

# Assignment 1 - Problem 3: Surgical Phase Recognition

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```
In [1]: from collections import OrderedDict
from PIL import Image
from pytorch_metric_learning import losses
from sklearn.utils.class_weight import compute_class_weight
from torch import nn
from torch.autograd import Variable
from torch.nn import init
from torch.utils.data import Dataset, DataLoader
from torchvision import datasets
from torchvision.transforms import (
    CenterCrop,
    ColorJitter,
    Compose,
    Normalize,
    RandomHorizontalFlip,
    RandomVerticalFlip,
    RandomResizedCrop,
    RandomRotation,
    Resize,
    ToTensor,
)
from transformers import AutoConfig, AutoFeatureExtractor, AutoModelForImageClassification
from tqdm import tqdm

import datasets
import h5py
import matplotlib.image as mpimg
import matplotlib.pyplot as plt
import numpy as np
import os
import pandas as pd
import random
import surface_distance.metrics as sf
import torch
import torch.nn.functional as F
import torch.optim as optim
import torchio as tio
import torchmetrics
import torchvision
```

```
In [2]: RANDOM_SEED = 42

def set_all_seeds(seed):
    random.seed(seed)
    np.random.seed(seed)
    torch.manual_seed(seed)
    torch.cuda.manual_seed(seed)
    torch.backends.cudnn.deterministic = True

set_all_seeds(RANDOM_SEED)
```

# Problem 3: Surgical Phase Recognition

```
In [3]: NUM_CLASSES = 7
        NUM_PREV_FRAMES = 2
```

```
In [4]: model_name_or_path = "microsoft/resnet-50"
```

## Data loading

### Function declaration

Loading function for `problem3_datas` dataset.

Class 0 corresponds to `Preparation`, 1 corresponds to `Calot Triangle Dissection`, 2 corresponds to `Clipping Cutting`, 3 corresponds to `Gallbladder Dissection`, 4 corresponds to `Gallbladder Packaging`, 5 corresponds to `Cleaning Coagulation`, and 6 corresponds to `Gallbladder Retraction`.

```
In [5]: def problem3_load_dataset(
        manifest_dir_path,
        vid_dir_path,
        only_these_ids=[],
        num_prev_frames=0,
        img_column_name="Frame",
        label_column_name="Phase",
        return_df=False):

    all_manifest_dfs = []

    for manifest_file_name in os.listdir(manifest_dir_path):
        data_id = int(manifest_file_name.split("_")[-1].replace(".csv", ""))
        if data_id in only_these_ids:
            manifest_path = os.path.join(manifest_dir_path, manifest_file_name)
            manifest_df = pd.read_csv(manifest_path)
            manifest_df["video_id"] = data_id
            manifest_df[img_column_name] = f"{os.path.join(vid_dir_path, str(data_id))}/"
            manifest_df = manifest_df.rename(columns={img_column_name: "image", label_co

            if num_prev_frames != 0:
                prev_frames = {}
                prev_labels = {}
                total_num_frames = len(manifest_df)
                for current_frame_id in range(total_num_frames):
                    for n_before_current in range(num_prev_frames):
                        if prev_frames.get(n_before_current) is None:
                            prev_frames[n_before_current] = []
                            prev_labels[n_before_current] = []

                        if current_frame_id - n_before_current >= 0:
                            prev_frames[n_before_current].append(
                                manifest_df["image"][current_frame_id - n_before_current]
                            )
                            prev_labels[n_before_current].append(
                                manifest_df["label"][current_frame_id - n_before_current]
                            )
                        else:
                            prev_frames[n_before_current].append(None)
                            prev_labels[n_before_current].append(None)

                    for n_before_current in range(num_prev_frames):
                        manifest_df[f"prev_frame_{n_before_current}"] = prev_frames[n_before
```

```

manifest_df[f"prev_label_{n_before_current}"] = prev_labels[n_before
    all_manifest_dfs.append(manifest_df)
whole_manifest_df = pd.concat(all_manifest_dfs, ignore_index=True)

dataset = datasets.Dataset.from_pandas(whole_manifest_df)
dataset = dataset.cast_column("image", datasets.Image(decode=True))
if num_prev_frames != 0:
    for n_before_current in range(num_prev_frames):
        dataset = dataset.cast_column(f"prev_frame_{n_before_current}", datasets.Ima
        dataset = dataset.cast_column(f"prev_label_{n_before_current}", datasets.Val
dataset.reset_format()
if return_df:
    return dataset, whole_manifest_df
else:
    return dataset

```

## Function utilization

Load the `problem3_datas` dataset.

```

In [6]: raw_datasets = datasets.DatasetDict()
raw_datasets["train"], train_df = problem3_load_dataset(
    "./data/problem3_datas/annotation/",
    "./data/problem3_datas/",
    num_prev_frames=NUM_PREV_FRAMES,
    only_these_ids=range(1, 6),
    return_df=True)
raw_datasets["valid"] = problem3_load_dataset(
    "./data/problem3_datas/annotation/",
    "./data/problem3_datas/",
    num_prev_frames=NUM_PREV_FRAMES,
    only_these_ids=[41],
    return_df=False)
raw_datasets

```

```

Casting the dataset: 0%|          | 0/1 [00:00<?, ?ba/s]
Casting the dataset: 0%|          | 0/1 [00:00<?, ?ba/s]
Casting the dataset: 0%|          | 0/1 [00:00<?, ?ba/s]
Casting the dataset: 0%|          | 0/1 [00:00<?, ?ba/s]

```

```

Out[6]: DatasetDict({
  train: Dataset({
    features: ['image', 'label', 'video_id', 'prev_frame_0', 'prev_label_0', 'prev_f
rame_1', 'prev_label_1'],
    num_rows: 3570
  })
  valid: Dataset({
    features: ['image', 'label', 'video_id', 'prev_frame_0', 'prev_label_0', 'prev_f
rame_1', 'prev_label_1'],
    num_rows: 776
  })
})

```

Display the label statistics of the `problem3_datas` dataset.

```

In [7]: label_stats = train_df["label"].value_counts()
label_stats

```

```

Out[7]: 1    1849
        3     644
        2     255
        5     255
        6     243
        0     225

```

4 99  
Name: label, dtype: int64

Wow, so imbalanced. Let's get the class weights. They can be used to adjust the cross-entropy loss later.

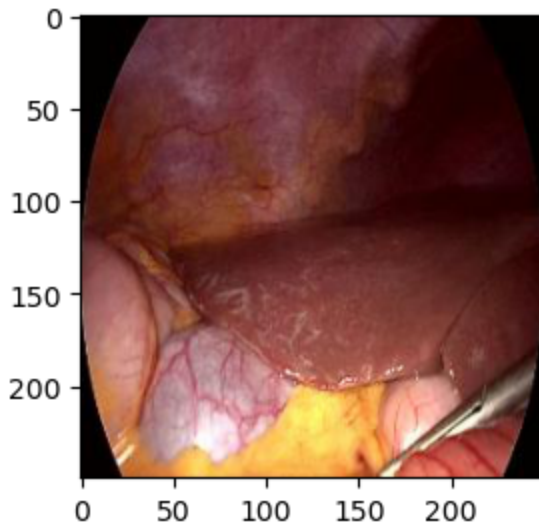
```
In [8]: num_train_labels = sum(label_stats)
train_class_weights = compute_class_weight(
    class_weight="balanced", classes=train_df["label"].unique(), y=train_df["label"]).to
train_class_weights
```

```
Out[8]: [2.2666666666666666,
0.27582477014602486,
2.0,
0.7919254658385093,
5.151515151515151,
2.0,
2.0987654320987654]
```

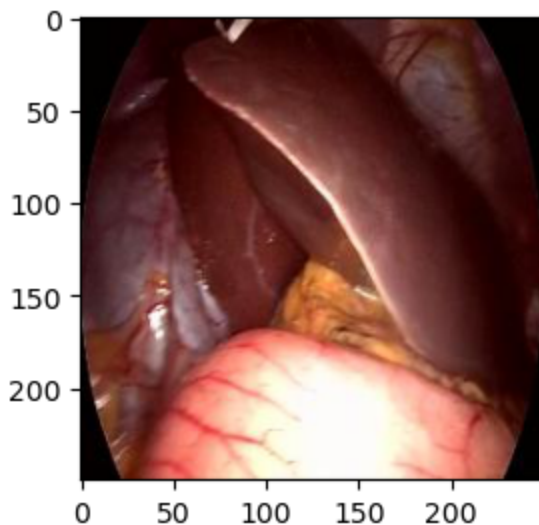
What do the data look like? Let's display a data sample of each class in the `problem3_dats`.

```
In [9]: for class_id in range(NUM_CLASSES):
    # Get the index of the first sample from `class_id`
    index = train_df.index[train_df["label"] == class_id][0]
    plt.figure(figsize=(4, 3))
    plt.suptitle(f'Class {class_id}: Test data #{index}', fontsize=12)
    plt.imshow(raw_datasets["train"][int(index)]["image"])
```

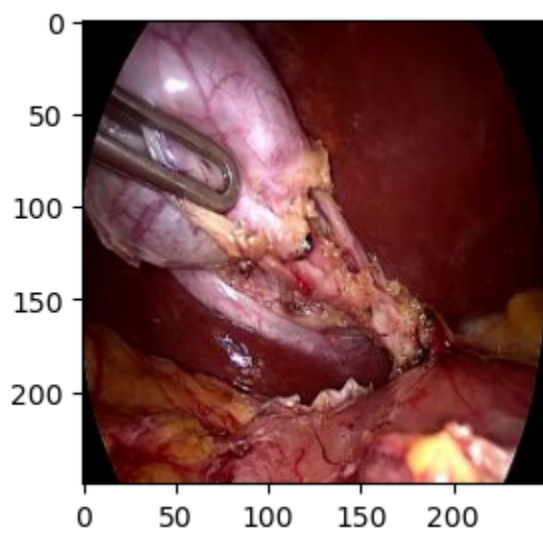
Class 0: Test data #0



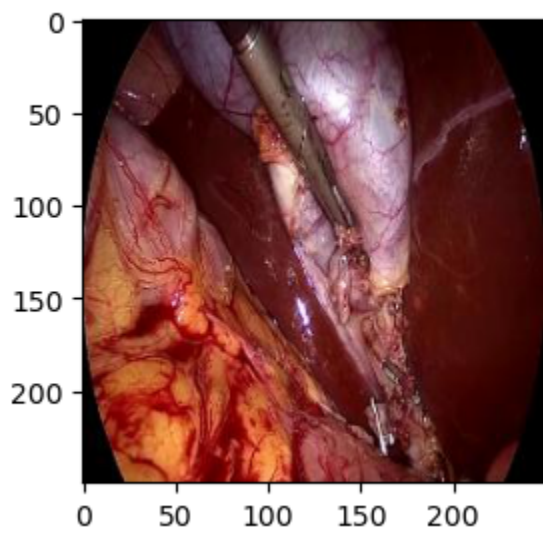
Class 1: Test data #16



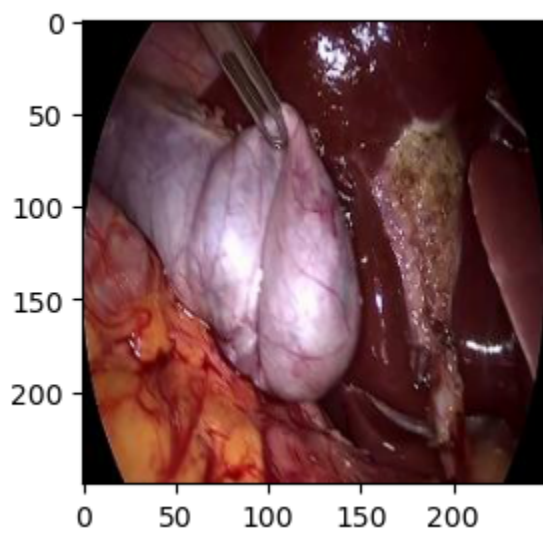
Class 2: Test data #254



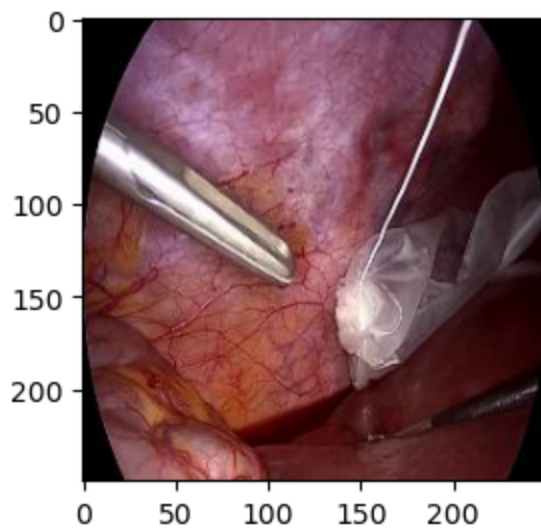
Class 3: Test data #326



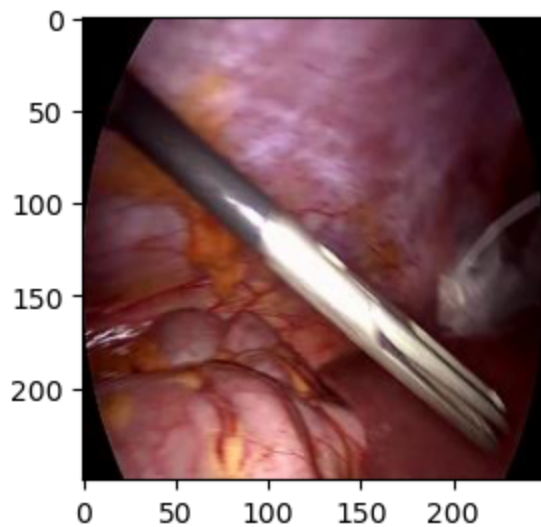
Class 4: Test data #386



Class 5: Test data #416



Class 6: Test data #444



## Preprocessing

Initialize the feature extractor I want to use.

```
In [10]: feature_extractor = AutoFeatureExtractor.from_pretrained(model_name_or_path)
```

## Function declarations

Augmentation and preprocessing functions.

```
In [11]: normalize = Normalize(mean=feature_extractor.image_mean, std=feature_extractor.image_std)
train_transforms = Compose(
    [
        Resize(feature_extractor.size),
        CenterCrop(feature_extractor.size),
        ColorJitter(brightness=0.1, contrast=0.1, saturation=0.1, hue=0.05),
        RandomHorizontalFlip(),
        RandomVerticalFlip(),
        RandomRotation(5),
        ToTensor(),
        normalize,
    ]
)
```

```

eval_transforms = Compose(
    [
        Resize(feature_extractor.size),
        CenterCrop(feature_extractor.size),
        ToTensor(),
        normalize,
    ]
)

# import pyarrow as pa
def preprocess_train(example_batch):
    """Apply train_transforms across a batch."""
    example_batch["pixel_values"] = [
        train_transforms(image.convert("RGB")) for image in example_batch["image"]
    ]
    for i in range(NUM_PREV_FRAMES):
        example_batch[f"pixel_values_prev_frame_{i}"] = []
        for image in example_batch[f"prev_frame_{i}"]:
            if image is None:
                example_batch[f"pixel_values_prev_frame_{i}"].append(
                    torch.zeros(example_batch["pixel_values"][0].shape))
            else:
                example_batch[f"pixel_values_prev_frame_{i}"].append(
                    train_transforms(image.convert("RGB")))
    return example_batch

def preprocess_eval(example_batch):
    """Apply eval_transforms across a batch."""
    example_batch["pixel_values"] = [
        eval_transforms(image.convert("RGB")) for image in example_batch["image"]
    ]
    for i in range(NUM_PREV_FRAMES):
        example_batch[f"pixel_values_prev_frame_{i}"] = []
        for image in example_batch[f"prev_frame_{i}"]:
            if image is None:
                example_batch[f"pixel_values_prev_frame_{i}"].append(
                    torch.zeros(example_batch["pixel_values"][0].shape))
            else:
                example_batch[f"pixel_values_prev_frame_{i}"].append(
                    train_transforms(image.convert("RGB")))
    return example_batch

```

Data collator.

This will be useful for batched data processing later.

