: 100% 127/127 [03:00<00:00, 1.42s/it, loss=0.99, v\_num=0]

Epoch 22: 100% 127/127 [03:00<00:00, 1.42s/it, loss=0.99, v\_num=0]Epoch 22, global step 2760: 'val/CER' reached 27.31502 (best 27.31502), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/RNN/logs/2025-03-11/21-44-04/checkpoints/epoch=22-step=2760.ckpt' as top 1

Epoch 23: 94% 120/127 [02:55<00:10, 1.47s/it, loss=0.975, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 23: 100% 127/127 [03:01<00:00, 1.43s/it, loss=0.975, v\_num=0]

Epoch 23: 100% 127/127 [03:01<00:00, 1.43s/it, loss=0.975, v\_num=0]Epoch 23, global step 2880: 'val/CER' reached 25.94151 (best 25.94151), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/RNN/logs/2025-03-11/21-44-04/checkpoints/epoch=23-step=2880.ckpt' as top 1

Epoch 24: 94% 120/127 [02:56<00:10, 1.47s/it, loss=0.964, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 24: 100% 127/127 [03:01<00:00, 1.43s/it, loss=0.964, v\_num=0]

Epoch 24: 100% 127/127 [03:01<00:00, 1.43s/it, loss=0.964, v\_num=0]Epoch 24, global step 3000: 'val/CER' was not in top 1

Epoch 25: 94% 120/127 [02:55<00:10, 1.46s/it, loss=0.949, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 25: 100% 127/127 [03:02<00:00, 1.44s/it, loss=0.949, v\_num=0]

Epoch 25: 100% 127/127 [03:02<00:00, 1.44s/it, loss=0.949, v\_num=0]Epoch 25, global step 3120: 'val/CER' was not in top 1

Epoch 26: 94% 120/127 [02:54<00:10, 1.46s/it, loss=0.957, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 26: 100% 127/127 [03:02<00:00, 1.43s/it, loss=0.957, v\_num=0]

Epoch 26: 100% 127/127 [03:02<00:00, 1.43s/it, loss=0.957, v\_num=0]Epoch 26, global step 3240: 'val/CER' was not in top 1

Epoch 27: 94% 120/127 [02:55<00:10, 1.46s/it, loss=0.981, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 27: 100% 127/127 [03:02<00:00, 1.43s/it, loss=0.981, v\_num=0]

Epoch 27: 100% 127/127 [03:02<00:00, 1.43s/it, loss=0.981, v\_num=0]Epoch 27, global step 3360: 'val/CER' was not in top 1

Epoch 28: 94% 120/127 [02:54<00:10, 1.45s/it, loss=0.864, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 28: 100% 127/127 [03:00<00:00, 1.42s/it, loss=0.864, v\_num=0]

Epoch 28: 100% 127/127 [03:00<00:00, 1.42s/it, loss=0.864, v\_num=0]Epoch 28, global step 3480: 'val/CER' reached 24.76739 (best 24.76739), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/RNN/logs/2025-03-11/21-44-04/checkpoints/epoch=28-step=3480.ckpt' as top 1

Epoch 29: 94% 120/127 [02:55<00:10, 1.46s/it, loss=0.969, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 29: 100% 127/127 [03:01<00:00, 1.43s/it, loss=0.969, v\_num=0]

Epoch 29: 100% 127/127 [03:01<00:00, 1.43s/it, loss=0.969, v\_num=0]Epoch 29, global step 3600: 'val/CER' was not in top 1

Epoch 30: 94% 120/127 [02:53<00:10, 1.44s/it, loss=0.845, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 30: 100% 127/127 [02:59<00:00, 1.42s/it, loss=0.845, v\_num=0]

Epoch 30: 100% 127/127 [02:59<00:00, 1.42s/it, loss=0.845, v\_num=0]Epoch 30, global step 3720: 'val/CER' reached 24.43509 (best 24.43509), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/RNN/logs/2025-03-11/21-44-04/checkpoints/epoch=30-step=3720.ckpt' as top 1

Epoch 31: 94% 120/127 [02:56<00:10, 1.47s/it, loss=0.79, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 31: 100% 127/127 [03:01<00:00, 1.43s/it, loss=0.79, v\_num=0]

Epoch 31: 100% 127/127 [03:01<00:00, 1.43s/it, loss=0.79, v\_num=0]Epoch 31, global step 3840: 'val/CER' reached 24.01418 (best 24.01418), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/RNN/logs/2025-03-11/21-44-04/checkpoints/epoch=31-step=3840.ckpt' as top 1

Epoch 32: 94% 120/127 [02:55<00:10, 1.46s/it, loss=0.785, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 32: 100% 127/127 [03:01<00:00, 1.43s/it, loss=0.785, v\_num=0]

Epoch 32: 100% 127/127 [03:01<00:00, 1.43s/it, loss=0.785, v\_num=0]Epoch 32, global step 3960: 'val/CER' reached 23.50465 (best 23.50465), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/RNN/logs/2025-03-11/21-44-04/checkpoints/epoch=32-step=3960.ckpt' as top 1

Epoch 33: 94% 120/127 [02:55<00:10, 1.46s/it, loss=0.738, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 33: 100% 127/127 [03:01<00:00, 1.43s/it, loss=0.738, v\_num=0]

Epoch 33: 100% 127/127 [03:01<00:00, 1.43s/it, loss=0.738, v\_num=0]Epoch 33, global step 4080: 'val/CER' reached 20.80195 (best 20.80195), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/RNN/logs/2025-03-11/21-44-04/checkpoints/epoch=33-step=4080.ckpt' as top 1

Epoch 34: 94% 120/127 [02:54<00:10, 1.45s/it, loss=0.699, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 34: 100% 127/127 [02:59<00:00, 1.41s/it, loss=0.699, v\_num=0]

Epoch 34: 100% 127/127 [02:59<00:00, 1.41s/it, loss=0.699, v\_num=0]Epoch 34, global step 4200: 'val/CER' was not in top 1

Epoch 35: 94% 120/127 [02:54<00:10, 1.45s/it, loss=0.675, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 35: 100% 127/127 [03:00<00:00, 1.42s/it, loss=0.675, v\_num=0]

Epoch 35: 100% 127/127 [03:00<00:00, 1.42s/it, loss=0.675, v\_num=0]Epoch 35, global step 4320: 'val/CER' reached 19.78290 (best 19.78290), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/RNN/logs/2025-03-11/21-44-04/checkpoints/epoch=35-step=4320.ckpt' as top 1

Epoch 36: 94% 120/127 [02:55<00:10, 1.47s/it, loss=0.65, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 36: 100% 127/127 [03:01<00:00, 1.43s/it, loss=0.65, v\_num=0]

Epoch 36: 100% 127/127 [03:01<00:00, 1.43s/it, loss=0.65, v\_num=0]Epoch 36, global step 4440: 'val/CER' was not in top 1

Epoch 37: 94% 120/127 [02:54<00:10, 1.45s/it, loss=0.634, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 37: 100% 127/127 [03:00<00:00, 1.42s/it, loss=0.634, v\_num=0]

Epoch 37: 100% 127/127 [03:00<00:00, 1.42s/it, loss=0.634, v\_num=0]Epoch 37, global step 4560: 'val/CER' reached 19.69428 (best 19.69428), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/RNN/logs/2025-03-11/21-44-04/checkpoints/epoch=37-step=4560.ckpt' as top 1

Epoch 38: 94% 120/127 [02:57<00:10, 1.48s/it, loss=0.587, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 38: 100% 127/127 [03:04<00:00, 1.45s/it, loss=0.587, v\_num=0]

Epoch 38: 100% 127/127 [03:04<00:00, 1.45s/it, loss=0.587, v\_num=0]Epoch 38, global step 4680: 'val/CER' reached 19.16261 (best 19.16261), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/RNN/logs/2025-03-11/21-44-04/checkpoints/epoch=38-step=4680.ckpt' as top 1

Epoch 39: 94% 120/127 [02:56<00:10, 1.47s/it, loss=0.588, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 39: 100% 127/127 [03:02<00:00, 1.44s/it, loss=0.588, v\_num=0]

Epoch 39: 100% 127/127 [03:02<00:00, 1.44s/it, loss=0.588, v\_num=0]Epoch 39, global step 4800: 'val/CER' was not in top 1

Epoch 40: 94% 120/127 [02:54<00:10, 1.45s/it, loss=0.567, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 40: 100% 127/127 [03:00<00:00, 1.42s/it, loss=0.567, v\_num=0]

Epoch 40: 100% 127/127 [03:00<00:00, 1.42s/it, loss=0.567, v\_num=0]Epoch 40, global step 4920: 'val/CER' reached 18.54231 (best 18.54231), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/RNN/logs/2025-03-11/21-44-04/checkpoints/epoch=40-step=4920.ckpt' as top 1

Epoch 41: 94% 120/127 [02:55<00:10, 1.46s/it, loss=0.539, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 41: 100% 127/127 [03:01<00:00, 1.43s/it, loss=0.539, v\_num=0]

Epoch 41: 100% 127/127 [03:01<00:00, 1.43s/it, loss=0.539, v\_num=0]Epoch 41, global step 5040: 'val/CER' reached 18.36509 (best 18.36509), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/RNN/logs/2025-03-11/21-44-04/checkpoints/epoch=41-step=5040.ckpt' as top 1

Epoch 42: 94% 120/127 [02:54<00:10, 1.45s/it, loss=0.513, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 42: 100% 127/127 [03:00<00:00, 1.42s/it, loss=0.513, v\_num=0]

Epoch 42: 100% 127/127 [03:00<00:00, 1.42s/it, loss=0.513, v\_num=0]Epoch 42, global step 5160: 'val/CER' reached 18.29863 (best 18.29863), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/RNN/logs/2025-03-11/21-44-04/checkpoints/epoch=42-step=5160.ckpt' as top 1

Epoch 43: 94% 120/127 [02:54<00:10, 1.45s/it, loss=0.491, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 43: 100% 127/127 [02:59<00:00, 1.42s/it, loss=0.491, v\_num=0]

Epoch 43: 100% 127/127 [02:59<00:00, 1.42s/it, loss=0.491, v\_num=0]Epoch 43, global step 5280: 'val/CER' reached 17.52326 (best 17.52326), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/RNN/logs/2025-03-11/21-44-04/checkpoints/epoch=43-step=5280.ckpt' as top 1

Epoch 44: 94% 120/127 [02:53<00:10, 1.45s/it, loss=0.499, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 44: 100% 127/127 [03:02<00:00, 1.43s/it, loss=0.499, v\_num=0]

Epoch 44: 100% 127/127 [03:02<00:00, 1.43s/it, loss=0.499, v\_num=0]Epoch 44, global step 5400: 'val/CER' reached 17.43465 (best 17.43465), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/RNN/logs/2025-03-11/21-44-04/checkpoints/epoch=44-step=5400.ckpt' as top 1

Epoch 45: 94% 120/127 [02:53<00:10, 1.45s/it, loss=0.47, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 45: 100% 127/127 [02:59<00:00, 1.41s/it, loss=0.47, v\_num=0]

Epoch 45: 100% 127/127 [02:59<00:00, 1.41s/it, loss=0.47, v\_num=0]Epoch 45, global step 5520: 'val/CER' reached 17.27958 (best 17.27958), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/RNN/logs/2025-03-11/21-44-04/checkpoints/epoch=45-step=5520.ckpt' as top 1

Epoch 46: 94% 120/127 [02:54<00:10, 1.45s/it, loss=0.466, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 46: 100% 127/127 [03:00<00:00, 1.42s/it, loss=0.466, v\_num=0]

Epoch 46: 100% 127/127 [03:00<00:00, 1.42s/it, loss=0.466, v\_num=0]Epoch 46, global step 5640: 'val/CER' reached 17.01373 (best 17.01373), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/RNN/logs/2025-03-11/21-44-04/checkpoints/epoch=46-step=5640.ckpt' as top 1

Epoch 47: 94% 120/127 [02:55<00:10, 1.46s/it, loss=0.464, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 47: 100% 127/127 [03:02<00:00, 1.44s/it, loss=0.464, v\_num=0]

Epoch 47: 100% 127/127 [03:02<00:00, 1.44s/it, loss=0.464, v\_num=0]Epoch 47, global step 5760: 'val/CER' was not in top 1

Epoch 48: 94% 120/127 [02:54<00:10, 1.45s/it, loss=0.453, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 48: 100% 127/127 [02:59<00:00, 1.42s/it, loss=0.453, v\_num=0]

Epoch 48: 100% 127/127 [02:59<00:00, 1.42s/it, loss=0.453, v\_num=0]Epoch 48, global step 5880: 'val/CER' was not in top 1

Epoch 49: 94% 120/127 [02:53<00:10, 1.45s/it, loss=0.444, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 49: 100% 127/127 [02:59<00:00, 1.41s/it, loss=0.444, v\_num=0]

Epoch 49: 100% 127/127 [02:59<00:00, 1.41s/it, loss=0.444, v\_num=0]Epoch 49, global step 6000: 'val/CER' was not in top 1

`Trainer.fit` stopped: `max\_epochs=50` reached.