```

In [12]: def collate_fn(examples):
        pixel_values = torch.stack([example["pixel_values"] for example in examples])
        labels = torch.tensor([example["label"] for example in examples])
        return {"pixel_values": pixel_values, "labels": labels}

```

Function utilization

Don't forget to preprocess the `problem3_dats` dataset.

```

In [13]: proc_datasets = raw_datasets
        proc_datasets["train"].set_transform(preprocess_train, output_all_columns=True)
        proc_datasets["valid"].set_transform(preprocess_eval)

```

## Training and evaluation



## Function declarations

The Trainer I use for non-temporal surgical phase recognition.

```
In [14]: class NonTemporalTrainer(Trainer):  
         pass
```

Accuracy evaluation metric.

```
In [15]: metric = datasets.load_metric("accuracy")
```

```
/tmp/ipykernel_26179/3770023701.py:1: FutureWarning: load_metric is deprecated and will  
be removed in the next major version of datasets. Use 'evaluate.load' instead, from the  
new library 🤗 Evaluate: https://huggingface.co/docs/evaluate  
metric = datasets.load_metric("accuracy")
```

```
In [16]: def compute_metrics(eval_pred):  
         """Computes accuracy on a batch of predictions"""  
         predictions = np.argmax(eval_pred.predictions, axis=1)  
         return metric.compute(predictions=predictions, references=eval_pred.label_ids)
```

Evaluation.

```
In [17]: def evaluation(trainer, datasets=[], eval_names=[]):  
         for dset, name in zip(datasets, eval_names):  
             metrics = trainer.evaluate(dset)  
             trainer.log_metrics(name, metrics)  
             trainer.save_metrics(name, metrics)
```

Training loop.

```
In [18]: def training(  
         model,  
         output_dir=f"save/problem3/nontemp/{model_name_or_path}__1e-3",  
         train_dataset=proc_datasets["train"],  
         eval_dataset=proc_datasets["valid"],  
         trainer_class=NonTemporalTrainer,  
         ):  
     args = TrainingArguments(  
         output_dir,  
         remove_unused_columns=False,  
         evaluation_strategy = "epoch",  
         save_strategy = "epoch",  
         learning_rate=1e-3,  
         per_device_train_batch_size=32,  
         gradient_accumulation_steps=4,  
         per_device_eval_batch_size=32,  
         num_train_epochs=200,  
         warmup_ratio=0.1,  
         logging_steps=10,  
         load_best_model_at_end=True,  
         metric_for_best_model="eval_accuracy",  
         gradient_checkpointing=True,  
         save_total_limit=1,  
         seed=RANDOM_SEED,  
         data_seed=RANDOM_SEED,  
         dataloader_num_workers=4,  
         lr_scheduler_type="cosine",  
         fp16=True,  
         report_to="wandb",  
         run_name=output_dir,  
     )
```



```

trainer = trainer_class(
    model,
    args,
    train_dataset=train_dataset,
    eval_dataset=eval_dataset,
    tokenizer=feature_extractor,
    compute_metrics=compute_metrics,
    data_collator=collate_fn,
    callbacks=[EarlyStoppingCallback(early_stopping_patience=20)],
)

train_results = trainer.train()
trainer.save_model()

return trainer

```

## Experiment 1: Non-Temporal Surgical Phase Recognition (Non-Weighted)

In [20]: `exp1_model = AutoModelForImageClassification.from_pretrained(model_name_or_path)`

In [21]: `trainer = training(
 exp1_model,
 output_dir=f"save/problem3/nontemp/{model_name_or_path}__1e-3",
 train_dataset=proc_datasets["train"],
 eval_dataset=proc_datasets["valid"],
 trainer_class=NonTemporalTrainer)`

Using cuda\_amp half precision backend  
/home/holy/anaconda3/envs/health/lib/python3.10/site-packages/transformers/optimization.py:306: FutureWarning: This implementation of AdamW is deprecated and will be removed in a future version. Use the PyTorch implementation torch.optim.AdamW instead, or set `no\_deprecation\_warning=True` to disable this warning

```


warnings.warn(
***** Running training *****
    Num examples = 3570
    Num Epochs = 200
    Instantaneous batch size per device = 32
    Total train batch size (w. parallel, distributed & accumulation) = 128
    Gradient Accumulation steps = 4
    Total optimization steps = 5600
Automatic Weights & Biases logging enabled, to disable set os.environ["WANDB_DISABLED"] = "true"
wandb: Currently logged in as: holylovenia. Use `wandb login --relogin` to force relogin

```

Tracking run with wandb version 0.13.4

Run data is saved locally in /home/holy/projects/ai-healthcare/assignment1/wandb/run-20221016\_010436-2kw2fft9

Syncing run [save/problem3/nontemp/microsoft/resnet-50\\_\\_1e-3](#) to [Weights & Biases \(docs\)](#)

 [1764/5600 1:06:33 < 2:24:54, 0.44 it/s, Epoch 63/200]

Epoch	Training Loss	Validation Loss	Accuracy
1	8.024900	7.487028	0.000000
2	6.930900	5.820574	0.023196
3	4.723200	3.146347	0.346649
4	2.047200	2.063026	0.421392
5	1.134900	1.787659	0.360825
6	0.875000	1.396298	0.512887
7	0.664800	1.354722	0.503866

8	0.463700	1.244888	0.539948
9	0.345300	1.346149	0.506443
10	0.302300	1.397681	0.538660
11	0.255100	1.177450	0.576031
12	0.197800	1.325529	0.578608
13	0.163700	1.344401	0.592784
14	0.150200	1.466037	0.581186
15	0.171000	1.530887	0.600515
16	0.118300	1.472156	0.606959
17	0.109600	1.549228	0.605670
18	0.136000	1.390043	0.648196
19	0.102100	1.210044	0.666237
20	0.104900	1.577439	0.614691
21	0.101700	1.361756	0.670103
22	0.071200	1.161202	0.680412
23	0.081300	1.115333	0.746134
24	0.049800	1.023313	0.715206
25	0.053500	1.213300	0.671392
26	0.044800	1.351857	0.667526
27	0.042900	1.320490	0.682990
28	0.047400	1.449430	0.682990
29	0.047300	1.393187	0.662371
30	0.048600	1.161261	0.695876
31	0.031700	1.409274	0.690722
32	0.026000	1.170302	0.743557
33	0.021300	1.299431	0.729381
34	0.019000	1.404753	0.711340
35	0.012900	1.477610	0.686856
36	0.012100	1.410011	0.703608
37	0.023300	1.357602	0.717784
38	0.014900	1.280086	0.706186
39	0.028600	1.458761	0.677835
40	0.033200	1.410323	0.688144
41	0.033500	1.530816	0.682990
42	0.015100	0.974994	0.747423
43	0.014200	0.943808	0.764175
44	0.011400	1.175535	0.735825
45	0.023600	1.402126	0.672680
46	0.015400	1.081974	0.743557
47	0.013200	1.234546	0.730670

48	0.011600	1.133834	0.739691
49	0.009600	1.336181	0.706186
50	0.010500	1.285596	0.719072
51	0.008600	1.423311	0.685567
52	0.005600	1.429182	0.697165
53	0.004800	1.415452	0.695876
54	0.005500	1.467501	0.670103
55	0.019900	1.386131	0.698454
56	0.012000	1.515813	0.689433
57	0.013300	1.345966	0.710052
58	0.015900	1.492783	0.672680
59	0.021400	1.311713	0.706186
60	0.015600	1.411174	0.702320
61	0.024700	1.422717	0.688144
62	0.023000	1.351010	0.676546
63	0.019300	1.142028	0.734536

\*\*\*\*\* Running Evaluation \*\*\*\*\*

Num examples = 776

Batch size = 32

Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50\_\_1e-3/checkpoint-28  
Configuration saved in save/problem3/nontemp/microsoft/resnet-50\_\_1e-3/checkpoint-28/con  
fig.json

Model weights saved in save/problem3/nontemp/microsoft/resnet-50\_\_1e-3/checkpoint-28/pyt  
orch\_model.bin

Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50\_\_1e-3/checkpoint-2  
8/preprocessor\_config.json

\*\*\*\*\* Running Evaluation \*\*\*\*\*

Num examples = 776

Batch size = 32

Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50\_\_1e-3/checkpoint-56  
Configuration saved in save/problem3/nontemp/microsoft/resnet-50\_\_1e-3/checkpoint-56/con  
fig.json

Model weights saved in save/problem3/nontemp/microsoft/resnet-50\_\_1e-3/checkpoint-56/pyt  
orch\_model.bin

Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50\_\_1e-3/checkpoint-5  
6/preprocessor\_config.json

Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50\_\_1e-3/checkpoint-2  
8] due to args.save\_total\_limit

\*\*\*\*\* Running Evaluation \*\*\*\*\*

Num examples = 776

Batch size = 32

Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50\_\_1e-3/checkpoint-84  
Configuration saved in save/problem3/nontemp/microsoft/resnet-50\_\_1e-3/checkpoint-84/con  
fig.json

Model weights saved in save/problem3/nontemp/microsoft/resnet-50\_\_1e-3/checkpoint-84/pyt  
orch\_model.bin

Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50\_\_1e-3/checkpoint-8  
4/preprocessor\_config.json

Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50\_\_1e-3/checkpoint-5  
6] due to args.save\_total\_limit

\*\*\*\*\* Running Evaluation \*\*\*\*\*

Num examples = 776

Batch size = 32

Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50\_\_1e-3/checkpoint-11  
2

```
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-112/co
nfig.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-112/py
torch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-11
2/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-8
4] due to args.save_total_limit
***** Running Evaluation *****
    Num examples = 776
    Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-14
0
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-140/co
nfig.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-140/py
torch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-14
0/preprocessor_config.json
***** Running Evaluation *****
    Num examples = 776
    Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-16
8
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-168/co
nfig.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-168/py
torch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-16
8/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-11
2] due to args.save_total_limit
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-14
0] due to args.save_total_limit
***** Running Evaluation *****
    Num examples = 776
    Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-19
6
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-196/co
nfig.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-196/py
torch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-19
6/preprocessor_config.json
***** Running Evaluation *****
    Num examples = 776
    Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-22
4
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-224/co
nfig.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-224/py
torch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-22
4/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-16
8] due to args.save_total_limit
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-19
6] due to args.save_total_limit
***** Running Evaluation *****
    Num examples = 776
    Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-25
2
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-252/co
```

```
nfig.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-252/py
torch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-25
2/preprocessor_config.json
***** Running Evaluation *****
    Num examples = 776
    Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-28
0
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-280/co
nfig.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-280/py
torch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-28
0/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-25
2] due to args.save_total_limit
***** Running Evaluation *****
    Num examples = 776
    Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-30
8
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-308/co
nfig.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-308/py
torch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-30
8/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-22
4] due to args.save_total_limit
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-28
0] due to args.save_total_limit
***** Running Evaluation *****
    Num examples = 776
    Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-33
6
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-336/co
nfig.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-336/py
torch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-33
6/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-30
8] due to args.save_total_limit
***** Running Evaluation *****
    Num examples = 776
    Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-36
4
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-364/co
nfig.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-364/py
torch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-36
4/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-33
6] due to args.save_total_limit
***** Running Evaluation *****
    Num examples = 776
    Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-39
2
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-392/co
nfig.json
```

```
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-392/py
torch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-39
2/preprocessor_config.json
***** Running Evaluation *****
    Num examples = 776
    Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-42
0
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-420/co
nfig.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-420/py
torch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-42
0/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-36
4] due to args.save_total_limit
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-39
2] due to args.save_total_limit
***** Running Evaluation *****
    Num examples = 776
    Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-44
8
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-448/co
nfig.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-448/py
torch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-44
8/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-42
0] due to args.save_total_limit
***** Running Evaluation *****
    Num examples = 776
    Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-47
6
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-476/co
nfig.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-476/py
torch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-47
6/preprocessor_config.json
***** Running Evaluation *****
    Num examples = 776
    Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-50
4
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-504/co
nfig.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-504/py
torch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-50
4/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-44
8] due to args.save_total_limit
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-47
6] due to args.save_total_limit
***** Running Evaluation *****
    Num examples = 776
    Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-53
2
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-532/co
nfig.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-532/py
```

```
torch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-53
2/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-50
4] due to args.save_total_limit
***** Running Evaluation *****
    Num examples = 776
    Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-56
0
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-560/co
nfig.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-560/py
torch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-56
0/preprocessor_config.json
***** Running Evaluation *****
    Num examples = 776
    Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-58
8
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-588/co
nfig.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-588/py
torch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-58
8/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-53
2] due to args.save_total_limit
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-56
0] due to args.save_total_limit
***** Running Evaluation *****
    Num examples = 776
    Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-61
6
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-616/co
nfig.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-616/py
torch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-61
6/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-58
8] due to args.save_total_limit
***** Running Evaluation *****
    Num examples = 776
    Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-64
4
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-644/co
nfig.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-644/py
torch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-64
4/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-61
6] due to args.save_total_limit
***** Running Evaluation *****
    Num examples = 776
    Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-67
2
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-672/co
nfig.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-672/py
torch_model.bin
```



```
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-67
2/preprocessor_config.json
***** Running Evaluation *****
  Num examples = 776
  Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-70
0
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-700/co
nfig.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-700/py
torch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-70
0/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-67
2] due to args.save_total_limit
***** Running Evaluation *****
  Num examples = 776
  Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-72
8
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-728/co
nfig.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-728/py
torch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-72
8/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-70
0] due to args.save_total_limit
***** Running Evaluation *****
  Num examples = 776
  Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-75
6
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-756/co
nfig.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-756/py
torch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-75
6/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-72
8] due to args.save_total_limit
***** Running Evaluation *****
  Num examples = 776
  Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-78
4
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-784/co
nfig.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-784/py
torch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-78
4/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-75
6] due to args.save_total_limit
***** Running Evaluation *****
  Num examples = 776
  Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-81
2
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-812/co
nfig.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-812/py
torch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-81
2/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-78
```

```
4] due to args.save_total_limit
***** Running Evaluation *****
    Num examples = 776
    Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-840
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-840/config.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-840/pytorch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-840/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-812] due to args.save_total_limit
***** Running Evaluation *****
    Num examples = 776
    Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-868
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-868/config.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-868/pytorch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-868/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-840] due to args.save_total_limit
***** Running Evaluation *****
    Num examples = 776
    Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-896
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-896/config.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-896/pytorch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-896/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-868] due to args.save_total_limit
***** Running Evaluation *****
    Num examples = 776
    Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-924
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-924/config.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-924/pytorch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-924/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-896] due to args.save_total_limit
***** Running Evaluation *****
    Num examples = 776
    Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-952
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-952/config.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-952/pytorch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-952/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-924] due to args.save_total_limit
```

```
***** Running Evaluation *****
  Num examples = 776
  Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-980
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-980/config.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-980/pytorch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-980/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-952] due to args.save_total_limit
***** Running Evaluation *****
  Num examples = 776
  Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1008
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1008/config.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1008/pytorch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1008/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-980] due to args.save_total_limit
***** Running Evaluation *****
  Num examples = 776
  Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1036
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1036/config.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1036/pytorch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1036/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1008] due to args.save_total_limit
***** Running Evaluation *****
  Num examples = 776
  Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1064
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1064/config.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1064/pytorch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1064/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1036] due to args.save_total_limit
***** Running Evaluation *****
  Num examples = 776
  Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1092
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1092/config.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1092/pytorch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1092/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1064] due to args.save_total_limit
***** Running Evaluation *****
```

```
Num examples = 776
Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1120
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1120/config.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1120/pytorch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1120/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1092] due to args.save_total_limit
***** Running Evaluation *****
    Num examples = 776
    Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1148
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1148/config.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1148/pytorch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1148/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1120] due to args.save_total_limit
***** Running Evaluation *****
    Num examples = 776
    Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1176
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1176/config.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1176/pytorch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1176/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-644] due to args.save_total_limit
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1148] due to args.save_total_limit
***** Running Evaluation *****
    Num examples = 776
    Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1204
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1204/config.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1204/pytorch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1204/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1176] due to args.save_total_limit
***** Running Evaluation *****
    Num examples = 776
    Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1232
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1232/config.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1232/pytorch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1232/preprocessor_config.json
***** Running Evaluation *****
    Num examples = 776
```

```
Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1260
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1260/config.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1260/pytorch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1260/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1232] due to args.save_total_limit
***** Running Evaluation *****
  Num examples = 776
  Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1288
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1288/config.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1288/pytorch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1288/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1260] due to args.save_total_limit
***** Running Evaluation *****
  Num examples = 776
  Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1316
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1316/config.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1316/pytorch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1316/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1288] due to args.save_total_limit
***** Running Evaluation *****
  Num examples = 776
  Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1344
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1344/config.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1344/pytorch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1344/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1316] due to args.save_total_limit
***** Running Evaluation *****
  Num examples = 776
  Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1372
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1372/config.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1372/pytorch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1372/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1344] due to args.save_total_limit
***** Running Evaluation *****
  Num examples = 776
  Batch size = 32
```



```
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1400
00
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1400/c
onfig.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1400/p
ytorch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-14
00/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-13
72] due to args.save_total_limit
***** Running Evaluation *****
    Num examples = 776
    Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-14
28
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1428/c
onfig.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1428/p
ytorch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-14
28/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-14
00] due to args.save_total_limit
***** Running Evaluation *****
    Num examples = 776
    Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-14
56
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1456/c
onfig.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1456/p
ytorch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-14
56/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-14
28] due to args.save_total_limit
***** Running Evaluation *****
    Num examples = 776
    Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-14
84
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1484/c
onfig.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1484/p
ytorch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-14
84/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-14
56] due to args.save_total_limit
***** Running Evaluation *****
    Num examples = 776
    Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-15
12
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1512/c
onfig.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1512/p
ytorch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-15
12/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-14
84] due to args.save_total_limit
***** Running Evaluation *****
    Num examples = 776
    Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-15
```

```
40
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1540/c
onfig.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1540/p
ytorch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-15
40/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-15
12] due to args.save_total_limit
***** Running Evaluation *****
    Num examples = 776
    Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-15
68
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1568/c
onfig.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1568/p
ytorch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-15
68/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-15
40] due to args.save_total_limit
***** Running Evaluation *****
    Num examples = 776
    Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-15
96
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1596/c
onfig.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1596/p
ytorch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-15
96/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-15
68] due to args.save_total_limit
***** Running Evaluation *****
    Num examples = 776
    Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-16
24
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1624/c
onfig.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1624/p
ytorch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-16
24/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-15
96] due to args.save_total_limit
***** Running Evaluation *****
    Num examples = 776
    Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-16
52
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1652/c
onfig.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1652/p
ytorch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-16
52/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-16
24] due to args.save_total_limit
***** Running Evaluation *****
    Num examples = 776
    Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-16
80
```



```

Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1680/c
onfig.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1680/p
ytorch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-16
80/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-16
52] due to args.save_total_limit
***** Running Evaluation *****
    Num examples = 776
    Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-17
08
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1708/c
onfig.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1708/p
ytorch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-17
08/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-16
80] due to args.save_total_limit
***** Running Evaluation *****
    Num examples = 776
    Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-17
36
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1736/c
onfig.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1736/p
ytorch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-17
36/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-17
08] due to args.save_total_limit
***** Running Evaluation *****
    Num examples = 776
    Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-17
64
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1764/c
onfig.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1764/p
ytorch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-17
64/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-17
36] due to args.save_total_limit

```

Training completed. Do not forget to share your model on [huggingface.co/models](https://huggingface.co/models) =)

```

Loading best model from save/problem3/nontemp/microsoft/resnet-50__1e-3/checkpoint-1204
(score: 0.7641752577319587).
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/config.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/pytorch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3/preprocessor_
config.json

```

```

In [22]: evaluation(
    trainer,
    datasets=[proc_datasets["valid"]],
    eval_names=["problem3_datas__valid"]
)

```

\*\*\*\*\* Running Evaluation \*\*\*\*\*

Num examples = 776

Batch size = 32

[25/25 00:08]

\*\*\*\*\* problem3\_datas\_\_valid metrics \*\*\*\*\*

epoch = 63.0

eval\_accuracy = 0.7642

eval\_loss = 0.9438

eval\_runtime = 0:00:10.29

eval\_samples\_per\_second = 75.394

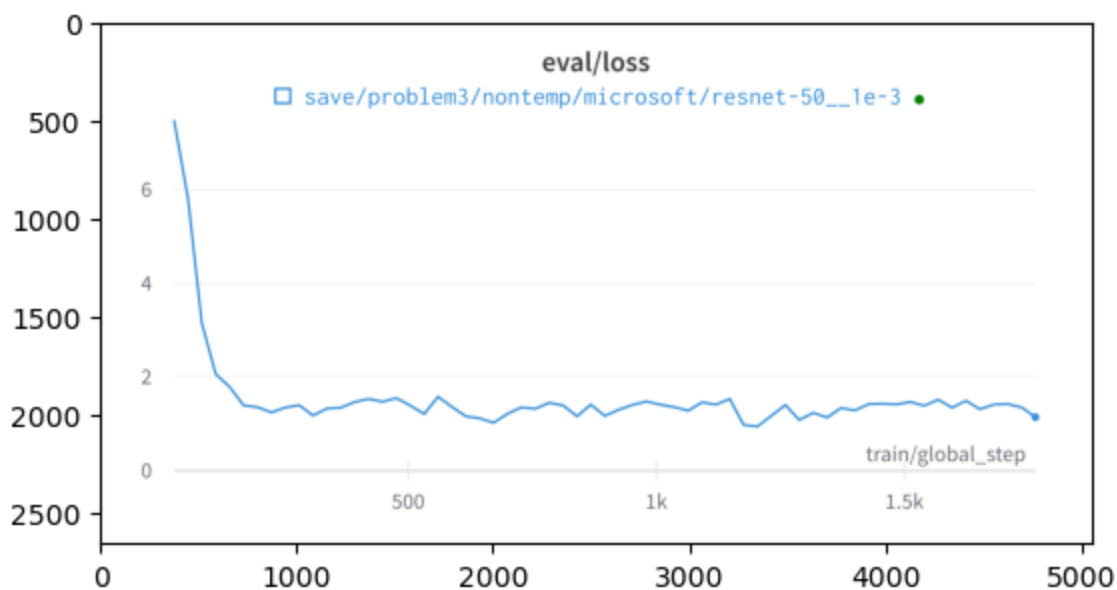
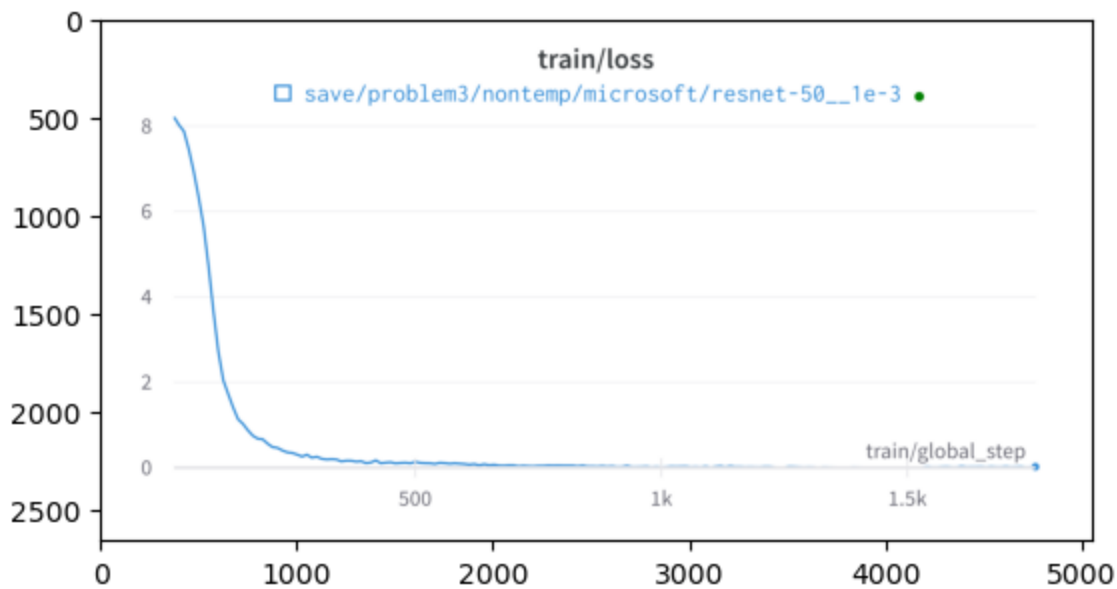
eval\_steps\_per\_second = 2.429

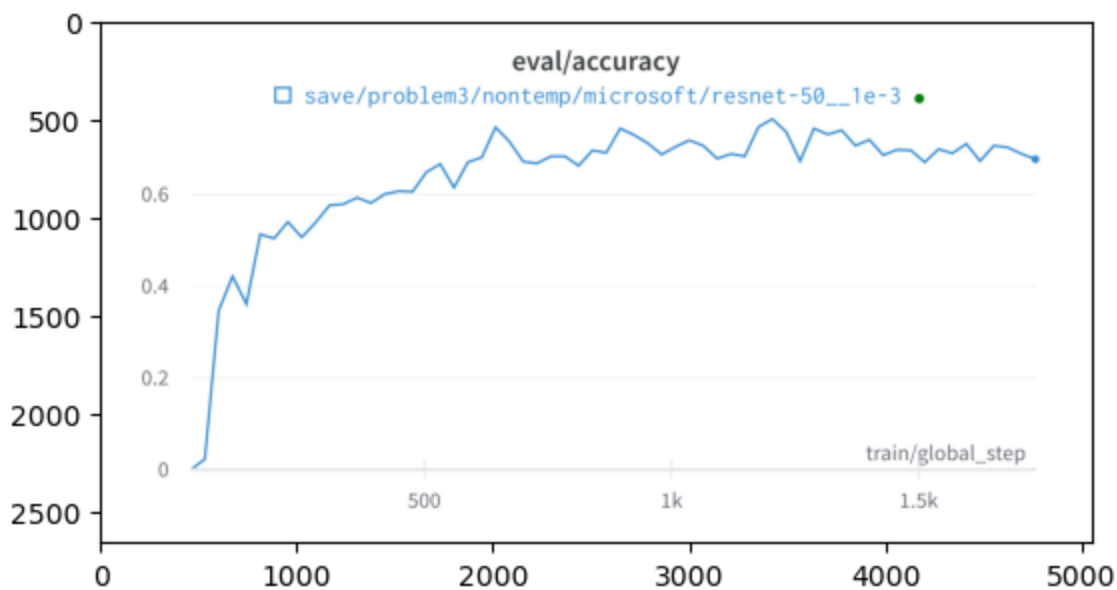
```
In [23]: plt.figure()
img = mpimg.imread("./log/problem3/exp1/exp1_train_loss.png")
plt.imshow(img)

plt.figure()
img = mpimg.imread("./log/problem3/exp1/exp1_valid_loss.png")
plt.imshow(img)

plt.figure()
img = mpimg.imread("./log/problem3/exp1/exp1_valid_acc.png")
plt.imshow(img)
```

Out[23]: <matplotlib.image.AxesImage at 0x7f83fbb5c670>





## Experiment 2: Weighted Non-Temporal Surgical Phase Recognition

### Function declarations

Modified Trainer.

Use the pre-computed `train_class_weights` to adjust the cross entropy loss.

```
In [19]: class WeightedNonTemporalTrainer(Trainer):
    def compute_loss(self, model, inputs, return_outputs=False):
        labels = inputs.get("labels").to("cuda")
        # forward pass
        outputs = model(**inputs)
        logits = outputs.get("logits").to("cuda")
        # compute weighted cross entropy loss
        loss_fct = nn.CrossEntropyLoss(weight=torch.tensor(train_class_weights + [0 for
        loss = loss_fct(logits.view(-1, self.model.config.num_labels), labels.view(-1))
        return (loss, outputs) if return_outputs else loss
```

### Function utilization

```
In [20]: exp2_model = AutoModelForImageClassification.from_pretrained(model_name_or_path)
```

```
In [21]: trainer = training(
    exp2_model,
    output_dir=f"save/problem3/nontemp/{model_name_or_path}__1e-3__weighted",
    train_dataset=proc_datasets["train"],
    eval_dataset=proc_datasets["valid"],
    trainer_class=WeightedNonTemporalTrainer)
```

Using cuda\_amp half precision backend

/home/holy/anaconda3/envs/health/lib/python3.10/site-packages/transformers/optimization.py:306: FutureWarning: This implementation of AdamW is deprecated and will be removed in a future version. Use the PyTorch implementation torch.optim.AdamW instead, or set `no\_deprecation\_warning=True` to disable this warning

```
warnings.warn(
***** Running training *****
Num examples = 3570
Num Epochs = 200
Instantaneous batch size per device = 32
Total train batch size (w. parallel, distributed & accumulation) = 128
```

Gradient Accumulation steps = 4

Total optimization steps = 5600


Automatic Weights & Biases logging enabled, to disable set `os.environ["WANDB_DISABLED"] = "true"`

**wandb**: Currently logged in as: **holylovenia**. Use ``wandb login --relogin`` to force relogin

Tracking run with wandb version 0.13.4

Run data is saved locally in `/home/holy/projects/ai-healthcare/assignment1/wandb/run-20221017_092007-tev8wm5i`

Syncing run **save/problem3/nontemp/microsoft/resnet-50\_\_1e-3\_\_weighted** to [Weights & Biases \(docs\)](#)

 [1764/5600 44:18 < 1:36:26, 0.66 it/s, Epoch 63/200]

Epoch	Training Loss	Validation Loss	Accuracy
1	8.117000	7.594343	0.000000
2	7.107200	6.239693	0.014175
3	5.191800	4.093779	0.182990
4	2.958700	2.652359	0.273196
5	1.531300	2.164495	0.317010
6	1.072200	1.797656	0.396907
7	0.838600	1.555815	0.436856
8	0.679300	1.590227	0.452320
9	0.478800	1.621724	0.471649
10	0.482500	1.660609	0.496134
11	0.375400	1.790921	0.452320
12	0.340900	1.540550	0.512887
13	0.253800	1.238655	0.592784
14	0.308000	1.205093	0.574742
15	0.183400	1.323344	0.606959
16	0.194100	1.460441	0.567010
17	0.180600	1.341915	0.606959
18	0.235900	1.174975	0.617268
19	0.204600	1.320966	0.653351
20	0.194700	1.529542	0.583763
21	0.142500	1.449718	0.623711
22	0.152100	1.279704	0.658505
23	0.101200	1.269209	0.637887
24	0.136600	1.513585	0.591495
25	0.085900	1.617057	0.599227
26	0.083600	1.503736	0.582474
27	0.076900	1.179001	0.666237
28	0.058100	1.359149	0.668814
29	0.083900	1.383552	0.635309
30	0.041700	1.562068	0.635309
31	0.031100	1.808826	0.618557
32	0.028000	1.547502	0.640464

33	0.024100	1.702445	0.609536
34	0.024200	1.692340	0.630155
35	0.022400	1.894743	0.605670
36	0.058500	1.353316	0.684278
37	0.031500	1.849803	0.617268
38	0.035400	1.836778	0.579897
39	0.052300	1.373135	0.663660
40	0.033400	1.773355	0.561856
41	0.027100	1.491002	0.630155
42	0.030200	1.609811	0.676546
43	0.017600	1.262341	0.726804
44	0.020600	1.559357	0.654639
45	0.034900	1.322778	0.706186
46	0.022300	1.525396	0.662371
47	0.015300	1.397988	0.697165
48	0.020700	1.435195	0.706186
49	0.019600	1.271425	0.703608
50	0.029100	1.291654	0.676546
51	0.015700	1.416511	0.680412
52	0.023800	1.554667	0.680412
53	0.012600	1.525676	0.694588
54	0.012900	1.707852	0.701031
55	0.021900	1.554909	0.703608
56	0.037000	1.495705	0.720361
57	0.019700	1.537382	0.688144
58	0.021900	1.309726	0.708763
59	0.041900	1.271845	0.695876
60	0.016200	1.620538	0.668814
61	0.007700	1.763006	0.632732
62	0.008400	1.534836	0.657216
63	0.014900	1.416337	0.721649

\*\*\*\*\* Running Evaluation \*\*\*\*\*

Num examples = 776

Batch size = 32

Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50\_\_1e-3\_\_weighted/checkpoint-28

Configuration saved in save/problem3/nontemp/microsoft/resnet-50\_\_1e-3\_\_weighted/checkpoint-28/config.json

Model weights saved in save/problem3/nontemp/microsoft/resnet-50\_\_1e-3\_\_weighted/checkpoint-28/pytorch\_model.bin

Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50\_\_1e-3\_\_weighted/checkpoint-28/preprocessor\_config.json

\*\*\*\*\* Running Evaluation \*\*\*\*\*

Num examples = 776

Batch size = 32