Epoch 49: 100% 127/127 [03:01<00:00, 1.43s/it, loss=0.444, v\_num=0]

/usr/local/lib/python3.11/dist-packages/torch/nn/modules/transformer.py:306: UserWarning: enable\_nested\_tensor is True, but self.use\_nested\_tensor is False because encoder\_layer.self\_attn.batch\_first was not True(use batch\_first for better inference performance)

warnings.warn(f"enable\_nested\_tensor is True, but self.use\_nested\_tensor is False because {why\_not\_sparsity\_fast\_path}")

LOCAL\_RANK: 0 - CUDA\_VISIBLE\_DEVICES: [0]

Validation DataLoader 0: 100% 7/7 [00:03<00:00, 2.24it/s]

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┃ **Runningstage.validating** ┃┃

┃ **metric** ┃ **DataLoader 0** ┃

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│ val/CER │ 17.013734817504883 │

│ val/DER │ 1.9716438055038452 │

│ val/IER │ 3.5445282459259033 │

│ val/SER │ 11.497563362121582 │

│ val/loss │ 0.5779509544372559 │

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LOCAL\_RANK: 0 - CUDA\_VISIBLE\_DEVICES: [0]

Testing DataLoader 0: 0% 0/1 [00:00<?, ?it/s]Error executing job with overrides: ['user=single\_user', 'trainer.accelerator=gpu', 'trainer.devices=1']

Traceback (most recent call last):

File "<frozen runpy>", line 198, in \_run\_module\_as\_main

File "<frozen runpy>", line 88, in \_run\_code

File "/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/RNN/emg2qwerty/train.py", line 129, in <module>

main()

File "/usr/local/lib/python3.11/dist-packages/hydra/main.py", line 94, in decorated\_main

\_run\_hydra(

File "/usr/local/lib/python3.11/dist-packages/hydra/\_internal/utils.py", line 394, in \_run\_hydra

\_run\_app(

File "/usr/local/lib/python3.11/dist-packages/hydra/\_internal/utils.py", line 457, in \_run\_app

run\_and\_report(

File "/usr/local/lib/python3.11/dist-packages/hydra/\_internal/utils.py", line 223, in run\_and\_report

raise ex

File "/usr/local/lib/python3.11/dist-packages/hydra/\_internal/utils.py", line 220, in run\_and\_report

return func()

^^^^^^

File "/usr/local/lib/python3.11/dist-packages/hydra/\_internal/utils.py", line 458, in <lambda>

lambda: hydra.run(

^^^^^^^^^^

File "/usr/local/lib/python3.11/dist-packages/hydra/\_internal/hydra.py", line 132, in run

\_ = ret.return\_value

^^^^^^^^^^^^^^^^

File "/usr/local/lib/python3.11/dist-packages/hydra/core/utils.py", line 260, in return\_value

raise self.\_return\_value

File "/usr/local/lib/python3.11/dist-packages/hydra/core/utils.py", line 186, in run\_job

ret.return\_value = task\_function(task\_cfg)

^^^^^^^^^^^^^^^^^^^^^^^

File "/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/RNN/emg2qwerty/train.py", line 117, in main

test\_metrics = trainer.test(module, datamodule)

^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^

File "/usr/local/lib/python3.11/dist-packages/pytorch\_lightning/trainer/trainer.py", line 780, in test

return call.\_call\_and\_handle\_interrupt(

^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^

File "/usr/local/lib/python3.11/dist-packages/pytorch\_lightning/trainer/call.py", line 38, in \_call\_and\_handle\_interrupt

return trainer\_fn(\*args, \*\*kwargs)

^^^^^^^^^^^^^^^^^^^^^^^^^^^

File "/usr/local/lib/python3.11/dist-packages/pytorch\_lightning/trainer/trainer.py", line 829, in \_test\_impl

results = self.\_run(model, ckpt\_path=self.ckpt\_path)

^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^

File "/usr/local/lib/python3.11/dist-packages/pytorch\_lightning/trainer/trainer.py", line 1098, in \_run

results = self.\_run\_stage()

^^^^^^^^^^^^^^^^^

File "/usr/local/lib/python3.11/dist-packages/pytorch\_lightning/trainer/trainer.py", line 1174, in \_run\_stage

return self.\_run\_evaluate()

^^^^^^^^^^^^^^^^^^^^

File "/usr/local/lib/python3.11/dist-packages/pytorch\_lightning/trainer/trainer.py", line 1214, in \_run\_evaluate

eval\_loop\_results = self.\_evaluation\_loop.run()

^^^^^^^^^^^^^^^^^^^^^^^^^^^

File "/usr/local/lib/python3.11/dist-packages/pytorch\_lightning/loops/loop.py", line 199, in run

self.advance(\*args, \*\*kwargs)

File "/usr/local/lib/python3.11/dist-packages/pytorch\_lightning/loops/dataloader/evaluation\_loop.py", line 152, in advance

dl\_outputs = self.epoch\_loop.run(self.\_data\_fetcher, dl\_max\_batches, kwargs)

^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^

File "/usr/local/lib/python3.11/dist-packages/pytorch\_lightning/loops/loop.py", line 199, in run

self.advance(\*args, \*\*kwargs)

File "/usr/local/lib/python3.11/dist-packages/pytorch\_lightning/loops/epoch/evaluation\_epoch\_loop.py", line 137, in advance

output = self.\_evaluation\_step(\*\*kwargs)

^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^

File "/usr/local/lib/python3.11/dist-packages/pytorch\_lightning/loops/epoch/evaluation\_epoch\_loop.py", line 234, in \_evaluation\_step

output = self.trainer.\_call\_strategy\_hook(hook\_name, \*kwargs.values())

^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^

File "/usr/local/lib/python3.11/dist-packages/pytorch\_lightning/trainer/trainer.py", line 1480, in \_call\_strategy\_hook

output = fn(\*args, \*\*kwargs)

^^^^^^^^^^^^^^^^^^^

File "/usr/local/lib/python3.11/dist-packages/pytorch\_lightning/strategies/strategy.py", line 399, in test\_step

return self.model.test\_step(\*args, \*\*kwargs)

^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^

File "/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/RNN/emg2qwerty/lightning.py", line 279, in test\_step

return self.\_step("test", \*args, \*\*kwargs)

^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^

File "/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/RNN/emg2qwerty/lightning.py", line 241, in \_step

emissions = self.forward(inputs) # (T, N, num\_classes)

^^^^^^^^^^^^^^^^^^^^

File "/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/RNN/emg2qwerty/lightning.py", line 217, in forward

features = self.pos\_encoder(features)

^^^^^^^^^^^^^^^^^^^^^^^^^^

File "/usr/local/lib/python3.11/dist-packages/torch/nn/modules/module.py", line 1532, in \_wrapped\_call\_impl

return self.\_call\_impl(\*args, \*\*kwargs)

^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^

File "/usr/local/lib/python3.11/dist-packages/torch/nn/modules/module.py", line 1541, in \_call\_impl

return forward\_call(\*args, \*\*kwargs)

^^^^^^^^^^^^^^^^^^^^^^^^^^^^^

File "/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/RNN/emg2qwerty/modules.py", line 174, in forward

x = x + self.pe[:x.size(0)]

~~^~~~~~~~~~~~~~~~~~~~~

RuntimeError: The size of tensor a (140633) must match the size of tensor b (5000) at non-singleton dimension 0

Testing DataLoader 0: 0%| | 0/1 [00:03<?, ?it/s]

# 

# TEST TIME

2025-03-12 00:37:55.418583: E external/local\_xla/xla/stream\_executor/cuda/cuda\_fft.cc:477] Unable to register cuFFT factory: Attempting to register factory for plugin cuFFT when one has already been registered

WARNING: All log messages before absl::InitializeLog() is called are written to STDERR

E0000 00:00:1741739875.450267 52413 cuda\_dnn.cc:8310] Unable to register cuDNN factory: Attempting to register factory for plugin cuDNN when one has already been registered

E0000 00:00:1741739875.460232 52413 cuda\_blas.cc:1418] Unable to register cuBLAS factory: Attempting to register factory for plugin cuBLAS when one has already been registered

2025-03-12 00:37:55.490277: I tensorflow/core/platform/cpu\_feature\_guard.cc:210] This TensorFlow binary is optimized to use available CPU instructions in performance-critical operations.

To enable the following instructions: AVX2 AVX512F FMA, in other operations, rebuild TensorFlow with the appropriate compiler flags.

[2025-03-12 00:38:02,750][\_\_main\_\_][INFO] -

Config:

user: single\_user

dataset:

train:

- user: 89335547

session: 2021-06-03-1622765527-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-06-02-1622681518-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-06-04-1622863166-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-07-22-1627003020-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-07-21-1626916256-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-07-22-1627004019-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-06-05-1622885888-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-06-02-1622679967-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-06-03-1622764398-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-07-21-1626917264-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-06-05-1622889105-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-06-03-1622766673-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-06-04-1622861066-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-07-22-1627001995-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-06-05-1622884635-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-07-21-1626915176-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

val:

- user: 89335547

session: 2021-06-04-1622862148-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

test:

- user: 89335547

session: 2021-06-02-1622682789-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

root: ${hydra:runtime.cwd}/data

to\_tensor:

\_target\_: emg2qwerty.transforms.ToTensor

fields:

- emg\_left

- emg\_right

band\_rotation:

\_target\_: emg2qwerty.transforms.ForEach

transform:

\_target\_: emg2qwerty.transforms.RandomBandRotation

offsets:

- -1

- 0

- 1

temporal\_jitter:

\_target\_: emg2qwerty.transforms.TemporalAlignmentJitter

max\_offset: 120

logspec:

\_target\_: emg2qwerty.transforms.LogSpectrogram

n\_fft: 64

hop\_length: 16

specaug:

\_target\_: emg2qwerty.transforms.SpecAugment

n\_time\_masks: 3

time\_mask\_param: 25

n\_freq\_masks: 2

freq\_mask\_param: 4

transforms:

train:

- ${to\_tensor}

- ${band\_rotation}

- ${temporal\_jitter}

- ${logspec}

- ${specaug}

val:

- ${to\_tensor}

- ${logspec}

test: ${transforms.val}

module:

\_target\_: emg2qwerty.lightning.TDSConvCTCModule

in\_features: 528

mlp\_features:

- 384

block\_channels:

- 24

- 24

- 24

- 24

kernel\_width: 32

optimizer: ${optimizer}

lr\_scheduler: ${lr\_scheduler}

decoder: ${decoder}

transformer:

dropout: 0.1

max\_len: 5000

nhead: 8

num\_encoder\_layers: 4

num\_decoder\_layers: 4

datamodule:

\_target\_: emg2qwerty.lightning.WindowedEMGDataModule

window\_length: 8000

padding:

- 1800

- 200

optimizer:

\_target\_: torch.optim.Adam

lr: 0.001

lr\_scheduler:

scheduler:

\_target\_: pl\_bolts.optimizers.lr\_scheduler.LinearWarmupCosineAnnealingLR

warmup\_epochs: 10

max\_epochs: ${trainer.max\_epochs}

warmup\_start\_lr: 1.0e-08

eta\_min: 1.0e-06

interval: epoch

decoder:

\_target\_: emg2qwerty.decoder.CTCGreedyDecoder

seed: 1501

batch\_size: 32

num\_workers: 4

train: false

checkpoint: /content/drive/MyDrive/147project/RNN/logs/2025-03-11/21-44-04/checkpoints/last.ckpt

monitor\_metric: val/CER

monitor\_mode: min

trainer:

accelerator: gpu

devices: 1

num\_nodes: 1

max\_epochs: 50

default\_root\_dir: ${hydra:runtime.output\_dir}

callbacks:

- \_target\_: pytorch\_lightning.callbacks.LearningRateMonitor

- \_target\_: pytorch\_lightning.callbacks.ModelCheckpoint

dirpath: ${hydra:runtime.output\_dir}/checkpoints

monitor: ${monitor\_metric}

mode: ${monitor\_mode}

save\_last: true

verbose: true

Global seed set to 1501

[2025-03-12 00:38:02,763][\_\_main\_\_][INFO] - Instantiating LightningModule {'\_target\_': 'emg2qwerty.lightning.TDSConvCTCModule', 'in\_features': 528, 'mlp\_features': [384], 'block\_channels': [24, 24, 24, 24], 'kernel\_width': 32, 'optimizer': '${optimizer}', 'lr\_scheduler': '${lr\_scheduler}', 'decoder': '${decoder}', 'transformer': {'dropout': 0.1, 'max\_len': 5000, 'nhead': 8, 'num\_encoder\_layers': 4, 'num\_decoder\_layers': 4}}

/usr/local/lib/python3.11/dist-packages/torch/nn/modules/transformer.py:306: UserWarning: enable\_nested\_tensor is True, but self.use\_nested\_tensor is False because encoder\_layer.self\_attn.batch\_first was not True(use batch\_first for better inference performance)

warnings.warn(f"enable\_nested\_tensor is True, but self.use\_nested\_tensor is False because {why\_not\_sparsity\_fast\_path}")