```
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-56
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-56/config.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-56/pytorch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-56/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-28] due to args.save_total_limit
***** Running Evaluation *****
    Num examples = 776
    Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-84
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-84/config.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-84/pytorch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-84/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-56] due to args.save_total_limit
***** Running Evaluation *****
    Num examples = 776
    Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-112
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-112/config.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-112/pytorch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-112/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-84] due to args.save_total_limit
***** Running Evaluation *****
    Num examples = 776
    Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-140
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-140/config.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-140/pytorch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-140/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-112] due to args.save_total_limit
***** Running Evaluation *****
    Num examples = 776
    Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-168
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-168/config.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-168/pytorch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-168/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-140] due to args.save_total_limit
***** Running Evaluation *****
    Num examples = 776
    Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
```

```
ckptoint-196
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-196/config.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-196/pytorch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckptoint-196/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckptoint-168] due to args.save_total_limit
***** Running Evaluation *****
    Num examples = 776
    Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckptoint-224
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-224/config.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-224/pytorch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckptoint-224/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckptoint-196] due to args.save_total_limit
***** Running Evaluation *****
    Num examples = 776
    Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckptoint-252
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-252/config.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-252/pytorch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckptoint-252/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckptoint-224] due to args.save_total_limit
***** Running Evaluation *****
    Num examples = 776
    Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckptoint-280
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-280/config.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-280/pytorch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckptoint-280/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckptoint-252] due to args.save_total_limit
***** Running Evaluation *****
    Num examples = 776
    Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckptoint-308
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-308/config.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-308/pytorch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckptoint-308/preprocessor_config.json
***** Running Evaluation *****
    Num examples = 776
    Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckptoint-336
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-336/config.json
```



```
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpoint-336/pytorch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpoint-336/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpoint-280] due to args.save_total_limit
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpoint-308] due to args.save_total_limit
***** Running Evaluation *****
    Num examples = 776
    Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpoint-364
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpoint-364/config.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpoint-364/pytorch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpoint-364/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpoint-336] due to args.save_total_limit
***** Running Evaluation *****
    Num examples = 776
    Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpoint-392
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpoint-392/config.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpoint-392/pytorch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpoint-392/preprocessor_config.json
***** Running Evaluation *****
    Num examples = 776
    Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpoint-420
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpoint-420/config.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpoint-420/pytorch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpoint-420/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpoint-364] due to args.save_total_limit
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpoint-392] due to args.save_total_limit
***** Running Evaluation *****
    Num examples = 776
    Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpoint-448
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpoint-448/config.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpoint-448/pytorch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpoint-448/preprocessor_config.json
***** Running Evaluation *****
    Num examples = 776
    Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpoint-476
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpoint-476/config.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpoint-
```

```
int-476/pytorch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckptoint-476/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckptoint-448] due to args.save_total_limit
***** Running Evaluation *****
    Num examples = 776
    Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckptoint-504
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-504/config.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-504/pytorch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckptoint-504/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckptoint-420] due to args.save_total_limit
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckptoint-476] due to args.save_total_limit
***** Running Evaluation *****
    Num examples = 776
    Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckptoint-532
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-532/config.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-532/pytorch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckptoint-532/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckptoint-504] due to args.save_total_limit
***** Running Evaluation *****
    Num examples = 776
    Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckptoint-560
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-560/config.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-560/pytorch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckptoint-560/preprocessor_config.json
***** Running Evaluation *****
    Num examples = 776
    Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckptoint-588
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-588/config.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-588/pytorch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckptoint-588/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckptoint-560] due to args.save_total_limit
***** Running Evaluation *****
    Num examples = 776
    Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckptoint-616
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-616/config.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-616/pytorch_model.bin
```

```
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-616/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-532] due to args.save_total_limit
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-588] due to args.save_total_limit
***** Running Evaluation *****
    Num examples = 776
    Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-644
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-644/config.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-644/pytorch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-644/preprocessor_config.json
***** Running Evaluation *****
    Num examples = 776
    Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-672
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-672/config.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-672/pytorch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-672/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-644] due to args.save_total_limit
***** Running Evaluation *****
    Num examples = 776
    Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-700
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-700/config.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-700/pytorch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-700/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-672] due to args.save_total_limit
***** Running Evaluation *****
    Num examples = 776
    Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-728
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-728/config.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-728/pytorch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-728/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-700] due to args.save_total_limit
***** Running Evaluation *****
    Num examples = 776
    Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-756
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-756/config.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-756/pytorch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
```

```
ckptoint-756/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckptoint-616] due to args.save_total_limit
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckptoint-728] due to args.save_total_limit
***** Running Evaluation *****
    Num examples = 776
    Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckptoint-784
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-784/config.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-784/pytorch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckptoint-784/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckptoint-756] due to args.save_total_limit
***** Running Evaluation *****
    Num examples = 776
    Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckptoint-812
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-812/config.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-812/pytorch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckptoint-812/preprocessor_config.json
***** Running Evaluation *****
    Num examples = 776
    Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckptoint-840
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-840/config.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-840/pytorch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckptoint-840/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckptoint-812] due to args.save_total_limit
***** Running Evaluation *****
    Num examples = 776
    Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckptoint-868
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-868/config.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-868/pytorch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckptoint-868/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckptoint-840] due to args.save_total_limit
***** Running Evaluation *****
    Num examples = 776
    Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckptoint-896
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-896/config.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-896/pytorch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckptoint-896/preprocessor_config.json
```

```
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-868] due to args.save_total_limit
***** Running Evaluation *****
  Num examples = 776
  Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-924
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-924/config.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-924/pytorch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-924/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-896] due to args.save_total_limit
***** Running Evaluation *****
  Num examples = 776
  Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-952
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-952/config.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-952/pytorch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-952/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-924] due to args.save_total_limit
***** Running Evaluation *****
  Num examples = 776
  Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-980
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-980/config.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-980/pytorch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-980/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-952] due to args.save_total_limit
***** Running Evaluation *****
  Num examples = 776
  Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-1008
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-1008/config.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-1008/pytorch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-1008/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-784] due to args.save_total_limit
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-980] due to args.save_total_limit
***** Running Evaluation *****
  Num examples = 776
  Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-1036
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-1036/config.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-1036/pytorch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
```



```
ckptoint-1036/preprocessor_config.json
***** Running Evaluation *****
    Num examples = 776
    Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckptoint-1064
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-1064/config.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-1064/pytorch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckptoint-1064/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckptoint-1036] due to args.save_total_limit
***** Running Evaluation *****
    Num examples = 776
    Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckptoint-1092
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-1092/config.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-1092/pytorch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckptoint-1092/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckptoint-1064] due to args.save_total_limit
***** Running Evaluation *****
    Num examples = 776
    Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckptoint-1120
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-1120/config.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-1120/pytorch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckptoint-1120/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckptoint-1092] due to args.save_total_limit
***** Running Evaluation *****
    Num examples = 776
    Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckptoint-1148
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-1148/config.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-1148/pytorch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckptoint-1148/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckptoint-1120] due to args.save_total_limit
***** Running Evaluation *****
    Num examples = 776
    Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckptoint-1176
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-1176/config.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-1176/pytorch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckptoint-1176/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckptoint-1148] due to args.save_total_limit
```

```
***** Running Evaluation *****
  Num examples = 776
  Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-1204
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-1204/config.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-1204/pytorch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-1204/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-1008] due to args.save_total_limit
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-1176] due to args.save_total_limit
***** Running Evaluation *****
  Num examples = 776
  Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-1232
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-1232/config.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-1232/pytorch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-1232/preprocessor_config.json
***** Running Evaluation *****
  Num examples = 776
  Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-1260
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-1260/config.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-1260/pytorch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-1260/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-1232] due to args.save_total_limit
***** Running Evaluation *****
  Num examples = 776
  Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-1288
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-1288/config.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-1288/pytorch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-1288/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-1260] due to args.save_total_limit
***** Running Evaluation *****
  Num examples = 776
  Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-1316
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-1316/config.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-1316/pytorch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-1316/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-1288] due to args.save_total_limit
***** Running Evaluation *****
```



```
Num examples = 776
Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-1344
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-1344/config.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-1344/pytorch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-1344/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-1316] due to args.save_total_limit
***** Running Evaluation *****
  Num examples = 776
  Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-1372
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-1372/config.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-1372/pytorch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-1372/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-1344] due to args.save_total_limit
***** Running Evaluation *****
  Num examples = 776
  Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-1400
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-1400/config.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-1400/pytorch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-1400/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-1372] due to args.save_total_limit
***** Running Evaluation *****
  Num examples = 776
  Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-1428
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-1428/config.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-1428/pytorch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-1428/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-1400] due to args.save_total_limit
***** Running Evaluation *****
  Num examples = 776
  Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-1456
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-1456/config.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-1456/pytorch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-1456/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-1428] due to args.save_total_limit
***** Running Evaluation *****
  Num examples = 776
```

```
Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-1484
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-1484/config.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-1484/pytorch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-1484/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-1456] due to args.save_total_limit
***** Running Evaluation *****
    Num examples = 776
    Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-1512
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-1512/config.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-1512/pytorch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-1512/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-1484] due to args.save_total_limit
***** Running Evaluation *****
    Num examples = 776
    Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-1540
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-1540/config.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-1540/pytorch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-1540/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-1512] due to args.save_total_limit
***** Running Evaluation *****
    Num examples = 776
    Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-1568
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-1568/config.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-1568/pytorch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-1568/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-1540] due to args.save_total_limit
***** Running Evaluation *****
    Num examples = 776
    Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-1596
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-1596/config.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-1596/pytorch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-1596/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-1568] due to args.save_total_limit
***** Running Evaluation *****
    Num examples = 776
    Batch size = 32
```

```
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-1624
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-1624/config.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-1624/pytorch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-1624/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-1596] due to args.save_total_limit
***** Running Evaluation *****
    Num examples = 776
    Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-1652
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-1652/config.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-1652/pytorch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-1652/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-1624] due to args.save_total_limit
***** Running Evaluation *****
    Num examples = 776
    Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-1680
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-1680/config.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-1680/pytorch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-1680/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-1652] due to args.save_total_limit
***** Running Evaluation *****
    Num examples = 776
    Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-1708
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-1708/config.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-1708/pytorch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-1708/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-1680] due to args.save_total_limit
***** Running Evaluation *****
    Num examples = 776
    Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-1736
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-1736/config.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpo
int-1736/pytorch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-1736/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
ckpoint-1708] due to args.save_total_limit
***** Running Evaluation *****
    Num examples = 776
    Batch size = 32
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/che
```

```
ckptoint-1764
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpoint-1764/config.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpoint-1764/pytorch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpoint-1764/preprocessor_config.json
Deleting older checkpoint [save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpoint-1736] due to args.save_total_limit
```

Training completed. Do not forget to share your model on [huggingface.co/models](https://huggingface.co/models) =)

```
Loading best model from save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/checkpoint-1204 (score: 0.7268041237113402).
Saving model checkpoint to save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted
Configuration saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/config.json
Model weights saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/pytorch_model.bin
Feature extractor saved in save/problem3/nontemp/microsoft/resnet-50__1e-3__weighted/preprocessor_config.json
```