[2025-03-12 00:38:04,108][\_\_main\_\_][INFO] - Loading module from checkpoint /content/drive/MyDrive/147project/RNN/logs/2025-03-11/21-44-04/checkpoints/last.ckpt

[2025-03-12 00:38:07,082][\_\_main\_\_][INFO] - Instantiating LightningDataModule {'\_target\_': 'emg2qwerty.lightning.WindowedEMGDataModule', 'window\_length': 8000, 'padding': [1800, 200]}

GPU available: True (cuda), used: True

TPU available: False, using: 0 TPU cores

IPU available: False, using: 0 IPUs

HPU available: False, using: 0 HPUs

Missing logger folder: /content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/RNN/logs/2025-03-12/00-38-02/lightning\_logs

LOCAL\_RANK: 0 - CUDA\_VISIBLE\_DEVICES: [0]

/usr/local/lib/python3.11/dist-packages/torch/utils/data/dataloader.py:558: UserWarning: This DataLoader will create 4 worker processes in total. Our suggested max number of worker in current system is 2, which is smaller than what this DataLoader is going to create. Please be aware that excessive worker creation might get DataLoader running slow or even freeze, lower the worker number to avoid potential slowness/freeze if necessary.

warnings.warn(\_create\_warning\_msg(

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]/usr/local/lib/python3.11/dist-packages/torch/nn/modules/conv.py:456: UserWarning: Plan failed with a cudnnException: CUDNN\_BACKEND\_EXECUTION\_PLAN\_DESCRIPTOR: cudnnFinalize Descriptor Failed cudnn\_status: CUDNN\_STATUS\_NOT\_SUPPORTED (Triggered internally at ../aten/src/ATen/native/cudnn/Conv\_v8.cpp:919.)

return F.conv2d(input, weight, bias, self.stride,

Validation DataLoader 0: 100% 7/7 [00:03<00:00, 1.99it/s]

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┃ **Runningstage.validating** ┃┃

┃ **metric** ┃ **DataLoader 0** ┃

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│ val/CER │ 17.035888671875 │

│ val/DER │ 1.9716438055038452 │

│ val/IER │ 3.4780681133270264 │

│ val/SER │ 11.586175918579102 │

│ val/loss │ 0.5714775919914246 │

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LOCAL\_RANK: 0 - CUDA\_VISIBLE\_DEVICES: [0]

Testing DataLoader 0: 100% 1/1 [02:39<00:00, 159.06s/it]

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┃ **Runningstage.testing** ┃┃

┃ **metric** ┃ **DataLoader 0** ┃

┡━━━━━━━━━━━━━━━━━━━━━━━━━━━╇━━━━━━━━━━━━━━━━━━━━━━━━━━━┩

│ test/CER │ 39.89625930786133 │

│ test/DER │ 1.361573338508606 │

│ test/IER │ 21.158418655395508 │

│ test/SER │ 17.376270294189453 │

│ test/loss │ 1.608945369720459 │

└───────────────────────────┴───────────────────────────┘

{'val\_metrics': [{'val/loss': 0.5714775919914246,

'val/CER': 17.035888671875,

'val/IER': 3.4780681133270264,

'val/DER': 1.9716438055038452,

'val/SER': 11.586175918579102}],

'test\_metrics': [{'test/loss': 1.608945369720459,

'test/CER': 39.89625930786133,

'test/IER': 21.158418655395508,

'test/DER': 1.361573338508606,

'test/SER': 17.376270294189453}],

'best\_checkpoint': ''}

cnn+transformer 2 layer dropout

# TRAIN TIME

## First 30 epochs

2025-03-12 17:47:35.626620: E external/local\_xla/xla/stream\_executor/cuda/cuda\_fft.cc:477] Unable to register cuFFT factory: Attempting to register factory for plugin cuFFT when one has already been registered

WARNING: All log messages before absl::InitializeLog() is called are written to STDERR

E0000 00:00:1741801655.661039 3980 cuda\_dnn.cc:8310] Unable to register cuDNN factory: Attempting to register factory for plugin cuDNN when one has already been registered

E0000 00:00:1741801655.675210 3980 cuda\_blas.cc:1418] Unable to register cuBLAS factory: Attempting to register factory for plugin cuBLAS when one has already been registered

2025-03-12 17:47:35.723707: I tensorflow/core/platform/cpu\_feature\_guard.cc:210] This TensorFlow binary is optimized to use available CPU instructions in performance-critical operations.

To enable the following instructions: AVX2 AVX512F FMA, in other operations, rebuild TensorFlow with the appropriate compiler flags.

[2025-03-12 17:47:42,380][\_\_main\_\_][INFO] -

Config:

user: single\_user

dataset:

train:

- user: 89335547

session: 2021-06-03-1622765527-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-06-02-1622681518-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-06-04-1622863166-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-07-22-1627003020-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-07-21-1626916256-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-07-22-1627004019-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-06-05-1622885888-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-06-02-1622679967-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-06-03-1622764398-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-07-21-1626917264-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-06-05-1622889105-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-06-03-1622766673-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-06-04-1622861066-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-07-22-1627001995-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-06-05-1622884635-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-07-21-1626915176-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

val:

- user: 89335547

session: 2021-06-04-1622862148-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

test:

- user: 89335547

session: 2021-06-02-1622682789-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

root: ${hydra:runtime.cwd}/data

to\_tensor:

\_target\_: emg2qwerty.transforms.ToTensor

fields:

- emg\_left

- emg\_right

band\_rotation:

\_target\_: emg2qwerty.transforms.ForEach

transform:

\_target\_: emg2qwerty.transforms.RandomBandRotation

offsets:

- -1

- 0

- 1

temporal\_jitter:

\_target\_: emg2qwerty.transforms.TemporalAlignmentJitter

max\_offset: 120

logspec:

\_target\_: emg2qwerty.transforms.LogSpectrogram

n\_fft: 64

hop\_length: 16

specaug:

\_target\_: emg2qwerty.transforms.SpecAugment

n\_time\_masks: 3

time\_mask\_param: 25

n\_freq\_masks: 2

freq\_mask\_param: 4

transforms:

train:

- ${to\_tensor}

- ${band\_rotation}

- ${temporal\_jitter}

- ${logspec}

- ${specaug}

val:

- ${to\_tensor}

- ${logspec}

test: ${transforms.val}

module:

\_target\_: emg2qwerty.lightning.TDSConvCTCModule

in\_features: 528

mlp\_features:

- 384

block\_channels:

- 24

- 24

- 24

- 24

kernel\_width: 32

optimizer: ${optimizer}

lr\_scheduler: ${lr\_scheduler}

decoder: ${decoder}

transformer:

dropout: 0.3

max\_len: 5000

nhead: 8

num\_encoder\_layers: 2

num\_decoder\_layers: 2

datamodule:

\_target\_: emg2qwerty.lightning.WindowedEMGDataModule

window\_length: 8000

padding:

- 1800

- 200

optimizer:

\_target\_: torch.optim.Adam

lr: 0.001

lr\_scheduler:

scheduler:

\_target\_: pl\_bolts.optimizers.lr\_scheduler.LinearWarmupCosineAnnealingLR

warmup\_epochs: 10

max\_epochs: ${trainer.max\_epochs}

warmup\_start\_lr: 1.0e-08

eta\_min: 1.0e-06

interval: epoch

decoder:

\_target\_: emg2qwerty.decoder.CTCGreedyDecoder

seed: 1501

batch\_size: 32

num\_workers: 4

train: true

checkpoint: null

monitor\_metric: val/CER

monitor\_mode: min

trainer:

accelerator: gpu

devices: 1

num\_nodes: 1

max\_epochs: 30

default\_root\_dir: ${hydra:runtime.output\_dir}

callbacks:

- \_target\_: pytorch\_lightning.callbacks.LearningRateMonitor

- \_target\_: pytorch\_lightning.callbacks.ModelCheckpoint

dirpath: ${hydra:runtime.output\_dir}/checkpoints

monitor: ${monitor\_metric}

mode: ${monitor\_mode}

save\_last: true

verbose: true

Global seed set to 1501

[2025-03-12 17:47:42,391][\_\_main\_\_][INFO] - Instantiating LightningModule {'\_target\_': 'emg2qwerty.lightning.TDSConvCTCModule', 'in\_features': 528, 'mlp\_features': [384], 'block\_channels': [24, 24, 24, 24], 'kernel\_width': 32, 'optimizer': '${optimizer}', 'lr\_scheduler': '${lr\_scheduler}', 'decoder': '${decoder}', 'transformer': {'dropout': 0.3, 'max\_len': 5000, 'nhead': 8, 'num\_encoder\_layers': 2, 'num\_decoder\_layers': 2}}

/usr/local/lib/python3.11/dist-packages/torch/nn/modules/transformer.py:306: UserWarning: enable\_nested\_tensor is True, but self.use\_nested\_tensor is False because encoder\_layer.self\_attn.batch\_first was not True(use batch\_first for better inference performance)

warnings.warn(f"enable\_nested\_tensor is True, but self.use\_nested\_tensor is False because {why\_not\_sparsity\_fast\_path}")

[2025-03-12 17:47:42,724][\_\_main\_\_][INFO] - Instantiating LightningDataModule {'\_target\_': 'emg2qwerty.lightning.WindowedEMGDataModule', 'window\_length': 8000, 'padding': [1800, 200]}

GPU available: True (cuda), used: True

TPU available: False, using: 0 TPU cores

IPU available: False, using: 0 IPUs

HPU available: False, using: 0 HPUs

Missing logger folder: /content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/RNN/logs/2025-03-12/17-47-42/lightning\_logs

LOCAL\_RANK: 0 - CUDA\_VISIBLE\_DEVICES: [0]

/usr/local/lib/python3.11/dist-packages/pl\_bolts/\_\_init\_\_.py:11: FutureWarning: In the future `np.object` will be defined as the corresponding NumPy scalar.

if not hasattr(numpy, tp\_name):

/usr/local/lib/python3.11/dist-packages/pl\_bolts/\_\_init\_\_.py:11: FutureWarning: In the future `np.bool` will be defined as the corresponding NumPy scalar.

if not hasattr(numpy, tp\_name):

/usr/local/lib/python3.11/dist-packages/pl\_bolts/models/self\_supervised/amdim/amdim\_module.py:34: UnderReviewWarning: The feature generate\_power\_seq is currently marked under review. The compatibility with other Lightning projects is not guaranteed and API may change at any time. The API and functionality may change without warning in future releases. More details:<https://lightning-bolts.readthedocs.io/en/latest/stability.html>

"lr\_options": generate\_power\_seq(LEARNING\_RATE\_CIFAR, 11),

/usr/local/lib/python3.11/dist-packages/pl\_bolts/models/self\_supervised/amdim/amdim\_module.py:92: UnderReviewWarning: The feature FeatureMapContrastiveTask is currently marked under review. The compatibility with other Lightning projects is not guaranteed and API may change at any time. The API and functionality may change without warning in future releases. More details:<https://lightning-bolts.readthedocs.io/en/latest/stability.html>

contrastive\_task: Union[FeatureMapContrastiveTask] = FeatureMapContrastiveTask("01, 02, 11"),

/usr/local/lib/python3.11/dist-packages/pl\_bolts/losses/self\_supervised\_learning.py:228: UnderReviewWarning: The feature AmdimNCELoss is currently marked under review. The compatibility with other Lightning projects is not guaranteed and API may change at any time. The API and functionality may change without warning in future releases. More details:<https://lightning-bolts.readthedocs.io/en/latest/stability.html>

self.nce\_loss = AmdimNCELoss(tclip)

/usr/local/lib/python3.11/dist-packages/hydra/\_internal/instantiate/\_instantiate2.py:92: UnderReviewWarning: The feature LinearWarmupCosineAnnealingLR is currently marked under review. The compatibility with other Lightning projects is not guaranteed and API may change at any time. The API and functionality may change without warning in future releases. More details:<https://lightning-bolts.readthedocs.io/en/latest/stability.html>

return \_target\_(\*args, \*\*kwargs)

| Name | Type | Params

-----------------------------------------------------------

0 | cnn | Sequential | 5.2 M

1 | pos\_encoder | PositionalEncoding | 0

2 | transformer\_encoder | TransformerEncoder | 11.0 M

3 | transformer\_decoder | TransformerDecoder | 15.8 M

4 | tgt\_embedding | Embedding | 76.0 K

5 | fc | Linear | 76.1 K

6 | log\_softmax | LogSoftmax | 0

7 | ctc\_loss | CTCLoss | 0

8 | metrics | ModuleDict | 0

-----------------------------------------------------------

32.2 M Trainable params

0 Non-trainable params

32.2 M Total params

128.612 Total estimated model params size (MB)

Sanity Checking: 0it [00:00, ?it/s]/usr/local/lib/python3.11/dist-packages/torch/utils/data/dataloader.py:558: UserWarning: This DataLoader will create 4 worker processes in total. Our suggested max number of worker in current system is 2, which is smaller than what this DataLoader is going to create. Please be aware that excessive worker creation might get DataLoader running slow or even freeze, lower the worker number to avoid potential slowness/freeze if necessary.