```
In [22]: evaluation(
        trainer,
        datasets=[proc_datasets["valid"]],
        eval_names=["problem3_datas__valid"]
    )
```

\*\*\*\*\* Running Evaluation \*\*\*\*\*

Num examples = 776

Batch size = 32

[25/25 00:04]

\*\*\*\*\* problem3\_datas\_\_valid metrics \*\*\*\*\*

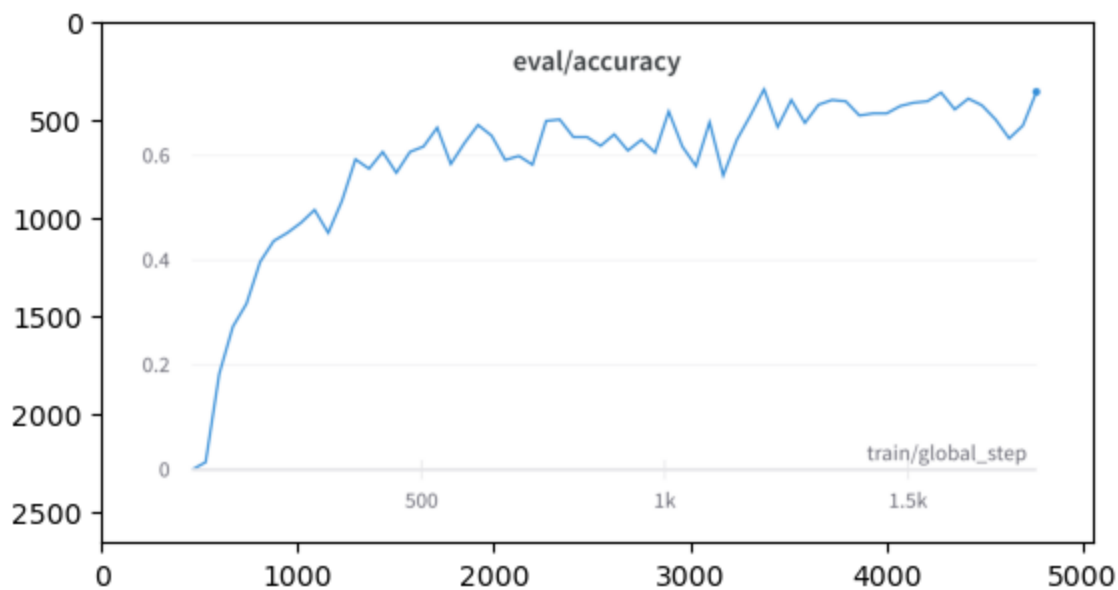
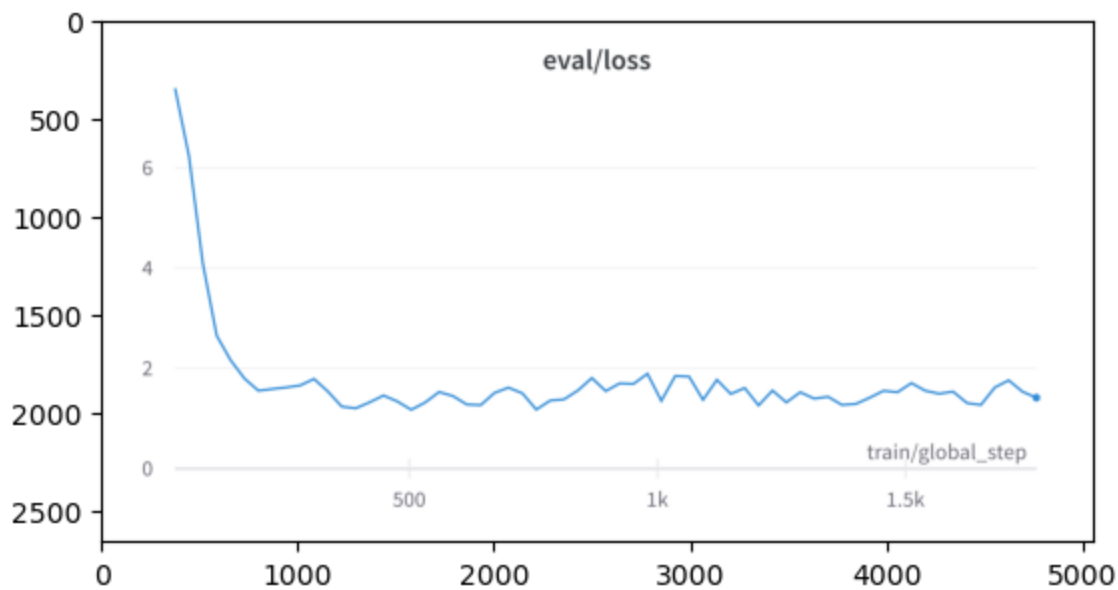
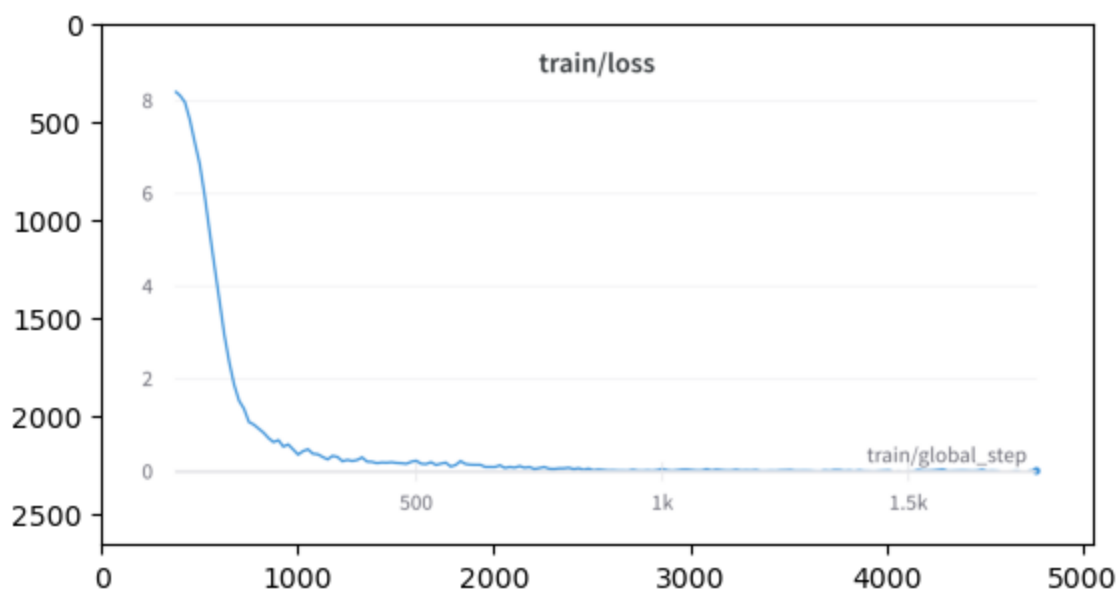
epoch	=	63.0
eval_accuracy	=	0.7268
eval_loss	=	1.2623
eval_runtime	=	0:00:05.72
eval_samples_per_second	=	135.476
eval_steps_per_second	=	4.365

```
In [23]: plt.figure()
img = mpimg.imread("./log/problem3/exp2/exp2_train_loss.png")
plt.imshow(img)

plt.figure()
img = mpimg.imread("./log/problem3/exp2/exp2_valid_loss.png")
plt.imshow(img)

plt.figure()
img = mpimg.imread("./log/problem3/exp2/exp2_valid_acc.png")
plt.imshow(img)
```

```
Out[23]: <matplotlib.image.AxesImage at 0x7f24ab92ffd0>
```



### Experiment 3: Temporal Surgical Phase Recognition (Non-Weighted)

```
In [19]: exp3_img_enc = AutoModelForImageClassification.from_pretrained(f"save/problem3/nontemp/{
```

## Function declarations

```
In [19]: def temporal_collate_fn(examples):
    pixel_values = torch.stack([example["pixel_values"] for example in examples])
    labels = torch.tensor([example["label"] for example in examples])

    all_pixel_values = [pixel_values]

    for i in range(NUM_PREV_FRAMES):
        prev_pixel_values = torch.stack([example[f"pixel_values_prev_frame_{i}"] for example in examples])
        all_pixel_values.append(prev_pixel_values)
    all_pixel_values = torch.stack(all_pixel_values)

    # (NUM_PREV_FRAMES + 1) x BATCH_SIZE x DIM
    return {"pixel_values": all_pixel_values, "labels": labels}
```

```
In [20]: class TemporalNetwork(nn.Module):

    def __init__(self, img_enc, temporal_lstm):
        super().__init__()
        self.img_enc = img_enc
        self.temporal_lstm = temporal_lstm

    def forward(self, pixel_values, labels=None):
        img_features = []
        for frame_i in range(pixel_values.shape[0]):
            img_enc_results = self.img_enc(pixel_values[frame_i], output_hidden_states=True)
            img_features.append(img_enc_results.hidden_states[-1])
        img_features = torch.stack(img_features)
        img_features = torch.swapaxes(img_features, 0, 1) # Swap axes so batch axis is t
        logits = self.temporal_lstm.forward(img_features, labels=labels)
        return logits
```

```
In [21]: class TemporalLSTM(nn.Module):

    def __init__(self, input_size=2048*7*7, hidden_size=512, num_layers=1, bidirectional=False, num_labels=10):
        super().__init__()
        self.input_size = input_size
        self.hidden_size = hidden_size
        self.num_layers = num_layers
        self.bidirectional = bidirectional
        self.num_labels = num_labels

        self.lstm = nn.LSTM(
            self.input_size, self.hidden_size, self.num_layers,
            batch_first=True, bidirectional=self.bidirectional, dropout=1)
        nn.init.xavier_normal_(self.lstm.all_weights[0][0])
        nn.init.xavier_normal_(self.lstm.all_weights[0][1])
        self.classifier = nn.Linear(self.hidden_size * (2 if self.bidirectional else 1), self.num_labels)

    def forward(self, x, labels=None):
        x = x.reshape(x.shape[0], x.shape[1], -1)
        self.lstm.flatten_parameters()
        y, _ = self.lstm(x)
        logits = self.classifier(y)
        loss = None
        if labels is not None:
            logits = logits[:, 0, :]
            loss_fct = F.cross_entropy
            loss = loss_fct(logits.view(-1, self.num_labels), labels.view(-1))
        return loss, logits
```

```
In [22]: class TemporalTrainer(Trainer):
    pass
```

```
In [23]: def temporal_training(
    model,
    output_dir=f"save/problem3/temp/{model_name_or_path}__5e-6",
    train_dataset=proc_datasets["train"],
    eval_dataset=proc_datasets["valid"],
    trainer_class=TemporalTrainer,
):
    args = TrainingArguments(
        output_dir,
        remove_unused_columns=False,
        evaluation_strategy = "epoch",
        save_strategy = "epoch",
        learning_rate=5e-6,
        per_device_train_batch_size=8,
        gradient_accumulation_steps=4,
        per_device_eval_batch_size=8,
        num_train_epochs=200,
        warmup_ratio=0.1,
        logging_steps=10,
        load_best_model_at_end=True,
        metric_for_best_model="eval_accuracy",
        gradient_checkpointing=False,
        save_total_limit=1,
        seed=RANDOM_SEED,
        data_seed=RANDOM_SEED,
        dataloader_num_workers=4,
        lr_scheduler_type="cosine",
        fp16=True,
        report_to="wandb",
        run_name=output_dir,
    )

    trainer = trainer_class(
        model,
        args,
        train_dataset=train_dataset,
        eval_dataset=eval_dataset,
        tokenizer=feature_extractor,
        compute_metrics=compute_metrics,
        data_collator=temporal_collate_fn,
        callbacks=[EarlyStoppingCallback(early_stopping_patience=20)],
    )

    train_results = trainer.train()
    trainer.save_model()

    return trainer
```

## Function utilization

```
In [25]: exp3_temporal_lstm = TemporalLSTM()
```

```
/home/holy/anaconda3/envs/health/lib/python3.10/site-packages/torch/nn/modules/rnn.py:6
2: UserWarning: dropout option adds dropout after all but last recurrent layer, so non-z
ero dropout expects num_layers greater than 1, but got dropout=1 and num_layers=1
warnings.warn("dropout option adds dropout after all but last "
```

```
In [26]: exp3_temporal_network = TemporalNetwork(exp3_img_enc, exp3_temporal_lstm)
```

```
In [27]: temporal_trainer = temporal_training(
    exp3_temporal_network,
    output_dir=f"save/problem3/temp/{model_name_or_path}__5e-6__submitted",
    train_dataset=proc_datasets["train"],
```



```
eval_dataset=proc_datasets["valid"],
trainer_class=TemporalTrainer)
```


```
Using cuda_amp half precision backend
/home/holy/anaconda3/envs/health/lib/python3.10/site-packages/transformers/optimization.
py:306: FutureWarning: This implementation of AdamW is deprecated and will be removed in
a future version. Use the PyTorch implementation torch.optim.AdamW instead, or set `no_d
eprecation_warning=True` to disable this warning
```

```
warnings.warn(
**** Running training ****
Num examples = 3570
Num Epochs = 200
Instantaneous batch size per device = 8
Total train batch size (w. parallel, distributed & accumulation) = 32
Gradient Accumulation steps = 4
Total optimization steps = 22200
Automatic Weights & Biases logging enabled, to disable set os.environ["WANDB_DISABLED"]
= "true"
wandb: Currently logged in as: holylovenia. Use `wandb login --relogin` to force relogin
```

Tracking run with wandb version 0.13.4

Run data is saved locally in /home/holy/projects/ai-healthcare/assignment1/wandb/run-20221017\_002848-3ngpbswm

Syncing run [save/problem3/temp/microsoft/resnet-50\\_\\_5e-6\\_\\_submitted](#) to [Weights & Biases \(docs\)](#)

 [ 3330/22200 1:13:43 < 6:58:04, 0.75 it/s, Epoch 29/200]

Epoch	Training Loss	Validation Loss	Accuracy
0	1.834800	1.874263	0.400773
1	1.602500	1.741627	0.403351
2	1.303600	1.512423	0.402062
3	1.127600	1.371974	0.474227
4	0.907600	1.217528	0.648196
5	0.620500	1.203499	0.597938
6	0.482500	1.072084	0.652062
7	0.358500	0.915036	0.716495
8	0.283100	0.806252	0.744845
9	0.245200	0.705146	0.771907
10	0.188800	0.903102	0.685567
11	0.184300	0.817190	0.738402
12	0.151500	0.759587	0.730670
13	0.132200	1.060012	0.649485
14	0.175100	1.044899	0.650773
15	0.097600	0.961159	0.694588
16	0.078100	1.333524	0.576031
17	0.062200	0.843753	0.713918
18	0.067600	0.761735	0.762887
19	0.056900	0.896792	0.712629
20	0.083600	1.133797	0.668814
21	0.064600	0.974416	0.702320
22	0.060700	1.119182	0.658505

23	0.054400	0.996483	0.712629
24	0.039200	1.016416	0.697165
25	0.054500	0.942935	0.722938
26	0.046900	1.450825	0.554124
27	0.073700	1.099505	0.672680
28	0.031500	1.058852	0.685567
29	0.027800	1.195361	0.662371

\*\*\*\*\* Running Evaluation \*\*\*\*\*

Num examples = 776

Batch size = 8

Saving model checkpoint to save/problem3/temp/microsoft/resnet-50\_\_5e-6\_\_submitted/checkpoint-111

Trainer.model is not a `PreTrainedModel`, only saving its state dict.

Feature extractor saved in save/problem3/temp/microsoft/resnet-50\_\_5e-6\_\_submitted/checkpoint-111/preprocessor\_config.json

Deleting older checkpoint [save/problem3/temp/microsoft/resnet-50\_\_5e-6\_\_submitted/checkpoint-555] due to args.save\_total\_limit

Deleting older checkpoint [save/problem3/temp/microsoft/resnet-50\_\_5e-6\_\_submitted/checkpoint-666] due to args.save\_total\_limit

\*\*\*\*\* Running Evaluation \*\*\*\*\*

Num examples = 776

Batch size = 8

Saving model checkpoint to save/problem3/temp/microsoft/resnet-50\_\_5e-6\_\_submitted/checkpoint-222

Trainer.model is not a `PreTrainedModel`, only saving its state dict.

Feature extractor saved in save/problem3/temp/microsoft/resnet-50\_\_5e-6\_\_submitted/checkpoint-222/preprocessor\_config.json

Deleting older checkpoint [save/problem3/temp/microsoft/resnet-50\_\_5e-6\_\_submitted/checkpoint-111] due to args.save\_total\_limit

\*\*\*\*\* Running Evaluation \*\*\*\*\*

Num examples = 776

Batch size = 8

Saving model checkpoint to save/problem3/temp/microsoft/resnet-50\_\_5e-6\_\_submitted/checkpoint-333

Trainer.model is not a `PreTrainedModel`, only saving its state dict.

Feature extractor saved in save/problem3/temp/microsoft/resnet-50\_\_5e-6\_\_submitted/checkpoint-333/preprocessor\_config.json

\*\*\*\*\* Running Evaluation \*\*\*\*\*

Num examples = 776

Batch size = 8

Saving model checkpoint to save/problem3/temp/microsoft/resnet-50\_\_5e-6\_\_submitted/checkpoint-444

Trainer.model is not a `PreTrainedModel`, only saving its state dict.

Feature extractor saved in save/problem3/temp/microsoft/resnet-50\_\_5e-6\_\_submitted/checkpoint-444/preprocessor\_config.json

Deleting older checkpoint [save/problem3/temp/microsoft/resnet-50\_\_5e-6\_\_submitted/checkpoint-222] due to args.save\_total\_limit

Deleting older checkpoint [save/problem3/temp/microsoft/resnet-50\_\_5e-6\_\_submitted/checkpoint-333] due to args.save\_total\_limit

\*\*\*\*\* Running Evaluation \*\*\*\*\*

Num examples = 776

Batch size = 8

Saving model checkpoint to save/problem3/temp/microsoft/resnet-50\_\_5e-6\_\_submitted/checkpoint-555

Trainer.model is not a `PreTrainedModel`, only saving its state dict.

Feature extractor saved in save/problem3/temp/microsoft/resnet-50\_\_5e-6\_\_submitted/checkpoint-555/preprocessor\_config.json

Deleting older checkpoint [save/problem3/temp/microsoft/resnet-50\_\_5e-6\_\_submitted/checkpoint-444] due to args.save\_total\_limit

\*\*\*\*\* Running Evaluation \*\*\*\*\*

```
Num examples = 776
Batch size = 8
Saving model checkpoint to save/problem3/temp/microsoft/resnet-50__5e-6__submitted/check
point-666
Trainer.model is not a `PreTrainedModel`, only saving its state dict.
Feature extractor saved in save/problem3/temp/microsoft/resnet-50__5e-6__submitted/check
point-666/preprocessor_config.json
***** Running Evaluation *****
  Num examples = 776
  Batch size = 8
Saving model checkpoint to save/problem3/temp/microsoft/resnet-50__5e-6__submitted/check
point-777
Trainer.model is not a `PreTrainedModel`, only saving its state dict.
Feature extractor saved in save/problem3/temp/microsoft/resnet-50__5e-6__submitted/check
point-777/preprocessor_config.json
Deleting older checkpoint [save/problem3/temp/microsoft/resnet-50__5e-6__submitted/check
point-555] due to args.save_total_limit
Deleting older checkpoint [save/problem3/temp/microsoft/resnet-50__5e-6__submitted/check
point-666] due to args.save_total_limit
***** Running Evaluation *****
  Num examples = 776
  Batch size = 8
Saving model checkpoint to save/problem3/temp/microsoft/resnet-50__5e-6__submitted/check
point-888
Trainer.model is not a `PreTrainedModel`, only saving its state dict.
Feature extractor saved in save/problem3/temp/microsoft/resnet-50__5e-6__submitted/check
point-888/preprocessor_config.json
Deleting older checkpoint [save/problem3/temp/microsoft/resnet-50__5e-6__submitted/check
point-777] due to args.save_total_limit
***** Running Evaluation *****
  Num examples = 776
  Batch size = 8
Saving model checkpoint to save/problem3/temp/microsoft/resnet-50__5e-6__submitted/check
point-999
Trainer.model is not a `PreTrainedModel`, only saving its state dict.
Feature extractor saved in save/problem3/temp/microsoft/resnet-50__5e-6__submitted/check
point-999/preprocessor_config.json
Deleting older checkpoint [save/problem3/temp/microsoft/resnet-50__5e-6__submitted/check
point-888] due to args.save_total_limit
***** Running Evaluation *****
  Num examples = 776
  Batch size = 8
Saving model checkpoint to save/problem3/temp/microsoft/resnet-50__5e-6__submitted/check
point-1110
Trainer.model is not a `PreTrainedModel`, only saving its state dict.
Feature extractor saved in save/problem3/temp/microsoft/resnet-50__5e-6__submitted/check
point-1110/preprocessor_config.json
Deleting older checkpoint [save/problem3/temp/microsoft/resnet-50__5e-6__submitted/check
point-999] due to args.save_total_limit
***** Running Evaluation *****
  Num examples = 776
  Batch size = 8
Saving model checkpoint to save/problem3/temp/microsoft/resnet-50__5e-6__submitted/check
point-1221
Trainer.model is not a `PreTrainedModel`, only saving its state dict.
Feature extractor saved in save/problem3/temp/microsoft/resnet-50__5e-6__submitted/check
point-1221/preprocessor_config.json
***** Running Evaluation *****
  Num examples = 776
  Batch size = 8
Saving model checkpoint to save/problem3/temp/microsoft/resnet-50__5e-6__submitted/check
point-1332
Trainer.model is not a `PreTrainedModel`, only saving its state dict.
Feature extractor saved in save/problem3/temp/microsoft/resnet-50__5e-6__submitted/check
point-1332/preprocessor_config.json
Deleting older checkpoint [save/problem3/temp/microsoft/resnet-50__5e-6__submitted/check
```

```
point-1221] due to args.save_total_limit
***** Running Evaluation *****
  Num examples = 776
  Batch size = 8
Saving model checkpoint to save/problem3/temp/microsoft/resnet-50__5e-6__submitted/check
point-1443
Trainer.model is not a `PreTrainedModel`, only saving its state dict.
Feature extractor saved in save/problem3/temp/microsoft/resnet-50__5e-6__submitted/check
point-1443/preprocessor_config.json
Deleting older checkpoint [save/problem3/temp/microsoft/resnet-50__5e-6__submitted/check
point-1332] due to args.save_total_limit
***** Running Evaluation *****
  Num examples = 776
  Batch size = 8
Saving model checkpoint to save/problem3/temp/microsoft/resnet-50__5e-6__submitted/check
point-1554
Trainer.model is not a `PreTrainedModel`, only saving its state dict.
Feature extractor saved in save/problem3/temp/microsoft/resnet-50__5e-6__submitted/check
point-1554/preprocessor_config.json
Deleting older checkpoint [save/problem3/temp/microsoft/resnet-50__5e-6__submitted/check
point-1443] due to args.save_total_limit
***** Running Evaluation *****
  Num examples = 776
  Batch size = 8
Saving model checkpoint to save/problem3/temp/microsoft/resnet-50__5e-6__submitted/check
point-1665
Trainer.model is not a `PreTrainedModel`, only saving its state dict.
Feature extractor saved in save/problem3/temp/microsoft/resnet-50__5e-6__submitted/check
point-1665/preprocessor_config.json
Deleting older checkpoint [save/problem3/temp/microsoft/resnet-50__5e-6__submitted/check
point-1554] due to args.save_total_limit
***** Running Evaluation *****
  Num examples = 776
  Batch size = 8
Saving model checkpoint to save/problem3/temp/microsoft/resnet-50__5e-6__submitted/check
point-1776
Trainer.model is not a `PreTrainedModel`, only saving its state dict.
Feature extractor saved in save/problem3/temp/microsoft/resnet-50__5e-6__submitted/check
point-1776/preprocessor_config.json
Deleting older checkpoint [save/problem3/temp/microsoft/resnet-50__5e-6__submitted/check
point-1665] due to args.save_total_limit
***** Running Evaluation *****
  Num examples = 776
  Batch size = 8
Saving model checkpoint to save/problem3/temp/microsoft/resnet-50__5e-6__submitted/check
point-1887
Trainer.model is not a `PreTrainedModel`, only saving its state dict.
Feature extractor saved in save/problem3/temp/microsoft/resnet-50__5e-6__submitted/check
point-1887/preprocessor_config.json
Deleting older checkpoint [save/problem3/temp/microsoft/resnet-50__5e-6__submitted/check
point-1776] due to args.save_total_limit
***** Running Evaluation *****
  Num examples = 776
  Batch size = 8
Saving model checkpoint to save/problem3/temp/microsoft/resnet-50__5e-6__submitted/check
point-1998
Trainer.model is not a `PreTrainedModel`, only saving its state dict.
Feature extractor saved in save/problem3/temp/microsoft/resnet-50__5e-6__submitted/check
point-1998/preprocessor_config.json
Deleting older checkpoint [save/problem3/temp/microsoft/resnet-50__5e-6__submitted/check
point-1887] due to args.save_total_limit
***** Running Evaluation *****
  Num examples = 776
  Batch size = 8
Saving model checkpoint to save/problem3/temp/microsoft/resnet-50__5e-6__submitted/check
point-2109
```

```
Trainer.model is not a `PreTrainedModel`, only saving its state dict.
Feature extractor saved in save/problem3/temp/microsoft/resnet-50__5e-6__submitted/check
point-2109/preprocessor_config.json
Deleting older checkpoint [save/problem3/temp/microsoft/resnet-50__5e-6__submitted/check
point-1998] due to args.save_total_limit
***** Running Evaluation *****
  Num examples = 776
  Batch size = 8
Saving model checkpoint to save/problem3/temp/microsoft/resnet-50__5e-6__submitted/check
point-2220
Trainer.model is not a `PreTrainedModel`, only saving its state dict.
Feature extractor saved in save/problem3/temp/microsoft/resnet-50__5e-6__submitted/check
point-2220/preprocessor_config.json
Deleting older checkpoint [save/problem3/temp/microsoft/resnet-50__5e-6__submitted/check
point-2109] due to args.save_total_limit
***** Running Evaluation *****
  Num examples = 776
  Batch size = 8
Saving model checkpoint to save/problem3/temp/microsoft/resnet-50__5e-6__submitted/check
point-2331
Trainer.model is not a `PreTrainedModel`, only saving its state dict.
Feature extractor saved in save/problem3/temp/microsoft/resnet-50__5e-6__submitted/check
point-2331/preprocessor_config.json
Deleting older checkpoint [save/problem3/temp/microsoft/resnet-50__5e-6__submitted/check
point-2220] due to args.save_total_limit
***** Running Evaluation *****
  Num examples = 776
  Batch size = 8
Saving model checkpoint to save/problem3/temp/microsoft/resnet-50__5e-6__submitted/check
point-2442
Trainer.model is not a `PreTrainedModel`, only saving its state dict.
Feature extractor saved in save/problem3/temp/microsoft/resnet-50__5e-6__submitted/check
point-2442/preprocessor_config.json
Deleting older checkpoint [save/problem3/temp/microsoft/resnet-50__5e-6__submitted/check
point-2331] due to args.save_total_limit
***** Running Evaluation *****
  Num examples = 776
  Batch size = 8
Saving model checkpoint to save/problem3/temp/microsoft/resnet-50__5e-6__submitted/check
point-2553
Trainer.model is not a `PreTrainedModel`, only saving its state dict.
Feature extractor saved in save/problem3/temp/microsoft/resnet-50__5e-6__submitted/check
point-2553/preprocessor_config.json
Deleting older checkpoint [save/problem3/temp/microsoft/resnet-50__5e-6__submitted/check
point-2442] due to args.save_total_limit
***** Running Evaluation *****
  Num examples = 776
  Batch size = 8
Saving model checkpoint to save/problem3/temp/microsoft/resnet-50__5e-6__submitted/check
point-2664
Trainer.model is not a `PreTrainedModel`, only saving its state dict.
Feature extractor saved in save/problem3/temp/microsoft/resnet-50__5e-6__submitted/check
point-2664/preprocessor_config.json
Deleting older checkpoint [save/problem3/temp/microsoft/resnet-50__5e-6__submitted/check
point-2553] due to args.save_total_limit
***** Running Evaluation *****
  Num examples = 776
  Batch size = 8
Saving model checkpoint to save/problem3/temp/microsoft/resnet-50__5e-6__submitted/check
point-2775
Trainer.model is not a `PreTrainedModel`, only saving its state dict.
Feature extractor saved in save/problem3/temp/microsoft/resnet-50__5e-6__submitted/check
point-2775/preprocessor_config.json
Deleting older checkpoint [save/problem3/temp/microsoft/resnet-50__5e-6__submitted/check
point-2664] due to args.save_total_limit
***** Running Evaluation *****
```

```

Num examples = 776
Batch size = 8
Saving model checkpoint to save/problem3/temp/microsoft/resnet-50__5e-6__submitted/checkpoint-2886
Trainer.model is not a `PreTrainedModel`, only saving its state dict.
Feature extractor saved in save/problem3/temp/microsoft/resnet-50__5e-6__submitted/checkpoint-2886/preprocessor_config.json
Deleting older checkpoint [save/problem3/temp/microsoft/resnet-50__5e-6__submitted/checkpoint-2775] due to args.save_total_limit
***** Running Evaluation *****
  Num examples = 776
  Batch size = 8
Saving model checkpoint to save/problem3/temp/microsoft/resnet-50__5e-6__submitted/checkpoint-2997
Trainer.model is not a `PreTrainedModel`, only saving its state dict.
Feature extractor saved in save/problem3/temp/microsoft/resnet-50__5e-6__submitted/checkpoint-2997/preprocessor_config.json
Deleting older checkpoint [save/problem3/temp/microsoft/resnet-50__5e-6__submitted/checkpoint-2886] due to args.save_total_limit
***** Running Evaluation *****
  Num examples = 776
  Batch size = 8
Saving model checkpoint to save/problem3/temp/microsoft/resnet-50__5e-6__submitted/checkpoint-3108
Trainer.model is not a `PreTrainedModel`, only saving its state dict.
Feature extractor saved in save/problem3/temp/microsoft/resnet-50__5e-6__submitted/checkpoint-3108/preprocessor_config.json
Deleting older checkpoint [save/problem3/temp/microsoft/resnet-50__5e-6__submitted/checkpoint-2997] due to args.save_total_limit
***** Running Evaluation *****
  Num examples = 776
  Batch size = 8
Saving model checkpoint to save/problem3/temp/microsoft/resnet-50__5e-6__submitted/checkpoint-3219
Trainer.model is not a `PreTrainedModel`, only saving its state dict.
Feature extractor saved in save/problem3/temp/microsoft/resnet-50__5e-6__submitted/checkpoint-3219/preprocessor_config.json
Deleting older checkpoint [save/problem3/temp/microsoft/resnet-50__5e-6__submitted/checkpoint-3108] due to args.save_total_limit
***** Running Evaluation *****
  Num examples = 776
  Batch size = 8
Saving model checkpoint to save/problem3/temp/microsoft/resnet-50__5e-6__submitted/checkpoint-3330
Trainer.model is not a `PreTrainedModel`, only saving its state dict.
Feature extractor saved in save/problem3/temp/microsoft/resnet-50__5e-6__submitted/checkpoint-3330/preprocessor_config.json
Deleting older checkpoint [save/problem3/temp/microsoft/resnet-50__5e-6__submitted/checkpoint-3219] due to args.save_total_limit

Training completed. Do not forget to share your model on huggingface.co/models =)

Loading best model from save/problem3/temp/microsoft/resnet-50__5e-6__submitted/checkpoint-1110 (score: 0.7719072164948454).
Saving model checkpoint to save/problem3/temp/microsoft/resnet-50__5e-6__submitted
Trainer.model is not a `PreTrainedModel`, only saving its state dict.
Feature extractor saved in save/problem3/temp/microsoft/resnet-50__5e-6__submitted/preprocessor_config.json

```

```

In [28]: evaluation(
          temporal_trainer,
          datasets=[proc_datasets["valid"]],

```



```
eval_names=["problem3_datas__valid"]  
)
```

```
***** Running Evaluation *****
```

```
Num examples = 776
```

```
Batch size = 8
```

```
[97/97 00:07]
```

```
***** problem3_datas__valid metrics *****
```

```
epoch = 29.99
```

```
eval_accuracy = 0.7719
```

```
eval_loss = 0.7051
```

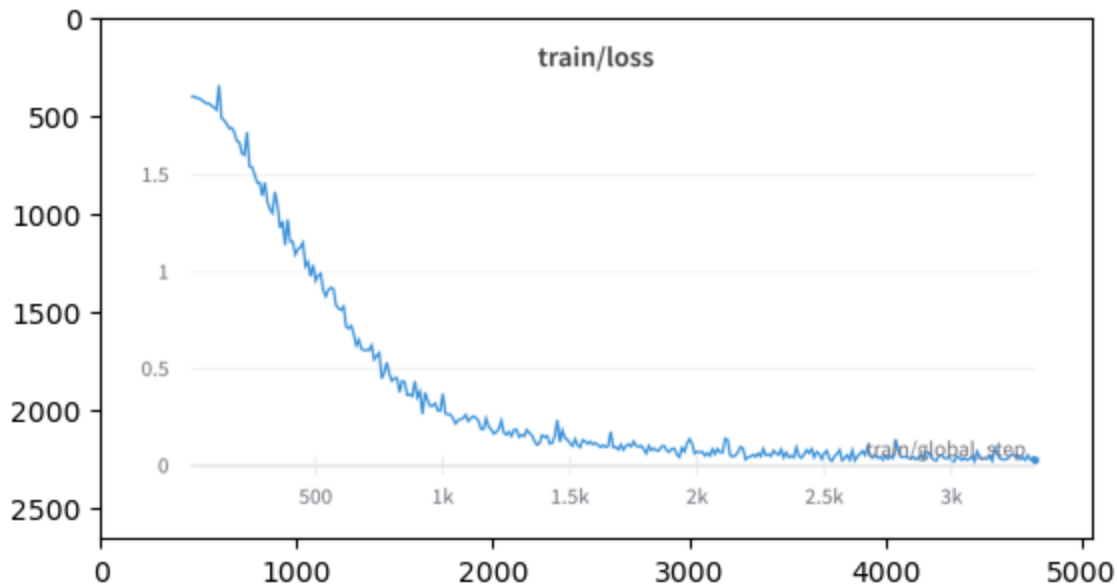
```
eval_runtime = 0:00:08.24
```