warnings.warn(\_create\_warning\_msg(

Sanity Checking DataLoader 0: 0% 0/2 [00:00<?, ?it/s]/usr/local/lib/python3.11/dist-packages/torch/nn/modules/conv.py:456: UserWarning: Plan failed with a cudnnException: CUDNN\_BACKEND\_EXECUTION\_PLAN\_DESCRIPTOR: cudnnFinalize Descriptor Failed cudnn\_status: CUDNN\_STATUS\_NOT\_SUPPORTED (Triggered internally at ../aten/src/ATen/native/cudnn/Conv\_v8.cpp:919.)

return F.conv2d(input, weight, bias, self.stride,

Epoch 0: 94% 120/127 [02:23<00:08, 1.20s/it, loss=127, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 0: 100% 127/127 [02:29<00:00, 1.17s/it, loss=127, v\_num=0]

Epoch 0: 100% 127/127 [02:29<00:00, 1.17s/it, loss=127, v\_num=0]Epoch 0, global step 120: 'val/CER' reached 1297.78467 (best 1297.78467), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/RNN/logs/2025-03-12/17-47-42/checkpoints/epoch=0-step=120.ckpt' as top 1

Epoch 1: 94% 120/127 [02:06<00:07, 1.06s/it, loss=3.5, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 1: 100% 127/127 [02:12<00:00, 1.04s/it, loss=3.5, v\_num=0]

Epoch 1: 100% 127/127 [02:12<00:00, 1.04s/it, loss=3.5, v\_num=0]Epoch 1, global step 240: 'val/CER' reached 100.00000 (best 100.00000), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/RNN/logs/2025-03-12/17-47-42/checkpoints/epoch=1-step=240.ckpt' as top 1

Epoch 2: 94% 120/127 [02:05<00:07, 1.05s/it, loss=3.35, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 2: 100% 127/127 [02:11<00:00, 1.04s/it, loss=3.35, v\_num=0]

Epoch 2: 100% 127/127 [02:11<00:00, 1.04s/it, loss=3.35, v\_num=0]Epoch 2, global step 360: 'val/CER' was not in top 1

Epoch 3: 94% 120/127 [02:02<00:07, 1.02s/it, loss=3.32, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 3: 100% 127/127 [02:09<00:00, 1.02s/it, loss=3.32, v\_num=0]

Epoch 3: 100% 127/127 [02:09<00:00, 1.02s/it, loss=3.32, v\_num=0]Epoch 3, global step 480: 'val/CER' was not in top 1

Epoch 4: 94% 120/127 [02:03<00:07, 1.03s/it, loss=3.34, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 4: 100% 127/127 [02:08<00:00, 1.01s/it, loss=3.34, v\_num=0]

Epoch 4: 100% 127/127 [02:08<00:00, 1.01s/it, loss=3.34, v\_num=0]Epoch 4, global step 600: 'val/CER' was not in top 1

Epoch 5: 94% 120/127 [02:01<00:07, 1.01s/it, loss=3.18, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 5: 100% 127/127 [02:06<00:00, 1.01it/s, loss=3.18, v\_num=0]

Epoch 5: 100% 127/127 [02:06<00:00, 1.01it/s, loss=3.18, v\_num=0]Epoch 5, global step 720: 'val/CER' was not in top 1

Epoch 6: 94% 120/127 [02:02<00:07, 1.02s/it, loss=3.1, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 6: 100% 127/127 [02:07<00:00, 1.01s/it, loss=3.1, v\_num=0]

Epoch 6: 100% 127/127 [02:07<00:00, 1.01s/it, loss=3.1, v\_num=0]Epoch 6, global step 840: 'val/CER' reached 99.88924 (best 99.88924), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/RNN/logs/2025-03-12/17-47-42/checkpoints/epoch=6-step=840.ckpt' as top 1

Epoch 7: 94% 120/127 [02:03<00:07, 1.03s/it, loss=2.95, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 7: 100% 127/127 [02:10<00:00, 1.03s/it, loss=2.95, v\_num=0]

Epoch 7: 100% 127/127 [02:10<00:00, 1.03s/it, loss=2.95, v\_num=0]Epoch 7, global step 960: 'val/CER' was not in top 1

Epoch 8: 94% 120/127 [02:03<00:07, 1.03s/it, loss=2.79, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 8: 100% 127/127 [02:09<00:00, 1.02s/it, loss=2.79, v\_num=0]

Epoch 8: 100% 127/127 [02:09<00:00, 1.02s/it, loss=2.79, v\_num=0]Epoch 8, global step 1080: 'val/CER' was not in top 1

Epoch 9: 94% 120/127 [02:02<00:07, 1.02s/it, loss=2.59, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 9: 100% 127/127 [02:09<00:00, 1.02s/it, loss=2.59, v\_num=0]

Epoch 9: 100% 127/127 [02:09<00:00, 1.02s/it, loss=2.59, v\_num=0]Epoch 9, global step 1200: 'val/CER' reached 96.07887 (best 96.07887), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/RNN/logs/2025-03-12/17-47-42/checkpoints/epoch=9-step=1200.ckpt' as top 1

Epoch 10: 94% 120/127 [02:04<00:07, 1.04s/it, loss=2.24, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 10: 100% 127/127 [02:10<00:00, 1.03s/it, loss=2.24, v\_num=0]

Epoch 10: 100% 127/127 [02:10<00:00, 1.03s/it, loss=2.24, v\_num=0]Epoch 10, global step 1320: 'val/CER' reached 89.87594 (best 89.87594), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/RNN/logs/2025-03-12/17-47-42/checkpoints/epoch=10-step=1320.ckpt' as top 1

Epoch 11: 94% 120/127 [02:04<00:07, 1.03s/it, loss=2.05, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 11: 100% 127/127 [02:09<00:00, 1.02s/it, loss=2.05, v\_num=0]

Epoch 11: 100% 127/127 [02:09<00:00, 1.02s/it, loss=2.05, v\_num=0]Epoch 11, global step 1440: 'val/CER' reached 85.91050 (best 85.91050), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/RNN/logs/2025-03-12/17-47-42/checkpoints/epoch=11-step=1440.ckpt' as top 1

Epoch 12: 94% 120/127 [02:04<00:07, 1.04s/it, loss=1.89, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 12: 100% 127/127 [02:09<00:00, 1.02s/it, loss=1.89, v\_num=0]

Epoch 12: 100% 127/127 [02:09<00:00, 1.02s/it, loss=1.89, v\_num=0]Epoch 12, global step 1560: 'val/CER' reached 75.38768 (best 75.38768), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/RNN/logs/2025-03-12/17-47-42/checkpoints/epoch=12-step=1560.ckpt' as top 1

Epoch 13: 94% 120/127 [02:04<00:07, 1.04s/it, loss=1.73, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 13: 100% 127/127 [02:11<00:00, 1.03s/it, loss=1.73, v\_num=0]

Epoch 13: 100% 127/127 [02:11<00:00, 1.03s/it, loss=1.73, v\_num=0]Epoch 13, global step 1680: 'val/CER' reached 65.13071 (best 65.13071), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/RNN/logs/2025-03-12/17-47-42/checkpoints/epoch=13-step=1680.ckpt' as top 1

Epoch 14: 94% 120/127 [02:04<00:07, 1.04s/it, loss=1.63, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 14: 100% 127/127 [02:09<00:00, 1.02s/it, loss=1.63, v\_num=0]

Epoch 14: 100% 127/127 [02:09<00:00, 1.02s/it, loss=1.63, v\_num=0]Epoch 14, global step 1800: 'val/CER' reached 57.15552 (best 57.15552), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/RNN/logs/2025-03-12/17-47-42/checkpoints/epoch=14-step=1800.ckpt' as top 1

Epoch 15: 94% 120/127 [02:06<00:07, 1.05s/it, loss=1.5, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 15: 100% 127/127 [02:11<00:00, 1.03s/it, loss=1.5, v\_num=0]

Epoch 15: 100% 127/127 [02:11<00:00, 1.03s/it, loss=1.5, v\_num=0]Epoch 15, global step 1920: 'val/CER' reached 40.56269 (best 40.56269), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/RNN/logs/2025-03-12/17-47-42/checkpoints/epoch=15-step=1920.ckpt' as top 1

Epoch 16: 94% 120/127 [02:05<00:07, 1.05s/it, loss=1.36, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 16: 100% 127/127 [02:10<00:00, 1.03s/it, loss=1.36, v\_num=0]

Epoch 16: 100% 127/127 [02:10<00:00, 1.03s/it, loss=1.36, v\_num=0]Epoch 16, global step 2040: 'val/CER' reached 35.68897 (best 35.68897), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/RNN/logs/2025-03-12/17-47-42/checkpoints/epoch=16-step=2040.ckpt' as top 1

Epoch 17: 94% 120/127 [02:05<00:07, 1.04s/it, loss=1.21, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 17: 100% 127/127 [02:10<00:00, 1.02s/it, loss=1.21, v\_num=0]

Epoch 17: 100% 127/127 [02:10<00:00, 1.02s/it, loss=1.21, v\_num=0]Epoch 17, global step 2160: 'val/CER' reached 34.18254 (best 34.18254), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/RNN/logs/2025-03-12/17-47-42/checkpoints/epoch=17-step=2160.ckpt' as top 1

Epoch 18: 94% 120/127 [02:04<00:07, 1.03s/it, loss=1.16, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 18: 100% 127/127 [02:09<00:00, 1.02s/it, loss=1.16, v\_num=0]

Epoch 18: 100% 127/127 [02:09<00:00, 1.02s/it, loss=1.16, v\_num=0]Epoch 18, global step 2280: 'val/CER' reached 30.21710 (best 30.21710), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/RNN/logs/2025-03-12/17-47-42/checkpoints/epoch=18-step=2280.ckpt' as top 1

Epoch 19: 94% 120/127 [02:03<00:07, 1.03s/it, loss=1.14, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 19: 100% 127/127 [02:09<00:00, 1.02s/it, loss=1.14, v\_num=0]

Epoch 19: 100% 127/127 [02:09<00:00, 1.02s/it, loss=1.14, v\_num=0]Epoch 19, global step 2400: 'val/CER' reached 29.02082 (best 29.02082), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/RNN/logs/2025-03-12/17-47-42/checkpoints/epoch=19-step=2400.ckpt' as top 1

Epoch 20: 94% 120/127 [02:04<00:07, 1.04s/it, loss=1.09, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 20: 100% 127/127 [02:09<00:00, 1.02s/it, loss=1.09, v\_num=0]

Epoch 20: 100% 127/127 [02:09<00:00, 1.02s/it, loss=1.09, v\_num=0]Epoch 20, global step 2520: 'val/CER' was not in top 1

Epoch 21: 94% 120/127 [02:02<00:07, 1.02s/it, loss=0.953, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 21: 100% 127/127 [02:07<00:00, 1.00s/it, loss=0.953, v\_num=0]

Epoch 21: 100% 127/127 [02:07<00:00, 1.00s/it, loss=0.953, v\_num=0]Epoch 21, global step 2640: 'val/CER' reached 27.75809 (best 27.75809), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/RNN/logs/2025-03-12/17-47-42/checkpoints/epoch=21-step=2640.ckpt' as top 1

Epoch 22: 94% 120/127 [02:04<00:07, 1.04s/it, loss=0.902, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 22: 100% 127/127 [02:10<00:00, 1.03s/it, loss=0.902, v\_num=0]

Epoch 22: 100% 127/127 [02:10<00:00, 1.03s/it, loss=0.902, v\_num=0]Epoch 22, global step 2760: 'val/CER' reached 25.74214 (best 25.74214), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/RNN/logs/2025-03-12/17-47-42/checkpoints/epoch=22-step=2760.ckpt' as top 1

Epoch 23: 94% 120/127 [02:04<00:07, 1.03s/it, loss=0.898, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 23: 100% 127/127 [02:09<00:00, 1.02s/it, loss=0.898, v\_num=0]

Epoch 23: 100% 127/127 [02:09<00:00, 1.02s/it, loss=0.898, v\_num=0]Epoch 23, global step 2880: 'val/CER' reached 24.63447 (best 24.63447), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/RNN/logs/2025-03-12/17-47-42/checkpoints/epoch=23-step=2880.ckpt' as top 1

Epoch 24: 94% 120/127 [02:04<00:07, 1.04s/it, loss=0.87, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 24: 100% 127/127 [02:09<00:00, 1.02s/it, loss=0.87, v\_num=0]

Epoch 24: 100% 127/127 [02:09<00:00, 1.02s/it, loss=0.87, v\_num=0]Epoch 24, global step 3000: 'val/CER' reached 23.96987 (best 23.96987), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/RNN/logs/2025-03-12/17-47-42/checkpoints/epoch=24-step=3000.ckpt' as top 1

Epoch 25: 94% 120/127 [02:04<00:07, 1.04s/it, loss=0.84, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 25: 100% 127/127 [02:10<00:00, 1.03s/it, loss=0.84, v\_num=0]