```
eval_samples_per_second = 94.152
```

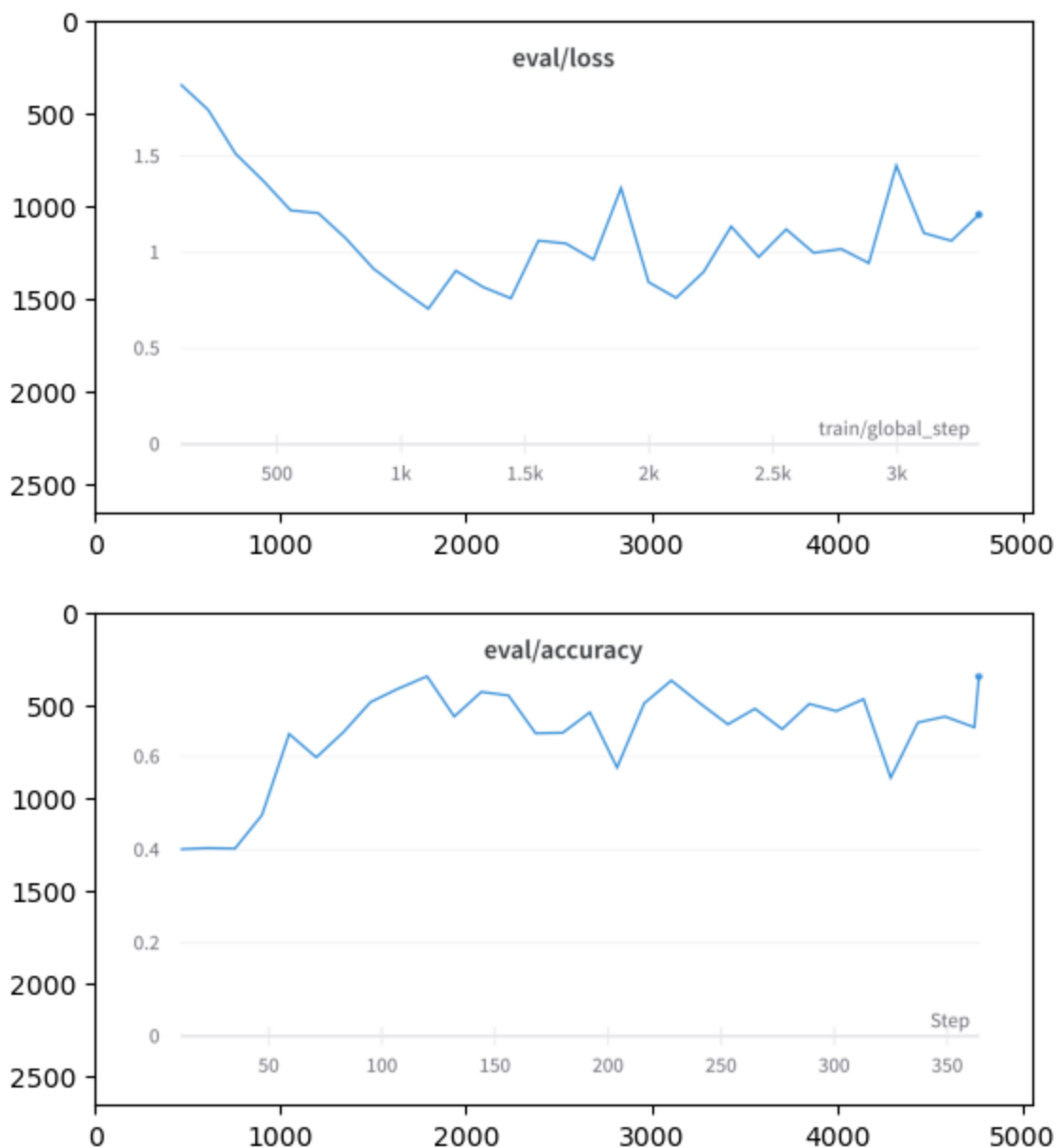
```
eval_steps_per_second = 11.769
```

```
In [48]: plt.figure()  
img = mpimg.imread("./log/problem3/exp3/exp3_train_loss.png")  
plt.imshow(img)  
  
plt.figure()  
img = mpimg.imread("./log/problem3/exp3/exp3_valid_loss.png")  
plt.imshow(img)  
  
plt.figure()  
img = mpimg.imread("./log/problem3/exp3/exp3_valid_acc.png")  
plt.imshow(img)
```

```
Out[48]: <matplotlib.image.AxesImage at 0x7f6aaf9a0880>
```







## Experiment 4: Temporal Surgical Phase Recognition (Bidirectional)

```
In [25]: exp4_img_enc = AutoModelForImageClassification.from_pretrained(f"save/problem3/nontemp/{
```

```
In [26]: exp4_temporal_lstm = TemporalLSTM(bidirectional=True)
```

```
/home/holy/anaconda3/envs/health/lib/python3.10/site-packages/torch/nn/modules/rnn.py:6
2: UserWarning: dropout option adds dropout after all but last recurrent layer, so non-z
ero dropout expects num_layers greater than 1, but got dropout=1 and num_layers=1
warnings.warn("dropout option adds dropout after all but last ")
```

```
In [27]: exp4_temporal_network = TemporalNetwork(exp4_img_enc, exp4_temporal_lstm)
```

```
In [29]: temporal_trainer = temporal_training(
    exp4_temporal_network,
    output_dir=f"save/problem3/temp/{model_name_or_path}_5e-6_bidir_submitted",
    train_dataset=proc_datasets["train"],
    eval_dataset=proc_datasets["valid"],
    trainer_class=TemporalTrainer)
```

```
Using cuda_amp half precision backend
/home/holy/anaconda3/envs/health/lib/python3.10/site-packages/transformers/optimization.
py:306: FutureWarning: This implementation of AdamW is deprecated and will be removed in
```

```

a future version. Use the PyTorch implementation torch.optim.AdamW instead, or set `no_deprecation_warning=True` to disable this warning
warnings.warn(
**** Running training ****
Num examples = 3570
Num Epochs = 200
Instantaneous batch size per device = 8
Total train batch size (w. parallel, distributed & accumulation) = 32
Gradient Accumulation steps = 4
Total optimization steps = 22200
Automatic Weights & Biases logging enabled, to disable set os.environ["WANDB_DISABLED"] = "true"
wandb: Currently logged in as: holylovenia. Use `wandb login --relogin` to force relogin

```

Tracking run with wandb version 0.13.4

Run data is saved locally in /home/holy/projects/ai-healthcare/assignment1/wandb/run-20221017\_195405-6zfhrsrd

Syncing run [save/problem3/temp/microsoft/resnet-50\\_\\_5e-6\\_\\_bidir\\_\\_submitted](#) to [Weights & Biases \(docs\)](#)

 [ 4329/22200 1:50:13 < 7:35:14, 0.65 it/s, Epoch 38/200]

Epoch	Training Loss	Validation Loss	Accuracy
0	1.922700	1.952911	0.145619
1	1.709200	1.806201	0.400773
2	1.400100	1.586491	0.402062
3	1.186300	1.428943	0.429124
4	0.992100	1.280210	0.632732
5	0.693000	1.237411	0.622423
6	0.562800	1.104077	0.699742
7	0.419200	0.956506	0.730670
8	0.330700	0.843106	0.742268
9	0.295200	0.731348	0.748711
10	0.226100	0.917398	0.697165
11	0.209400	0.799662	0.738402
12	0.174200	0.738602	0.755155
13	0.145300	1.032150	0.668814
14	0.186900	0.986800	0.663660
15	0.108500	0.913568	0.699742
16	0.086300	1.230696	0.596649
17	0.069000	0.796499	0.722938
18	0.068900	0.684021	0.773196
19	0.059000	0.832868	0.722938
20	0.082500	1.019022	0.682990
21	0.064200	0.885326	0.707474
22	0.057900	1.017704	0.671392
23	0.050000	0.900107	0.719072
24	0.036700	0.916763	0.695876
25	0.046200	0.841077	0.733247

26	0.041300	1.319202	0.581186
27	0.070600	0.961975	0.703608
28	0.025700	0.944233	0.699742
29	0.023800	1.086383	0.672680
30	0.033100	1.021702	0.685567
31	0.036400	0.928667	0.728093
32	0.020100	1.155258	0.664948
33	0.029800	0.929399	0.711340
34	0.019700	1.548784	0.506443
35	0.036900	0.896597	0.731959
36	0.022800	0.977328	0.693299
37	0.030800	1.023089	0.701031
38	0.016400	1.035421	0.692010

\*\*\*\*\* Running Evaluation \*\*\*\*\*

Num examples = 776

Batch size = 8

Saving model checkpoint to save/problem3/temp/microsoft/resnet-50\_\_5e-6\_\_bidir\_\_submitted/checkpoint-111

Trainer.model is not a `PreTrainedModel`, only saving its state dict.

Feature extractor saved in save/problem3/temp/microsoft/resnet-50\_\_5e-6\_\_bidir\_\_submitted/checkpoint-111/preprocessor\_config.json

\*\*\*\*\* Running Evaluation \*\*\*\*\*

Num examples = 776

Batch size = 8

Saving model checkpoint to save/problem3/temp/microsoft/resnet-50\_\_5e-6\_\_bidir\_\_submitted/checkpoint-222

Trainer.model is not a `PreTrainedModel`, only saving its state dict.

Feature extractor saved in save/problem3/temp/microsoft/resnet-50\_\_5e-6\_\_bidir\_\_submitted/checkpoint-222/preprocessor\_config.json

Deleting older checkpoint [save/problem3/temp/microsoft/resnet-50\_\_5e-6\_\_bidir\_\_submitted/checkpoint-111] due to args.save\_total\_limit

\*\*\*\*\* Running Evaluation \*\*\*\*\*

Num examples = 776

Batch size = 8

Saving model checkpoint to save/problem3/temp/microsoft/resnet-50\_\_5e-6\_\_bidir\_\_submitted/checkpoint-333

Trainer.model is not a `PreTrainedModel`, only saving its state dict.

Feature extractor saved in save/problem3/temp/microsoft/resnet-50\_\_5e-6\_\_bidir\_\_submitted/checkpoint-333/preprocessor\_config.json

Deleting older checkpoint [save/problem3/temp/microsoft/resnet-50\_\_5e-6\_\_bidir\_\_submitted/checkpoint-222] due to args.save\_total\_limit

\*\*\*\*\* Running Evaluation \*\*\*\*\*

Num examples = 776

Batch size = 8

Saving model checkpoint to save/problem3/temp/microsoft/resnet-50\_\_5e-6\_\_bidir\_\_submitted/checkpoint-444

Trainer.model is not a `PreTrainedModel`, only saving its state dict.

Feature extractor saved in save/problem3/temp/microsoft/resnet-50\_\_5e-6\_\_bidir\_\_submitted/checkpoint-444/preprocessor\_config.json

Deleting older checkpoint [save/problem3/temp/microsoft/resnet-50\_\_5e-6\_\_bidir\_\_submitted/checkpoint-333] due to args.save\_total\_limit

\*\*\*\*\* Running Evaluation \*\*\*\*\*

Num examples = 776

Batch size = 8

Saving model checkpoint to save/problem3/temp/microsoft/resnet-50\_\_5e-6\_\_bidir\_\_submitted/checkpoint-555

Trainer.model is not a `PreTrainedModel`, only saving its state dict.

```
Feature extractor saved in save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-555/preprocessor_config.json
Deleting older checkpoint [save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-444] due to args.save_total_limit
***** Running Evaluation *****
  Num examples = 776
  Batch size = 8
Saving model checkpoint to save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-666
Trainer.model is not a `PreTrainedModel`, only saving its state dict.
Feature extractor saved in save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-666/preprocessor_config.json
***** Running Evaluation *****
  Num examples = 776
  Batch size = 8
Saving model checkpoint to save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-777
Trainer.model is not a `PreTrainedModel`, only saving its state dict.
Feature extractor saved in save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-777/preprocessor_config.json
Deleting older checkpoint [save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-555] due to args.save_total_limit
Deleting older checkpoint [save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-666] due to args.save_total_limit
***** Running Evaluation *****
  Num examples = 776
  Batch size = 8
Saving model checkpoint to save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-888
Trainer.model is not a `PreTrainedModel`, only saving its state dict.
Feature extractor saved in save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-888/preprocessor_config.json
Deleting older checkpoint [save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-777] due to args.save_total_limit
***** Running Evaluation *****
  Num examples = 776
  Batch size = 8
Saving model checkpoint to save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-999
Trainer.model is not a `PreTrainedModel`, only saving its state dict.
Feature extractor saved in save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-999/preprocessor_config.json
Deleting older checkpoint [save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-888] due to args.save_total_limit
***** Running Evaluation *****
  Num examples = 776
  Batch size = 8
Saving model checkpoint to save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-1110
Trainer.model is not a `PreTrainedModel`, only saving its state dict.
Feature extractor saved in save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-1110/preprocessor_config.json
Deleting older checkpoint [save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-999] due to args.save_total_limit
***** Running Evaluation *****
  Num examples = 776
  Batch size = 8
Saving model checkpoint to save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-1221
Trainer.model is not a `PreTrainedModel`, only saving its state dict.
Feature extractor saved in save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-1221/preprocessor_config.json
***** Running Evaluation *****
  Num examples = 776
  Batch size = 8
Saving model checkpoint to save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
```

```
d/checkpoint-1332
Trainer.model is not a `PreTrainedModel`, only saving its state dict.
Feature extractor saved in save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-1332/preprocessor_config.json
Deleting older checkpoint [save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-1221] due to args.save_total_limit
***** Running Evaluation *****
  Num examples = 776
  Batch size = 8
Saving model checkpoint to save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-1443
Trainer.model is not a `PreTrainedModel`, only saving its state dict.
Feature extractor saved in save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-1443/preprocessor_config.json
Deleting older checkpoint [save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-1110] due to args.save_total_limit
Deleting older checkpoint [save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-1332] due to args.save_total_limit
***** Running Evaluation *****
  Num examples = 776
  Batch size = 8
Saving model checkpoint to save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-1554
Trainer.model is not a `PreTrainedModel`, only saving its state dict.
Feature extractor saved in save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-1554/preprocessor_config.json
***** Running Evaluation *****
  Num examples = 776
  Batch size = 8
Saving model checkpoint to save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-1665
Trainer.model is not a `PreTrainedModel`, only saving its state dict.
Feature extractor saved in save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-1665/preprocessor_config.json
Deleting older checkpoint [save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-1554] due to args.save_total_limit
***** Running Evaluation *****
  Num examples = 776
  Batch size = 8
Saving model checkpoint to save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-1776
Trainer.model is not a `PreTrainedModel`, only saving its state dict.
Feature extractor saved in save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-1776/preprocessor_config.json
Deleting older checkpoint [save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-1665] due to args.save_total_limit
***** Running Evaluation *****
  Num examples = 776
  Batch size = 8
Saving model checkpoint to save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-1887
Trainer.model is not a `PreTrainedModel`, only saving its state dict.
Feature extractor saved in save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-1887/preprocessor_config.json
Deleting older checkpoint [save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-1776] due to args.save_total_limit
***** Running Evaluation *****
  Num examples = 776
  Batch size = 8
Saving model checkpoint to save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-1998
Trainer.model is not a `PreTrainedModel`, only saving its state dict.
Feature extractor saved in save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-1998/preprocessor_config.json
Deleting older checkpoint [save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-1887] due to args.save_total_limit
```