Epoch 25: 100% 127/127 [02:10<00:00, 1.03s/it, loss=0.84, v\_num=0]Epoch 25, global step 3120: 'val/CER' reached 23.74834 (best 23.74834), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/RNN/logs/2025-03-12/17-47-42/checkpoints/epoch=25-step=3120.ckpt' as top 1

Epoch 26: 94% 120/127 [02:04<00:07, 1.04s/it, loss=0.825, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 26: 100% 127/127 [02:09<00:00, 1.02s/it, loss=0.825, v\_num=0]

Epoch 26: 100% 127/127 [02:09<00:00, 1.02s/it, loss=0.825, v\_num=0]Epoch 26, global step 3240: 'val/CER' reached 23.54896 (best 23.54896), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/RNN/logs/2025-03-12/17-47-42/checkpoints/epoch=26-step=3240.ckpt' as top 1

Epoch 27: 94% 120/127 [02:05<00:07, 1.04s/it, loss=0.793, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 27: 100% 127/127 [02:11<00:00, 1.03s/it, loss=0.793, v\_num=0]

Epoch 27: 100% 127/127 [02:11<00:00, 1.03s/it, loss=0.793, v\_num=0]Epoch 27, global step 3360: 'val/CER' reached 22.57421 (best 22.57421), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/RNN/logs/2025-03-12/17-47-42/checkpoints/epoch=27-step=3360.ckpt' as top 1

Epoch 28: 94% 120/127 [02:05<00:07, 1.05s/it, loss=0.772, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 28: 100% 127/127 [02:10<00:00, 1.03s/it, loss=0.772, v\_num=0]

Epoch 28: 100% 127/127 [02:10<00:00, 1.03s/it, loss=0.772, v\_num=0]Epoch 28, global step 3480: 'val/CER' reached 22.13115 (best 22.13115), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/RNN/logs/2025-03-12/17-47-42/checkpoints/epoch=28-step=3480.ckpt' as top 1

Epoch 29: 94% 120/127 [02:06<00:07, 1.05s/it, loss=0.778, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 29: 100% 127/127 [02:11<00:00, 1.04s/it, loss=0.778, v\_num=0]

Epoch 29: 100% 127/127 [02:11<00:00, 1.04s/it, loss=0.778, v\_num=0]Epoch 29, global step 3600: 'val/CER' reached 21.93177 (best 21.93177), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/RNN/logs/2025-03-12/17-47-42/checkpoints/epoch=29-step=3600.ckpt' as top 1

`Trainer.fit` stopped: `max\_epochs=30` reached.

Epoch 29: 100% 127/127 [02:18<00:00, 1.09s/it, loss=0.778, v\_num=0]

/usr/local/lib/python3.11/dist-packages/torch/nn/modules/transformer.py:306: UserWarning: enable\_nested\_tensor is True, but self.use\_nested\_tensor is False because encoder\_layer.self\_attn.batch\_first was not True(use batch\_first for better inference performance)

warnings.warn(f"enable\_nested\_tensor is True, but self.use\_nested\_tensor is False because {why\_not\_sparsity\_fast\_path}")

LOCAL\_RANK: 0 - CUDA\_VISIBLE\_DEVICES: [0]

Validation DataLoader 0: 100% 7/7 [00:02<00:00, 2.92it/s]

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┃ **Runningstage.validating** ┃┃

┃ **metric** ┃ **DataLoader 0** ┃

┡━━━━━━━━━━━━━━━━━━━━━━━━━━━╇━━━━━━━━━━━━━━━━━━━━━━━━━━━┩

│ val/CER │ 21.9317684173584 │

│ val/DER │ 2.4811697006225586 │

│ val/IER │ 5.427558898925781 │

│ val/SER │ 14.023039817810059 │

│ val/loss │ 0.7440177798271179 │

└───────────────────────────┴───────────────────────────┘

LOCAL\_RANK: 0 - CUDA\_VISIBLE\_DEVICES: [0]

Testing DataLoader 0: 100% 1/1 [01:24<00:00, 84.97s/it]

┏━━━━━━━━━━━━━━━━━━━━━━━━━━━┳━━━━━━━━━━━━━━━━━━━━━━━━━━━┓

┃ **Runningstage.testing** ┃┃

┃ **metric** ┃ **DataLoader 0** ┃

┡━━━━━━━━━━━━━━━━━━━━━━━━━━━╇━━━━━━━━━━━━━━━━━━━━━━━━━━━┩

│ test/CER │ 28.225631713867188 │

│ test/DER │ 3.933434247970581 │

│ test/IER │ 5.078884601593018 │

│ test/SER │ 19.213314056396484 │

│ test/loss │ 0.9758427143096924 │

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{'val\_metrics': [{'val/loss': 0.7440177798271179,

'val/CER': 21.9317684173584,

'val/IER': 5.427558898925781,

'val/DER': 2.4811697006225586,

'val/SER': 14.023039817810059}],

'test\_metrics': [{'test/loss': 0.9758427143096924,

'test/CER': 28.225631713867188,

'test/IER': 5.078884601593018,

'test/DER': 3.933434247970581,

'test/SER': 19.213314056396484}],

'best\_checkpoint': '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/RNN/logs/2025-03-12/17-47-42/checkpoints/epoch=29-step=3600.ckpt'}

# TEST TIME

## First 30 epochs

2025-03-12 18:59:29.425125: E external/local\_xla/xla/stream\_executor/cuda/cuda\_fft.cc:477] Unable to register cuFFT factory: Attempting to register factory for plugin cuFFT when one has already been registered

WARNING: All log messages before absl::InitializeLog() is called are written to STDERR

E0000 00:00:1741805969.585144 21935 cuda\_dnn.cc:8310] Unable to register cuDNN factory: Attempting to register factory for plugin cuDNN when one has already been registered

E0000 00:00:1741805969.629189 21935 cuda\_blas.cc:1418] Unable to register cuBLAS factory: Attempting to register factory for plugin cuBLAS when one has already been registered

2025-03-12 18:59:30.009285: I tensorflow/core/platform/cpu\_feature\_guard.cc:210] This TensorFlow binary is optimized to use available CPU instructions in performance-critical operations.

To enable the following instructions: AVX2 AVX512F FMA, in other operations, rebuild TensorFlow with the appropriate compiler flags.

[2025-03-12 18:59:38,016][\_\_main\_\_][INFO] -

Config:

user: single\_user

dataset:

train:

- user: 89335547

session: 2021-06-03-1622765527-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-06-02-1622681518-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-06-04-1622863166-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-07-22-1627003020-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-07-21-1626916256-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-07-22-1627004019-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-06-05-1622885888-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-06-02-1622679967-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-06-03-1622764398-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-07-21-1626917264-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-06-05-1622889105-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-06-03-1622766673-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-06-04-1622861066-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-07-22-1627001995-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-06-05-1622884635-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-07-21-1626915176-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

val:

- user: 89335547

session: 2021-06-04-1622862148-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

test:

- user: 89335547

session: 2021-06-02-1622682789-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

root: ${hydra:runtime.cwd}/data

to\_tensor:

\_target\_: emg2qwerty.transforms.ToTensor

fields:

- emg\_left

- emg\_right

band\_rotation:

\_target\_: emg2qwerty.transforms.ForEach

transform:

\_target\_: emg2qwerty.transforms.RandomBandRotation

offsets:

- -1

- 0

- 1

temporal\_jitter:

\_target\_: emg2qwerty.transforms.TemporalAlignmentJitter

max\_offset: 120

logspec:

\_target\_: emg2qwerty.transforms.LogSpectrogram

n\_fft: 64

hop\_length: 16

specaug:

\_target\_: emg2qwerty.transforms.SpecAugment

n\_time\_masks: 3

time\_mask\_param: 25

n\_freq\_masks: 2

freq\_mask\_param: 4

transforms:

train:

- ${to\_tensor}

- ${band\_rotation}

- ${temporal\_jitter}

- ${logspec}

- ${specaug}

val:

- ${to\_tensor}

- ${logspec}

test: ${transforms.val}

module:

\_target\_: emg2qwerty.lightning.TDSConvCTCModule

in\_features: 528

mlp\_features:

- 384

block\_channels:

- 24

- 24

- 24

- 24

kernel\_width: 32

optimizer: ${optimizer}

lr\_scheduler: ${lr\_scheduler}

decoder: ${decoder}

transformer:

dropout: 0.3

max\_len: 5000

nhead: 8

num\_encoder\_layers: 2

num\_decoder\_layers: 2

datamodule:

\_target\_: emg2qwerty.lightning.WindowedEMGDataModule

window\_length: 8000

padding:

- 1800

- 200

optimizer:

\_target\_: torch.optim.Adam

lr: 0.001

lr\_scheduler:

scheduler:

\_target\_: pl\_bolts.optimizers.lr\_scheduler.LinearWarmupCosineAnnealingLR

warmup\_epochs: 10

max\_epochs: ${trainer.max\_epochs}

warmup\_start\_lr: 1.0e-08

eta\_min: 1.0e-06

interval: epoch

decoder:

\_target\_: emg2qwerty.decoder.CTCGreedyDecoder

seed: 1501

batch\_size: 32

num\_workers: 4

train: false

checkpoint: /content/drive/MyDrive/147project/RNN/logs/2025-03-12/17-47-42/checkpoints/last.ckpt

monitor\_metric: val/CER

monitor\_mode: min

trainer:

accelerator: gpu

devices: 1

num\_nodes: 1

max\_epochs: 30

default\_root\_dir: ${hydra:runtime.output\_dir}

callbacks:

- \_target\_: pytorch\_lightning.callbacks.LearningRateMonitor

- \_target\_: pytorch\_lightning.callbacks.ModelCheckpoint

dirpath: ${hydra:runtime.output\_dir}/checkpoints

monitor: ${monitor\_metric}

mode: ${monitor\_mode}

save\_last: true

verbose: true

Global seed set to 1501

[2025-03-12 18:59:38,031][\_\_main\_\_][INFO] - Instantiating LightningModule {'\_target\_': 'emg2qwerty.lightning.TDSConvCTCModule', 'in\_features': 528, 'mlp\_features': [384], 'block\_channels': [24, 24, 24, 24], 'kernel\_width': 32, 'optimizer': '${optimizer}', 'lr\_scheduler': '${lr\_scheduler}', 'decoder': '${decoder}', 'transformer': {'dropout': 0.3, 'max\_len': 5000, 'nhead': 8, 'num\_encoder\_layers': 2, 'num\_decoder\_layers': 2}}

/usr/local/lib/python3.11/dist-packages/torch/nn/modules/transformer.py:306: UserWarning: enable\_nested\_tensor is True, but self.use\_nested\_tensor is False because encoder\_layer.self\_attn.batch\_first was not True(use batch\_first for better inference performance)

warnings.warn(f"enable\_nested\_tensor is True, but self.use\_nested\_tensor is False because {why\_not\_sparsity\_fast\_path}")

[2025-03-12 18:59:38,520][\_\_main\_\_][INFO] - Loading module from checkpoint /content/drive/MyDrive/147project/RNN/logs/2025-03-12/17-47-42/checkpoints/last.ckpt

[2025-03-12 18:59:40,474][\_\_main\_\_][INFO] - Instantiating LightningDataModule {'\_target\_': 'emg2qwerty.lightning.WindowedEMGDataModule', 'window\_length': 8000, 'padding': [1800, 200]}

GPU available: True (cuda), used: True

TPU available: False, using: 0 TPU cores

IPU available: False, using: 0 IPUs

HPU available: False, using: 0 HPUs

Missing logger folder: /content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/RNN/logs/2025-03-12/18-59-37/lightning\_logs

LOCAL\_RANK: 0 - CUDA\_VISIBLE\_DEVICES: [0]

/usr/local/lib/python3.11/dist-packages/torch/utils/data/dataloader.py:558: UserWarning: This DataLoader will create 4 worker processes in total. Our suggested max number of worker in current system is 2, which is smaller than what this DataLoader is going to create. Please be aware that excessive worker creation might get DataLoader running slow or even freeze, lower the worker number to avoid potential slowness/freeze if necessary.

warnings.warn(\_create\_warning\_msg(

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]/usr/local/lib/python3.11/dist-packages/torch/nn/modules/conv.py:456: UserWarning: Plan failed with a cudnnException: CUDNN\_BACKEND\_EXECUTION\_PLAN\_DESCRIPTOR: cudnnFinalize Descriptor Failed cudnn\_status: CUDNN\_STATUS\_NOT\_SUPPORTED (Triggered internally at ../aten/src/ATen/native/cudnn/Conv\_v8.cpp:919.)

return F.conv2d(input, weight, bias, self.stride,

Validation DataLoader 0: 100% 7/7 [00:02<00:00, 2.44it/s]