```
***** Running Evaluation *****
  Num examples = 776
  Batch size = 8
Saving model checkpoint to save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-2109
Trainer.model is not a `PreTrainedModel`, only saving its state dict.
Feature extractor saved in save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-2109/preprocessor_config.json
Deleting older checkpoint [save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-1443] due to args.save_total_limit
Deleting older checkpoint [save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-1998] due to args.save_total_limit
***** Running Evaluation *****
  Num examples = 776
  Batch size = 8
Saving model checkpoint to save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-2220
Trainer.model is not a `PreTrainedModel`, only saving its state dict.
Feature extractor saved in save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-2220/preprocessor_config.json
***** Running Evaluation *****
  Num examples = 776
  Batch size = 8
Saving model checkpoint to save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-2331
Trainer.model is not a `PreTrainedModel`, only saving its state dict.
Feature extractor saved in save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-2331/preprocessor_config.json
Deleting older checkpoint [save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-2220] due to args.save_total_limit
***** Running Evaluation *****
  Num examples = 776
  Batch size = 8
Saving model checkpoint to save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-2442
Trainer.model is not a `PreTrainedModel`, only saving its state dict.
Feature extractor saved in save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-2442/preprocessor_config.json
Deleting older checkpoint [save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-2331] due to args.save_total_limit
***** Running Evaluation *****
  Num examples = 776
  Batch size = 8
Saving model checkpoint to save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-2553
Trainer.model is not a `PreTrainedModel`, only saving its state dict.
Feature extractor saved in save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-2553/preprocessor_config.json
Deleting older checkpoint [save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-2442] due to args.save_total_limit
***** Running Evaluation *****
  Num examples = 776
  Batch size = 8
Saving model checkpoint to save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-2664
Trainer.model is not a `PreTrainedModel`, only saving its state dict.
Feature extractor saved in save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-2664/preprocessor_config.json
Deleting older checkpoint [save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-2553] due to args.save_total_limit
***** Running Evaluation *****
  Num examples = 776
  Batch size = 8
Saving model checkpoint to save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-2775
Trainer.model is not a `PreTrainedModel`, only saving its state dict.
```



```
Feature extractor saved in save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-2775/preprocessor_config.json
Deleting older checkpoint [save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-2664] due to args.save_total_limit
***** Running Evaluation *****
  Num examples = 776
  Batch size = 8
Saving model checkpoint to save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-2886
Trainer.model is not a `PreTrainedModel`, only saving its state dict.
Feature extractor saved in save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-2886/preprocessor_config.json
Deleting older checkpoint [save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-2775] due to args.save_total_limit
***** Running Evaluation *****
  Num examples = 776
  Batch size = 8
Saving model checkpoint to save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-2997
Trainer.model is not a `PreTrainedModel`, only saving its state dict.
Feature extractor saved in save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-2997/preprocessor_config.json
Deleting older checkpoint [save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-2886] due to args.save_total_limit
***** Running Evaluation *****
  Num examples = 776
  Batch size = 8
Saving model checkpoint to save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-3108
Trainer.model is not a `PreTrainedModel`, only saving its state dict.
Feature extractor saved in save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-3108/preprocessor_config.json
Deleting older checkpoint [save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-2997] due to args.save_total_limit
***** Running Evaluation *****
  Num examples = 776
  Batch size = 8
Saving model checkpoint to save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-3219
Trainer.model is not a `PreTrainedModel`, only saving its state dict.
Feature extractor saved in save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-3219/preprocessor_config.json
Deleting older checkpoint [save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-3108] due to args.save_total_limit
***** Running Evaluation *****
  Num examples = 776
  Batch size = 8
Saving model checkpoint to save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-3330
Trainer.model is not a `PreTrainedModel`, only saving its state dict.
Feature extractor saved in save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-3330/preprocessor_config.json
Deleting older checkpoint [save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-3219] due to args.save_total_limit
***** Running Evaluation *****
  Num examples = 776
  Batch size = 8
Saving model checkpoint to save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-3441
Trainer.model is not a `PreTrainedModel`, only saving its state dict.
Feature extractor saved in save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-3441/preprocessor_config.json
Deleting older checkpoint [save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-3330] due to args.save_total_limit
***** Running Evaluation *****
  Num examples = 776
```



```
Batch size = 8
Saving model checkpoint to save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-3552
Trainer.model is not a `PreTrainedModel`, only saving its state dict.
Feature extractor saved in save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-3552/preprocessor_config.json
Deleting older checkpoint [save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-3441] due to args.save_total_limit
***** Running Evaluation *****
  Num examples = 776
  Batch size = 8
Saving model checkpoint to save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-3663
Trainer.model is not a `PreTrainedModel`, only saving its state dict.
Feature extractor saved in save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-3663/preprocessor_config.json
Deleting older checkpoint [save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-3552] due to args.save_total_limit
***** Running Evaluation *****
  Num examples = 776
  Batch size = 8
Saving model checkpoint to save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-3774
Trainer.model is not a `PreTrainedModel`, only saving its state dict.
Feature extractor saved in save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-3774/preprocessor_config.json
Deleting older checkpoint [save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-3663] due to args.save_total_limit
***** Running Evaluation *****
  Num examples = 776
  Batch size = 8
Saving model checkpoint to save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-3885
Trainer.model is not a `PreTrainedModel`, only saving its state dict.
Feature extractor saved in save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-3885/preprocessor_config.json
Deleting older checkpoint [save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-3774] due to args.save_total_limit
***** Running Evaluation *****
  Num examples = 776
  Batch size = 8
Saving model checkpoint to save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-3996
Trainer.model is not a `PreTrainedModel`, only saving its state dict.
Feature extractor saved in save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-3996/preprocessor_config.json
Deleting older checkpoint [save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-3885] due to args.save_total_limit
***** Running Evaluation *****
  Num examples = 776
  Batch size = 8
Saving model checkpoint to save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-4107
Trainer.model is not a `PreTrainedModel`, only saving its state dict.
Feature extractor saved in save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-4107/preprocessor_config.json
Deleting older checkpoint [save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-3996] due to args.save_total_limit
***** Running Evaluation *****
  Num examples = 776
  Batch size = 8
Saving model checkpoint to save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-4218
Trainer.model is not a `PreTrainedModel`, only saving its state dict.
Feature extractor saved in save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-4218/preprocessor_config.json
```

```
Deleting older checkpoint [save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-4107] due to args.save_total_limit
***** Running Evaluation *****
  Num examples = 776
  Batch size = 8
Saving model checkpoint to save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-4329
Trainer.model is not a `PreTrainedModel`, only saving its state dict.
Feature extractor saved in save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-4329/preprocessor_config.json
Deleting older checkpoint [save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/checkpoint-4218] due to args.save_total_limit
```

Training completed. Do not forget to share your model on [huggingface.co/models](https://huggingface.co/models) =)

```
Loading best model from save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitted/c
heckpoint-2109 (score: 0.7731958762886598).
Saving model checkpoint to save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d
Trainer.model is not a `PreTrainedModel`, only saving its state dict.
Feature extractor saved in save/problem3/temp/microsoft/resnet-50__5e-6__bidir__submitte
d/preprocessor_config.json
```

```
In [31]: evaluation(
        temporal_trainer,
        datasets=[proc_datasets["valid"]],
        eval_names=["problem3_datas__valid"]
    )
```

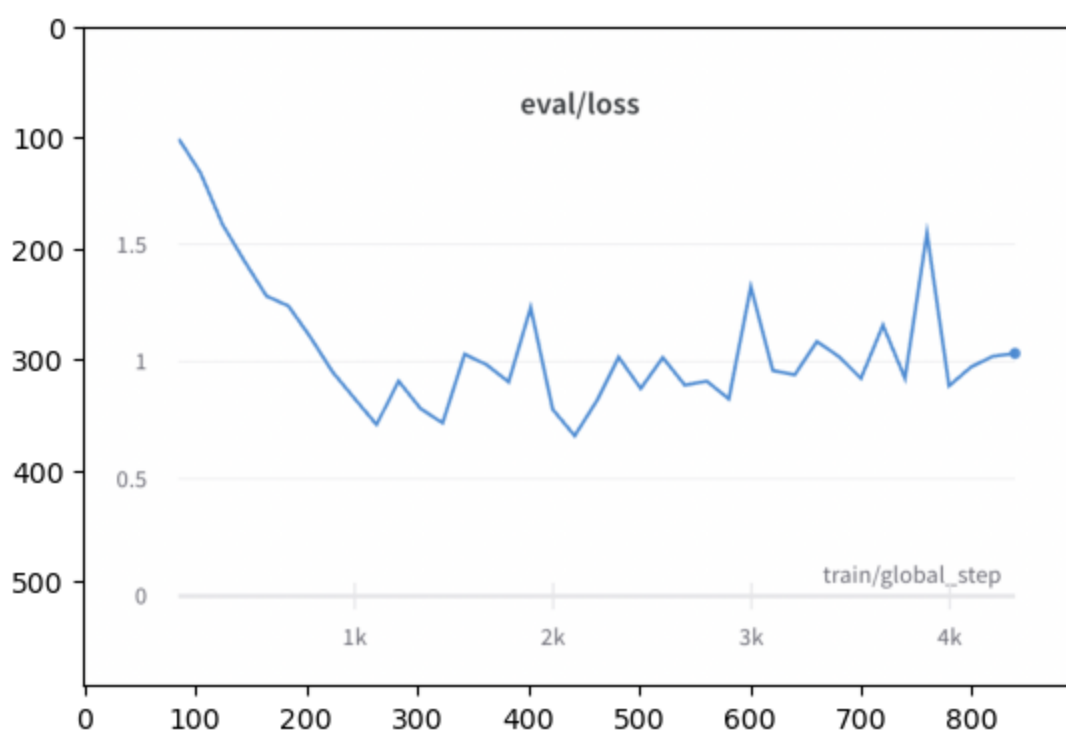
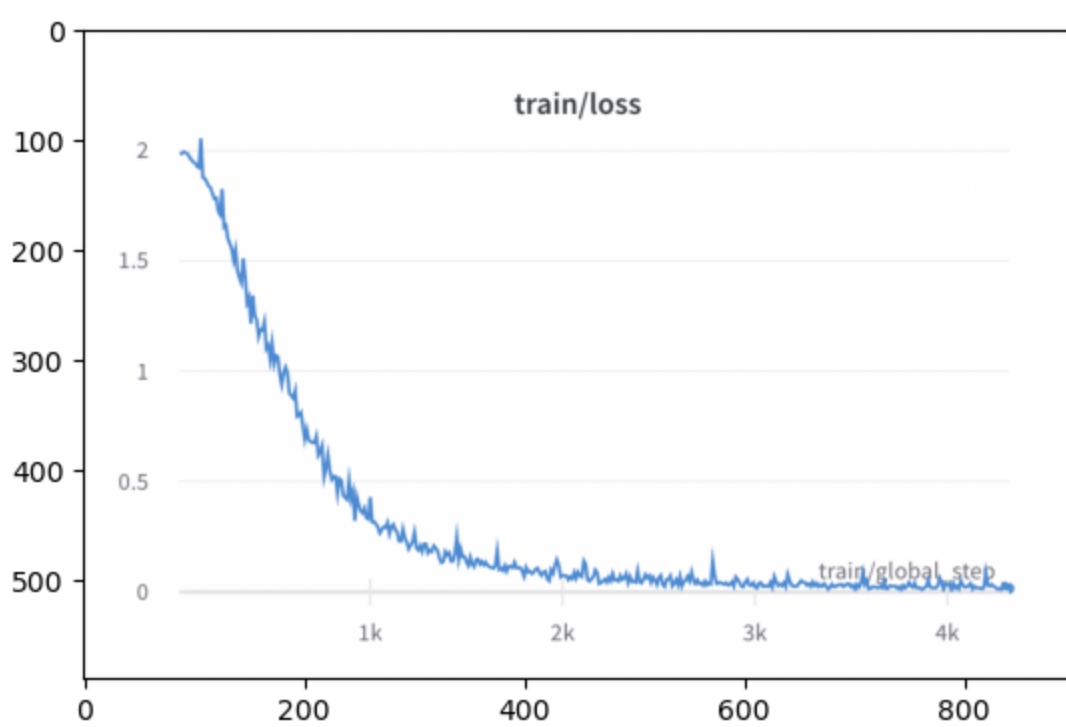
```
***** Running Evaluation *****
  Num examples = 776
  Batch size = 8
***** problem3_datas__valid metrics *****
epoch                =      38.99
eval_accuracy        =      0.7706
eval_loss            =      0.6863
eval_runtime         = 0:00:09.06
eval_samples_per_second =      85.628
eval_steps_per_second   =     10.704
```

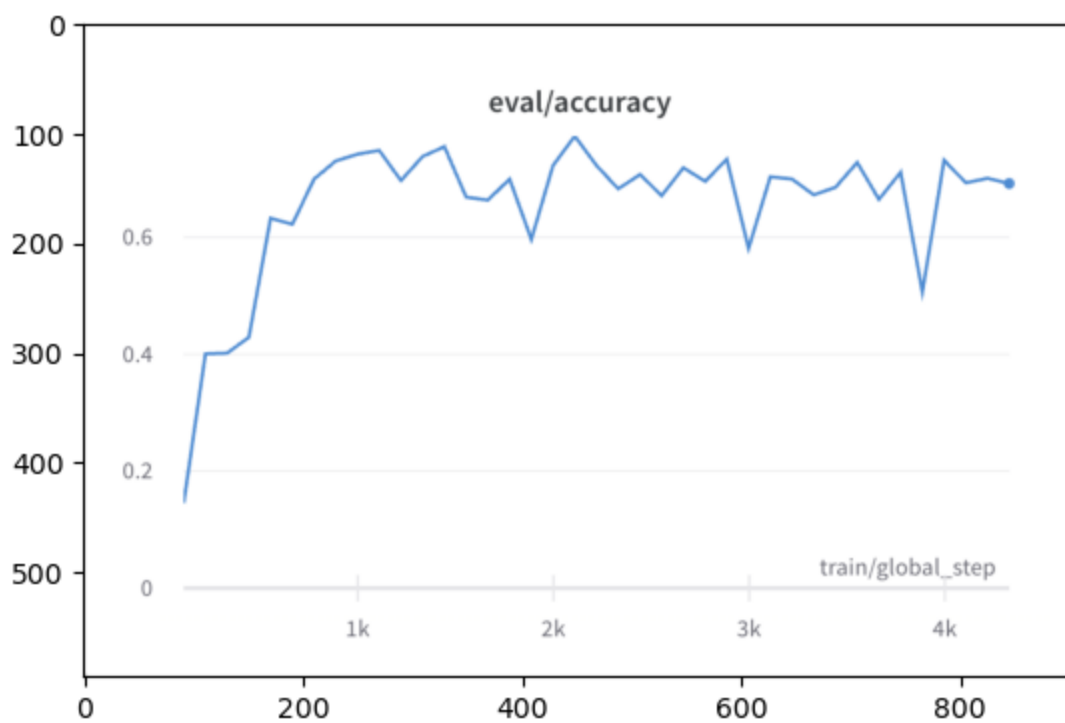
```
In [32]: plt.figure()
img = mpimg.imread("./log/problem3/exp4/exp4_train_loss.png")
plt.imshow(img)

plt.figure()
img = mpimg.imread("./log/problem3/exp4/exp4_valid_loss.png")
plt.imshow(img)

plt.figure()
img = mpimg.imread("./log/problem3/exp4/exp4_valid_acc.png")
plt.imshow(img)
```

```
Out[32]: <matplotlib.image.AxesImage at 0x7f36b0355570>
```





## Conclusion

Exp. ID	Exp. Setting	Eval. Acc.
1	Non-Temporal Surgical Phase Recognition (Non-Weighted, LSTM)	76.42%
2	Non-Temporal Surgical Phase Recognition (Weighted, LSTM)	72.68%
3	Temporal Surgical Phase Recognition (Non-Weighted, LSTM)	<b>77.19%</b>
4	Temporal Surgical Phase Recognition (Non-Weighted, Bidirectional LSTM)	<u>77.06%</u>

In this notebook, I have:

- 1) tried out 4 different experiment configurations (including non-temporal and temporal recognition);
- 2) reported the results (i.e., train loss, eval loss, and eval accuracy); and
- 3) achieved a best performance of 77.06% using ResNet-50 + LSTM (through Experiment 4) for surgical phase recognition.