┏━━━━━━━━━━━━━━━━━━━━━━━━━━━┳━━━━━━━━━━━━━━━━━━━━━━━━━━━┓

┃ **Runningstage.validating** ┃┃

┃ **metric** ┃ **DataLoader 0** ┃

┡━━━━━━━━━━━━━━━━━━━━━━━━━━━╇━━━━━━━━━━━━━━━━━━━━━━━━━━━┩

│ val/CER │ 21.9317684173584 │

│ val/DER │ 2.4811697006225586 │

│ val/IER │ 5.427558898925781 │

│ val/SER │ 14.023039817810059 │

│ val/loss │ 0.7440177798271179 │

└───────────────────────────┴───────────────────────────┘

LOCAL\_RANK: 0 - CUDA\_VISIBLE\_DEVICES: [0]

Testing DataLoader 0: 100% 1/1 [01:18<00:00, 78.88s/it]

┏━━━━━━━━━━━━━━━━━━━━━━━━━━━┳━━━━━━━━━━━━━━━━━━━━━━━━━━━┓

┃ **Runningstage.testing** ┃┃

┃ **metric** ┃ **DataLoader 0** ┃

┡━━━━━━━━━━━━━━━━━━━━━━━━━━━╇━━━━━━━━━━━━━━━━━━━━━━━━━━━┩

│ test/CER │ 28.225631713867188 │

│ test/DER │ 3.933434247970581 │

│ test/IER │ 5.078884601593018 │

│ test/SER │ 19.213314056396484 │

│ test/loss │ 0.9758427143096924 │

└───────────────────────────┴───────────────────────────┘

{'val\_metrics': [{'val/loss': 0.7440177798271179,

'val/CER': 21.9317684173584,

'val/IER': 5.427558898925781,

'val/DER': 2.4811697006225586,

'val/SER': 14.023039817810059}],

'test\_metrics': [{'test/loss': 0.9758427143096924,

'test/CER': 28.225631713867188,

'test/IER': 5.078884601593018,

'test/DER': 3.933434247970581,

'test/SER': 19.213314056396484}],

'best\_checkpoint': ''}

cnn+transformer 1 layer dropout

# TRAIN TIME 30 EPOCHS

2025-03-12 19:18:56.175346: E external/local\_xla/xla/stream\_executor/cuda/cuda\_fft.cc:477] Unable to register cuFFT factory: Attempting to register factory for plugin cuFFT when one has already been registered

WARNING: All log messages before absl::InitializeLog() is called are written to STDERR

E0000 00:00:1741807136.196513 26965 cuda\_dnn.cc:8310] Unable to register cuDNN factory: Attempting to register factory for plugin cuDNN when one has already been registered

E0000 00:00:1741807136.203033 26965 cuda\_blas.cc:1418] Unable to register cuBLAS factory: Attempting to register factory for plugin cuBLAS when one has already been registered

2025-03-12 19:18:56.224213: I tensorflow/core/platform/cpu\_feature\_guard.cc:210] This TensorFlow binary is optimized to use available CPU instructions in performance-critical operations.

To enable the following instructions: AVX2 AVX512F FMA, in other operations, rebuild TensorFlow with the appropriate compiler flags.

[2025-03-12 19:19:01,813][\_\_main\_\_][INFO] -

Config:

user: single\_user

dataset:

train:

- user: 89335547

session: 2021-06-03-1622765527-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-06-02-1622681518-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-06-04-1622863166-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-07-22-1627003020-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-07-21-1626916256-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-07-22-1627004019-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-06-05-1622885888-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-06-02-1622679967-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-06-03-1622764398-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-07-21-1626917264-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-06-05-1622889105-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-06-03-1622766673-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-06-04-1622861066-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-07-22-1627001995-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-06-05-1622884635-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-07-21-1626915176-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

val:

- user: 89335547

session: 2021-06-04-1622862148-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

test:

- user: 89335547

session: 2021-06-02-1622682789-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

root: ${hydra:runtime.cwd}/data

to\_tensor:

\_target\_: emg2qwerty.transforms.ToTensor

fields:

- emg\_left

- emg\_right

band\_rotation:

\_target\_: emg2qwerty.transforms.ForEach

transform:

\_target\_: emg2qwerty.transforms.RandomBandRotation

offsets:

- -1

- 0

- 1

temporal\_jitter:

\_target\_: emg2qwerty.transforms.TemporalAlignmentJitter

max\_offset: 120

logspec:

\_target\_: emg2qwerty.transforms.LogSpectrogram

n\_fft: 64

hop\_length: 16

specaug:

\_target\_: emg2qwerty.transforms.SpecAugment

n\_time\_masks: 3

time\_mask\_param: 25

n\_freq\_masks: 2

freq\_mask\_param: 4

transforms:

train:

- ${to\_tensor}

- ${band\_rotation}

- ${temporal\_jitter}

- ${logspec}

- ${specaug}

val:

- ${to\_tensor}

- ${logspec}

test: ${transforms.val}

module:

\_target\_: emg2qwerty.lightning.TDSConvCTCModule

in\_features: 528

mlp\_features:

- 384

block\_channels:

- 24

- 24

- 24

- 24

kernel\_width: 32

optimizer: ${optimizer}

lr\_scheduler: ${lr\_scheduler}

decoder: ${decoder}

transformer:

dropout: 0.3

max\_len: 5000

nhead: 8

num\_encoder\_layers: 1

num\_decoder\_layers: 1

datamodule:

\_target\_: emg2qwerty.lightning.WindowedEMGDataModule

window\_length: 8000

padding:

- 1800

- 200

optimizer:

\_target\_: torch.optim.Adam

lr: 0.001

lr\_scheduler:

scheduler:

\_target\_: pl\_bolts.optimizers.lr\_scheduler.LinearWarmupCosineAnnealingLR

warmup\_epochs: 10

max\_epochs: ${trainer.max\_epochs}

warmup\_start\_lr: 1.0e-08

eta\_min: 1.0e-06

interval: epoch

decoder:

\_target\_: emg2qwerty.decoder.CTCGreedyDecoder

seed: 1501

batch\_size: 32

num\_workers: 4

train: true

checkpoint: null

monitor\_metric: val/CER

monitor\_mode: min

trainer:

accelerator: gpu

devices: 1

num\_nodes: 1

max\_epochs: 30

default\_root\_dir: ${hydra:runtime.output\_dir}

callbacks:

- \_target\_: pytorch\_lightning.callbacks.LearningRateMonitor

- \_target\_: pytorch\_lightning.callbacks.ModelCheckpoint

dirpath: ${hydra:runtime.output\_dir}/checkpoints

monitor: ${monitor\_metric}

mode: ${monitor\_mode}

save\_last: true

verbose: true

Global seed set to 1501

[2025-03-12 19:19:01,825][\_\_main\_\_][INFO] - Instantiating LightningModule {'\_target\_': 'emg2qwerty.lightning.TDSConvCTCModule', 'in\_features': 528, 'mlp\_features': [384], 'block\_channels': [24, 24, 24, 24], 'kernel\_width': 32, 'optimizer': '${optimizer}', 'lr\_scheduler': '${lr\_scheduler}', 'decoder': '${decoder}', 'transformer': {'dropout': 0.3, 'max\_len': 5000, 'nhead': 8, 'num\_encoder\_layers': 1, 'num\_decoder\_layers': 1}}

/usr/local/lib/python3.11/dist-packages/torch/nn/modules/transformer.py:306: UserWarning: enable\_nested\_tensor is True, but self.use\_nested\_tensor is False because encoder\_layer.self\_attn.batch\_first was not True(use batch\_first for better inference performance)

warnings.warn(f"enable\_nested\_tensor is True, but self.use\_nested\_tensor is False because {why\_not\_sparsity\_fast\_path}")

[2025-03-12 19:19:02,246][\_\_main\_\_][INFO] - Instantiating LightningDataModule {'\_target\_': 'emg2qwerty.lightning.WindowedEMGDataModule', 'window\_length': 8000, 'padding': [1800, 200]}

GPU available: True (cuda), used: True

TPU available: False, using: 0 TPU cores

IPU available: False, using: 0 IPUs

HPU available: False, using: 0 HPUs

Missing logger folder: /content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/RNN/logs/2025-03-12/19-19-01/lightning\_logs

LOCAL\_RANK: 0 - CUDA\_VISIBLE\_DEVICES: [0]

/usr/local/lib/python3.11/dist-packages/pl\_bolts/\_\_init\_\_.py:11: FutureWarning: In the future `np.object` will be defined as the corresponding NumPy scalar.

if not hasattr(numpy, tp\_name):

/usr/local/lib/python3.11/dist-packages/pl\_bolts/\_\_init\_\_.py:11: FutureWarning: In the future `np.bool` will be defined as the corresponding NumPy scalar.

if not hasattr(numpy, tp\_name):

/usr/local/lib/python3.11/dist-packages/pl\_bolts/models/self\_supervised/amdim/amdim\_module.py:34: UnderReviewWarning: The feature generate\_power\_seq is currently marked under review. The compatibility with other Lightning projects is not guaranteed and API may change at any time. The API and functionality may change without warning in future releases. More details:<https://lightning-bolts.readthedocs.io/en/latest/stability.html>

"lr\_options": generate\_power\_seq(LEARNING\_RATE\_CIFAR, 11),

/usr/local/lib/python3.11/dist-packages/pl\_bolts/models/self\_supervised/amdim/amdim\_module.py:92: UnderReviewWarning: The feature FeatureMapContrastiveTask is currently marked under review. The compatibility with other Lightning projects is not guaranteed and API may change at any time. The API and functionality may change without warning in future releases. More details:<https://lightning-bolts.readthedocs.io/en/latest/stability.html>

contrastive\_task: Union[FeatureMapContrastiveTask] = FeatureMapContrastiveTask("01, 02, 11"),

/usr/local/lib/python3.11/dist-packages/pl\_bolts/losses/self\_supervised\_learning.py:228: UnderReviewWarning: The feature AmdimNCELoss is currently marked under review. The compatibility with other Lightning projects is not guaranteed and API may change at any time. The API and functionality may change without warning in future releases. More details:<https://lightning-bolts.readthedocs.io/en/latest/stability.html>

self.nce\_loss = AmdimNCELoss(tclip)

/usr/local/lib/python3.11/dist-packages/hydra/\_internal/instantiate/\_instantiate2.py:92: UnderReviewWarning: The feature LinearWarmupCosineAnnealingLR is currently marked under review. The compatibility with other Lightning projects is not guaranteed and API may change at any time. The API and functionality may change without warning in future releases. More details:<https://lightning-bolts.readthedocs.io/en/latest/stability.html>

return \_target\_(\*args, \*\*kwargs)

| Name | Type | Params

-----------------------------------------------------------

0 | cnn | Sequential | 5.2 M

1 | pos\_encoder | PositionalEncoding | 0

2 | transformer\_encoder | TransformerEncoder | 5.5 M

3 | transformer\_decoder | TransformerDecoder | 7.9 M

4 | tgt\_embedding | Embedding | 76.0 K

5 | fc | Linear | 76.1 K

6 | log\_softmax | LogSoftmax | 0

7 | ctc\_loss | CTCLoss | 0

8 | metrics | ModuleDict | 0

-----------------------------------------------------------

18.8 M Trainable params

0 Non-trainable params

18.8 M Total params

75.045 Total estimated model params size (MB)

Sanity Checking: 0it [00:00, ?it/s]/usr/local/lib/python3.11/dist-packages/torch/utils/data/dataloader.py:558: UserWarning: This DataLoader will create 4 worker processes in total. Our suggested max number of worker in current system is 2, which is smaller than what this DataLoader is going to create. Please be aware that excessive worker creation might get DataLoader running slow or even freeze, lower the worker number to avoid potential slowness/freeze if necessary.

warnings.warn(\_create\_warning\_msg(

Sanity Checking DataLoader 0: 0% 0/2 [00:00<?, ?it/s]/usr/local/lib/python3.11/dist-packages/torch/nn/modules/conv.py:456: UserWarning: Plan failed with a cudnnException: CUDNN\_BACKEND\_EXECUTION\_PLAN\_DESCRIPTOR: cudnnFinalize Descriptor Failed cudnn\_status: CUDNN\_STATUS\_NOT\_SUPPORTED (Triggered internally at ../aten/src/ATen/native/cudnn/Conv\_v8.cpp:919.)

return F.conv2d(input, weight, bias, self.stride,

Epoch 0: 94% 120/127 [02:07<00:07, 1.06s/it, loss=129, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 0: 100% 127/127 [02:13<00:00, 1.05s/it, loss=129, v\_num=0]

Epoch 0: 100% 127/127 [02:13<00:00, 1.05s/it, loss=129, v\_num=0]Epoch 0, global step 120: 'val/CER' reached 1439.80945 (best 1439.80945), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/RNN/logs/2025-03-12/19-19-01/checkpoints/epoch=0-step=120.ckpt' as top 1

Epoch 1: 94% 120/127 [01:58<00:06, 1.01it/s, loss=3.52, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 1: 100% 127/127 [02:04<00:00, 1.02it/s, loss=3.52, v\_num=0]

Epoch 1: 100% 127/127 [02:04<00:00, 1.02it/s, loss=3.52, v\_num=0]Epoch 1, global step 240: 'val/CER' reached 100.00000 (best 100.00000), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/RNN/logs/2025-03-12/19-19-01/checkpoints/epoch=1-step=240.ckpt' as top 1

Epoch 2: 94% 120/127 [01:57<00:06, 1.02it/s, loss=3.35, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 2: 100% 127/127 [02:04<00:00, 1.02it/s, loss=3.35, v\_num=0]

Epoch 2: 100% 127/127 [02:04<00:00, 1.02it/s, loss=3.35, v\_num=0]Epoch 2, global step 360: 'val/CER' was not in top 1

Epoch 3: 94% 120/127 [01:51<00:06, 1.07it/s, loss=3.32, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 3: 100% 127/127 [01:56<00:00, 1.09it/s, loss=3.32, v\_num=0]

Epoch 3: 100% 127/127 [01:56<00:00, 1.09it/s, loss=3.32, v\_num=0]Epoch 3, global step 480: 'val/CER' was not in top 1

Epoch 4: 94% 120/127 [01:58<00:06, 1.01it/s, loss=3.28, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 4: 100% 127/127 [02:04<00:00, 1.02it/s, loss=3.28, v\_num=0]

Epoch 4: 100% 127/127 [02:04<00:00, 1.02it/s, loss=3.28, v\_num=0]Epoch 4, global step 600: 'val/CER' was not in top 1

Epoch 5: 94% 120/127 [01:59<00:06, 1.01it/s, loss=3.17, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 5: 100% 127/127 [02:06<00:00, 1.01it/s, loss=3.17, v\_num=0]

Epoch 5: 100% 127/127 [02:06<00:00, 1.01it/s, loss=3.17, v\_num=0]Epoch 5, global step 720: 'val/CER' was not in top 1

Epoch 6: 94% 120/127 [01:56<00:06, 1.03it/s, loss=3.04, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 6: 100% 127/127 [02:03<00:00, 1.02it/s, loss=3.04, v\_num=0]

Epoch 6: 100% 127/127 [02:03<00:00, 1.02it/s, loss=3.04, v\_num=0]Epoch 6, global step 840: 'val/CER' was not in top 1

Epoch 7: 94% 120/127 [01:55<00:06, 1.04it/s, loss=2.94, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 7: 100% 127/127 [02:02<00:00, 1.04it/s, loss=2.94, v\_num=0]

Epoch 7: 100% 127/127 [02:02<00:00, 1.04it/s, loss=2.94, v\_num=0]Epoch 7, global step 960: 'val/CER' was not in top 1

Epoch 8: 94% 120/127 [01:56<00:06, 1.03it/s, loss=2.81, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 8: 100% 127/127 [02:02<00:00, 1.03it/s, loss=2.81, v\_num=0]

Epoch 8: 100% 127/127 [02:02<00:00, 1.03it/s, loss=2.81, v\_num=0]Epoch 8, global step 1080: 'val/CER' reached 99.93354 (best 99.93354), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/RNN/logs/2025-03-12/19-19-01/checkpoints/epoch=8-step=1080.ckpt' as top 1

Epoch 9: 94% 120/127 [01:58<00:06, 1.01it/s, loss=2.64, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 9: 100% 127/127 [02:04<00:00, 1.02it/s, loss=2.64, v\_num=0]

Epoch 9: 100% 127/127 [02:04<00:00, 1.02it/s, loss=2.64, v\_num=0]Epoch 9, global step 1200: 'val/CER' reached 97.58529 (best 97.58529), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/RNN/logs/2025-03-12/19-19-01/checkpoints/epoch=9-step=1200.ckpt' as top 1

Epoch 10: 94% 120/127 [02:00<00:07, 1.00s/it, loss=2.34, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 10: 100% 127/127 [02:05<00:00, 1.01it/s, loss=2.34, v\_num=0]

Epoch 10: 100% 127/127 [02:05<00:00, 1.01it/s, loss=2.34, v\_num=0]Epoch 10, global step 1320: 'val/CER' reached 89.56580 (best 89.56580), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/RNN/logs/2025-03-12/19-19-01/checkpoints/epoch=10-step=1320.ckpt' as top 1

Epoch 11: 94% 120/127 [01:58<00:06, 1.01it/s, loss=2.17, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 11: 100% 127/127 [02:06<00:00, 1.01it/s, loss=2.17, v\_num=0]

Epoch 11: 100% 127/127 [02:06<00:00, 1.01it/s, loss=2.17, v\_num=0]Epoch 11, global step 1440: 'val/CER' reached 83.60656 (best 83.60656), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/RNN/logs/2025-03-12/19-19-01/checkpoints/epoch=11-step=1440.ckpt' as top 1

Epoch 12: 94% 120/127 [01:57<00:06, 1.02it/s, loss=2, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 12: 100% 127/127 [02:03<00:00, 1.03it/s, loss=2, v\_num=0]

Epoch 12: 100% 127/127 [02:03<00:00, 1.03it/s, loss=2, v\_num=0]Epoch 12, global step 1560: 'val/CER' reached 74.41294 (best 74.41294), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/RNN/logs/2025-03-12/19-19-01/checkpoints/epoch=12-step=1560.ckpt' as top 1

Epoch 13: 94% 120/127 [01:58<00:06, 1.01it/s, loss=1.83, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 13: 100% 127/127 [02:03<00:00, 1.03it/s, loss=1.83, v\_num=0]

Epoch 13: 100% 127/127 [02:03<00:00, 1.03it/s, loss=1.83, v\_num=0]Epoch 13, global step 1680: 'val/CER' reached 70.20381 (best 70.20381), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/RNN/logs/2025-03-12/19-19-01/checkpoints/epoch=13-step=1680.ckpt' as top 1

Epoch 14: 94% 120/127 [01:57<00:06, 1.02it/s, loss=1.71, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 14: 100% 127/127 [02:04<00:00, 1.02it/s, loss=1.71, v\_num=0]

Epoch 14: 100% 127/127 [02:04<00:00, 1.02it/s, loss=1.71, v\_num=0]Epoch 14, global step 1800: 'val/CER' reached 59.74745 (best 59.74745), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/RNN/logs/2025-03-12/19-19-01/checkpoints/epoch=14-step=1800.ckpt' as top 1

Epoch 15: 94% 120/127 [01:59<00:06, 1.00it/s, loss=1.57, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 15: 100% 127/127 [02:04<00:00, 1.02it/s, loss=1.57, v\_num=0]

Epoch 15: 100% 127/127 [02:04<00:00, 1.02it/s, loss=1.57, v\_num=0]Epoch 15, global step 1920: 'val/CER' reached 45.56934 (best 45.56934), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/RNN/logs/2025-03-12/19-19-01/checkpoints/epoch=15-step=1920.ckpt' as top 1

Epoch 16: 94% 120/127 [02:00<00:07, 1.01s/it, loss=1.41, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 16: 100% 127/127 [02:06<00:00, 1.01it/s, loss=1.41, v\_num=0]

Epoch 16: 100% 127/127 [02:06<00:00, 1.01it/s, loss=1.41, v\_num=0]Epoch 16, global step 2040: 'val/CER' reached 36.28711 (best 36.28711), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/RNN/logs/2025-03-12/19-19-01/checkpoints/epoch=16-step=2040.ckpt' as top 1

Epoch 17: 94% 120/127 [01:56<00:06, 1.03it/s, loss=1.29, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 17: 100% 127/127 [02:01<00:00, 1.04it/s, loss=1.29, v\_num=0]

Epoch 17: 100% 127/127 [02:01<00:00, 1.04it/s, loss=1.29, v\_num=0]Epoch 17, global step 2160: 'val/CER' reached 34.38192 (best 34.38192), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/RNN/logs/2025-03-12/19-19-01/checkpoints/epoch=17-step=2160.ckpt' as top 1

Epoch 18: 94% 120/127 [01:56<00:06, 1.03it/s, loss=1.2, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 18: 100% 127/127 [02:02<00:00, 1.04it/s, loss=1.2, v\_num=0]

Epoch 18: 100% 127/127 [02:02<00:00, 1.04it/s, loss=1.2, v\_num=0]Epoch 18, global step 2280: 'val/CER' reached 32.12229 (best 32.12229), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/RNN/logs/2025-03-12/19-19-01/checkpoints/epoch=18-step=2280.ckpt' as top 1

Epoch 19: 94% 120/127 [02:00<00:07, 1.00s/it, loss=1.16, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 19: 100% 127/127 [02:05<00:00, 1.01it/s, loss=1.16, v\_num=0]

Epoch 19: 100% 127/127 [02:05<00:00, 1.01it/s, loss=1.16, v\_num=0]Epoch 19, global step 2400: 'val/CER' reached 29.75188 (best 29.75188), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/RNN/logs/2025-03-12/19-19-01/checkpoints/epoch=19-step=2400.ckpt' as top 1

Epoch 20: 94% 120/127 [01:57<00:06, 1.02it/s, loss=1.1, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 20: 100% 127/127 [02:03<00:00, 1.03it/s, loss=1.1, v\_num=0]

Epoch 20: 100% 127/127 [02:03<00:00, 1.03it/s, loss=1.1, v\_num=0]Epoch 20, global step 2520: 'val/CER' reached 28.88791 (best 28.88791), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/RNN/logs/2025-03-12/19-19-01/checkpoints/epoch=20-step=2520.ckpt' as top 1

Epoch 21: 94% 120/127 [01:59<00:06, 1.01it/s, loss=1, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 21: 100% 127/127 [02:05<00:00, 1.01it/s, loss=1, v\_num=0]

Epoch 21: 100% 127/127 [02:05<00:00, 1.01it/s, loss=1, v\_num=0]Epoch 21, global step 2640: 'val/CER' reached 27.15995 (best 27.15995), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/RNN/logs/2025-03-12/19-19-01/checkpoints/epoch=21-step=2640.ckpt' as top 1

Epoch 22: 94% 120/127 [01:58<00:06, 1.02it/s, loss=0.928, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 22: 100% 127/127 [02:03<00:00, 1.03it/s, loss=0.928, v\_num=0]

Epoch 22: 100% 127/127 [02:03<00:00, 1.03it/s, loss=0.928, v\_num=0]Epoch 22, global step 2760: 'val/CER' reached 27.02703 (best 27.02703), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/RNN/logs/2025-03-12/19-19-01/checkpoints/epoch=22-step=2760.ckpt' as top 1

Epoch 23: 94% 120/127 [01:58<00:06, 1.01it/s, loss=0.926, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 23: 100% 127/127 [02:03<00:00, 1.03it/s, loss=0.926, v\_num=0]

Epoch 23: 100% 127/127 [02:03<00:00, 1.03it/s, loss=0.926, v\_num=0]Epoch 23, global step 2880: 'val/CER' reached 25.34338 (best 25.34338), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/RNN/logs/2025-03-12/19-19-01/checkpoints/epoch=23-step=2880.ckpt' as top 1

Epoch 24: 94% 120/127 [01:57<00:06, 1.02it/s, loss=0.918, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 24: 100% 127/127 [02:02<00:00, 1.04it/s, loss=0.918, v\_num=0]

Epoch 24: 100% 127/127 [02:02<00:00, 1.04it/s, loss=0.918, v\_num=0]Epoch 24, global step 3000: 'val/CER' reached 24.43509 (best 24.43509), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/RNN/logs/2025-03-12/19-19-01/checkpoints/epoch=24-step=3000.ckpt' as top 1

Epoch 25: 94% 120/127 [01:58<00:06, 1.02it/s, loss=0.874, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 25: 100% 127/127 [02:04<00:00, 1.02it/s, loss=0.874, v\_num=0]

Epoch 25: 100% 127/127 [02:04<00:00, 1.02it/s, loss=0.874, v\_num=0]Epoch 25, global step 3120: 'val/CER' reached 24.03633 (best 24.03633), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/RNN/logs/2025-03-12/19-19-01/checkpoints/epoch=25-step=3120.ckpt' as top 1

Epoch 26: 94% 120/127 [01:59<00:06, 1.00it/s, loss=0.837, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 26: 100% 127/127 [02:05<00:00, 1.01it/s, loss=0.837, v\_num=0]

Epoch 26: 100% 127/127 [02:05<00:00, 1.01it/s, loss=0.837, v\_num=0]Epoch 26, global step 3240: 'val/CER' reached 23.26097 (best 23.26097), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/RNN/logs/2025-03-12/19-19-01/checkpoints/epoch=26-step=3240.ckpt' as top 1

Epoch 27: 94% 120/127 [01:54<00:06, 1.04it/s, loss=0.828, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 27: 100% 127/127 [02:00<00:00, 1.05it/s, loss=0.828, v\_num=0]

Epoch 27: 100% 127/127 [02:00<00:00, 1.05it/s, loss=0.828, v\_num=0]Epoch 27, global step 3360: 'val/CER' reached 22.99513 (best 22.99513), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/RNN/logs/2025-03-12/19-19-01/checkpoints/epoch=27-step=3360.ckpt' as top 1

Epoch 28: 94% 120/127 [01:56<00:06, 1.03it/s, loss=0.814, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 28: 100% 127/127 [02:01<00:00, 1.04it/s, loss=0.814, v\_num=0]

Epoch 28: 100% 127/127 [02:01<00:00, 1.04it/s, loss=0.814, v\_num=0]Epoch 28, global step 3480: 'val/CER' was not in top 1

Epoch 29: 94% 120/127 [01:55<00:06, 1.04it/s, loss=0.82, v\_num=0]

Validation: 0it [00:00, ?it/s]

Validation: 0% 0/7 [00:00<?, ?it/s]

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]

Epoch 29: 100% 127/127 [02:00<00:00, 1.05it/s, loss=0.82, v\_num=0]

Epoch 29: 100% 127/127 [02:00<00:00, 1.05it/s, loss=0.82, v\_num=0]Epoch 29, global step 3600: 'val/CER' reached 22.88436 (best 22.88436), saving model to '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/RNN/logs/2025-03-12/19-19-01/checkpoints/epoch=29-step=3600.ckpt' as top 1

`Trainer.fit` stopped: `max\_epochs=30` reached.

Epoch 29: 100% 127/127 [02:02<00:00, 1.03it/s, loss=0.82, v\_num=0]

/usr/local/lib/python3.11/dist-packages/torch/nn/modules/transformer.py:306: UserWarning: enable\_nested\_tensor is True, but self.use\_nested\_tensor is False because encoder\_layer.self\_attn.batch\_first was not True(use batch\_first for better inference performance)

warnings.warn(f"enable\_nested\_tensor is True, but self.use\_nested\_tensor is False because {why\_not\_sparsity\_fast\_path}")

LOCAL\_RANK: 0 - CUDA\_VISIBLE\_DEVICES: [0]

Validation DataLoader 0: 100% 7/7 [00:02<00:00, 3.02it/s]

┏━━━━━━━━━━━━━━━━━━━━━━━━━━━┳━━━━━━━━━━━━━━━━━━━━━━━━━━━┓

┃ **Runningstage.validating** ┃┃

┃ **metric** ┃ **DataLoader 0** ┃

┡━━━━━━━━━━━━━━━━━━━━━━━━━━━╇━━━━━━━━━━━━━━━━━━━━━━━━━━━┩

│ val/CER │ 22.88435935974121 │

│ val/DER │ 2.769162654876709 │

│ val/IER │ 5.050952434539795 │

│ val/SER │ 15.064244270324707 │

│ val/loss │ 0.7704615592956543 │

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LOCAL\_RANK: 0 - CUDA\_VISIBLE\_DEVICES: [0]

Testing DataLoader 0: 100% 1/1 [00:45<00:00, 45.23s/it]

┏━━━━━━━━━━━━━━━━━━━━━━━━━━━┳━━━━━━━━━━━━━━━━━━━━━━━━━━━┓

┃ **Runningstage.testing** ┃┃

┃ **metric** ┃ **DataLoader 0** ┃

┡━━━━━━━━━━━━━━━━━━━━━━━━━━━╇━━━━━━━━━━━━━━━━━━━━━━━━━━━┩

│ test/CER │ 26.77760887145996 │

│ test/DER │ 4.106332302093506 │

│ test/IER │ 3.6956992149353027 │

│ test/SER │ 18.97557830810547 │

│ test/loss │ 0.9376956224441528 │

└───────────────────────────┴───────────────────────────┘

{'val\_metrics': [{'val/loss': 0.7704615592956543,

'val/CER': 22.88435935974121,

'val/IER': 5.050952434539795,

'val/DER': 2.769162654876709,

'val/SER': 15.064244270324707}],

'test\_metrics': [{'test/loss': 0.9376956224441528,

'test/CER': 26.77760887145996,

'test/IER': 3.6956992149353027,

'test/DER': 4.106332302093506,

'test/SER': 18.97557830810547}],

'best\_checkpoint': '/content/drive/.shortcut-targets-by-id/1341lU4c3y-nhZPQpfPS6vHI0a8KfSY-U/147project/RNN/logs/2025-03-12/19-19-01/checkpoints/epoch=29-step=3600.ckpt'}

## To 50 epochs

# TEST TIME 30 epochs

2025-03-12 21:17:52.423048: E external/local\_xla/xla/stream\_executor/cuda/cuda\_fft.cc:477] Unable to register cuFFT factory: Attempting to register factory for plugin cuFFT when one has already been registered

WARNING: All log messages before absl::InitializeLog() is called are written to STDERR

E0000 00:00:1741814272.443405 4625 cuda\_dnn.cc:8310] Unable to register cuDNN factory: Attempting to register factory for plugin cuDNN when one has already been registered

E0000 00:00:1741814272.450049 4625 cuda\_blas.cc:1418] Unable to register cuBLAS factory: Attempting to register factory for plugin cuBLAS when one has already been registered

2025-03-12 21:17:52.471530: I tensorflow/core/platform/cpu\_feature\_guard.cc:210] This TensorFlow binary is optimized to use available CPU instructions in performance-critical operations.

To enable the following instructions: AVX2 AVX512F FMA, in other operations, rebuild TensorFlow with the appropriate compiler flags.

[2025-03-12 21:18:06,832][\_\_main\_\_][INFO] -

Config:

user: single\_user

dataset:

train:

- user: 89335547

session: 2021-06-03-1622765527-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-06-02-1622681518-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-06-04-1622863166-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-07-22-1627003020-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-07-21-1626916256-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-07-22-1627004019-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-06-05-1622885888-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-06-02-1622679967-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-06-03-1622764398-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-07-21-1626917264-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-06-05-1622889105-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-06-03-1622766673-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-06-04-1622861066-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-07-22-1627001995-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-06-05-1622884635-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

- user: 89335547

session: 2021-07-21-1626915176-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

val:

- user: 89335547

session: 2021-06-04-1622862148-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

test:

- user: 89335547

session: 2021-06-02-1622682789-keystrokes-dca-study@1-0efbe614-9ae6-4131-9192-4398359b4f5f

root: ${hydra:runtime.cwd}/data

to\_tensor:

\_target\_: emg2qwerty.transforms.ToTensor

fields:

- emg\_left

- emg\_right

band\_rotation:

\_target\_: emg2qwerty.transforms.ForEach

transform:

\_target\_: emg2qwerty.transforms.RandomBandRotation

offsets:

- -1

- 0

- 1

temporal\_jitter:

\_target\_: emg2qwerty.transforms.TemporalAlignmentJitter

max\_offset: 120

logspec:

\_target\_: emg2qwerty.transforms.LogSpectrogram

n\_fft: 64

hop\_length: 16

specaug:

\_target\_: emg2qwerty.transforms.SpecAugment

n\_time\_masks: 3

time\_mask\_param: 25

n\_freq\_masks: 2

freq\_mask\_param: 4

transforms:

train:

- ${to\_tensor}

- ${band\_rotation}

- ${temporal\_jitter}

- ${logspec}

- ${specaug}

val:

- ${to\_tensor}

- ${logspec}

test: ${transforms.val}

module:

\_target\_: emg2qwerty.lightning.TDSConvCTCModule

in\_features: 528

mlp\_features:

- 384

block\_channels:

- 24

- 24

- 24

- 24

kernel\_width: 32

optimizer: ${optimizer}

lr\_scheduler: ${lr\_scheduler}

decoder: ${decoder}

transformer:

dropout: 0.3

max\_len: 5000

nhead: 8

num\_encoder\_layers: 1

num\_decoder\_layers: 1

datamodule:

\_target\_: emg2qwerty.lightning.WindowedEMGDataModule

window\_length: 8000

padding:

- 1800

- 200

optimizer:

\_target\_: torch.optim.Adam

lr: 0.001

lr\_scheduler:

scheduler:

\_target\_: pl\_bolts.optimizers.lr\_scheduler.LinearWarmupCosineAnnealingLR

warmup\_epochs: 10

max\_epochs: ${trainer.max\_epochs}

warmup\_start\_lr: 1.0e-08

eta\_min: 1.0e-06

interval: epoch

decoder:

\_target\_: emg2qwerty.decoder.CTCGreedyDecoder

seed: 1501

batch\_size: 32

num\_workers: 4

train: false

checkpoint: /content/drive/MyDrive/147project/RNN/logs/2025-03-12/19-19-01/checkpoints/last.ckpt

monitor\_metric: val/CER

monitor\_mode: min

trainer:

accelerator: gpu

devices: 1

num\_nodes: 1

max\_epochs: 30

default\_root\_dir: ${hydra:runtime.output\_dir}

callbacks:

- \_target\_: pytorch\_lightning.callbacks.LearningRateMonitor

- \_target\_: pytorch\_lightning.callbacks.ModelCheckpoint

dirpath: ${hydra:runtime.output\_dir}/checkpoints

monitor: ${monitor\_metric}

mode: ${monitor\_mode}

save\_last: true

verbose: true

Global seed set to 1501

[2025-03-12 21:18:06,840][\_\_main\_\_][INFO] - Instantiating LightningModule {'\_target\_': 'emg2qwerty.lightning.TDSConvCTCModule', 'in\_features': 528, 'mlp\_features': [384], 'block\_channels': [24, 24, 24, 24], 'kernel\_width': 32, 'optimizer': '${optimizer}', 'lr\_scheduler': '${lr\_scheduler}', 'decoder': '${decoder}', 'transformer': {'dropout': 0.3, 'max\_len': 5000, 'nhead': 8, 'num\_encoder\_layers': 1, 'num\_decoder\_layers': 1}}

/usr/local/lib/python3.11/dist-packages/torch/nn/modules/transformer.py:306: UserWarning: enable\_nested\_tensor is True, but self.use\_nested\_tensor is False because encoder\_layer.self\_attn.batch\_first was not True(use batch\_first for better inference performance)

warnings.warn(f"enable\_nested\_tensor is True, but self.use\_nested\_tensor is False because {why\_not\_sparsity\_fast\_path}")

[2025-03-12 21:18:10,512][\_\_main\_\_][INFO] - Loading module from checkpoint /content/drive/MyDrive/147project/RNN/logs/2025-03-12/19-19-01/checkpoints/last.ckpt

[2025-03-12 21:18:20,632][\_\_main\_\_][INFO] - Instantiating LightningDataModule {'\_target\_': 'emg2qwerty.lightning.WindowedEMGDataModule', 'window\_length': 8000, 'padding': [1800, 200]}

GPU available: True (cuda), used: True

TPU available: False, using: 0 TPU cores

IPU available: False, using: 0 IPUs

HPU available: False, using: 0 HPUs

Missing logger folder: /content/drive/MyDrive/147project/RNN/logs/2025-03-12/21-18-06/lightning\_logs

LOCAL\_RANK: 0 - CUDA\_VISIBLE\_DEVICES: [0]

/usr/local/lib/python3.11/dist-packages/torch/utils/data/dataloader.py:558: UserWarning: This DataLoader will create 4 worker processes in total. Our suggested max number of worker in current system is 2, which is smaller than what this DataLoader is going to create. Please be aware that excessive worker creation might get DataLoader running slow or even freeze, lower the worker number to avoid potential slowness/freeze if necessary.

warnings.warn(\_create\_warning\_msg(

Validation DataLoader 0: 0% 0/7 [00:00<?, ?it/s]/usr/local/lib/python3.11/dist-packages/torch/nn/modules/conv.py:456: UserWarning: Plan failed with a cudnnException: CUDNN\_BACKEND\_EXECUTION\_PLAN\_DESCRIPTOR: cudnnFinalize Descriptor Failed cudnn\_status: CUDNN\_STATUS\_NOT\_SUPPORTED (Triggered internally at ../aten/src/ATen/native/cudnn/Conv\_v8.cpp:919.)

return F.conv2d(input, weight, bias, self.stride,

Validation DataLoader 0: 100% 7/7 [00:03<00:00, 2.26it/s]

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┃ **Runningstage.validating** ┃┃

┃ **metric** ┃ **DataLoader 0** ┃

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│ val/CER │ 22.88435935974121 │

│ val/DER │ 2.769162654876709 │

│ val/IER │ 5.050952434539795 │

│ val/SER │ 15.064244270324707 │

│ val/loss │ 0.7704615592956543 │

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LOCAL\_RANK: 0 - CUDA\_VISIBLE\_DEVICES: [0]

Testing DataLoader 0: 100% 1/1 [00:37<00:00, 37.57s/it]

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┃ **Runningstage.testing** ┃┃

┃ **metric** ┃ **DataLoader 0** ┃

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│ test/CER │ 26.77760887145996 │

│ test/DER │ 4.106332302093506 │

│ test/IER │ 3.6956992149353027 │

│ test/SER │ 18.97557830810547 │

│ test/loss │ 0.9376956224441528 │

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{'val\_metrics': [{'val/loss': 0.7704615592956543,

'val/CER': 22.88435935974121,

'val/IER': 5.050952434539795,

'val/DER': 2.769162654876709,

'val/SER': 15.064244270324707}],

'test\_metrics': [{'test/loss': 0.9376956224441528,

'test/CER': 26.77760887145996,

'test/IER': 3.6956992149353027,

'test/DER': 4.106332302093506,

'test/SER': 18.97557830810547}],

'best\_checkpoint': ''}

## To 50 epochs