

```
train, test, id2label, label2id = VisionDataset.fromImageFolder(
    "./hirise-map-proj-v3/data/",
    test_ratio = 0.15,
    balanced = False,
    augmentation = True,
);
```

C:\Anaconda\envs\CEML\lib\site-packages\tqdm\auto.py:22: TqdmWarning: IPProgress not found. Please update jupyter and ipywidgets. See https://ipywidgets.readthedocs.io/en/stable/user_install.html

```
from .autonotebook import tqdm as notebook_tqdm
```

C:\Anaconda\envs\CEML\lib\site-packages\torchvision\transforms\transforms.py:333: UserWarning: Argument interpolation should be of type InterpolationMode instead of int. Please, use InterpolationMode enum.

"Argument interpolation should be of type InterpolationMode instead of int. "

C:\Anaconda\envs\CEML\lib\site-packages\torchvision\transforms\transforms.py:333: UserWarning: Argument interpolation should be of type InterpolationMode instead of int. Please, use InterpolationMode enum.

"Argument interpolation should be of type InterpolationMode instead of int. "

Split Datasets...

train_ds: 8886

```
+-----+-----+-----+-----+-----+-----+-----+
+-----+-----+-----+-----+
| Dataset | bright_dune | crater | dark_dune | impact_ejecta | other |
slope_streak | spider | swiss_cheese | Total |
+-----+-----+-----+-----+-----+-----+-----+
+-----+-----+-----+-----+
| Train  |      293    | 749    | 445    |      19    | 7006    |      217
| 46     |      111    | 8886   |         |             |          |
| Test   |      61     | 121    | 87     |      1     | 1239    |      43
| 6      |      11     | 1569   |         |             |          |
+-----+-----+-----+-----+-----+-----+-----+
+-----+-----+-----+-----+
```

```
[2]: huggingface_model = 'google/vit-base-patch16-224-in21k'
```

```
[3]: from huggingface_vision.nnet.VisionClassifierTrainer import VisionClassifierTrainer
from transformers import ViTFeatureExtractor, ViTForImageClassification
```

```
model_name = "HIRISE_20EPOCH"
```

```
trainer = VisionClassifierTrainer(
    model_name = model_name,
    train      = train,
    test       = test,
```

```

output_dir = "hirise-map-proj-v3/out/",
max_epochs = 5,
batch_size = 12, # On RTX 2080 Ti
lr = 2e-5,
model = ViTForImageClassification.from_pretrained(
    huggingface_model,
    num_labels = len(label2id),
    label2id = label2id,
    id2label = id2label
),
feature_extractor = ViTFeatureExtractor.from_pretrained(
    huggingface_model,
),
)

```

Downloading: 100%| | 502/502 [00:00<00:00, 502kB/s]

Downloading: 100%| | 330M/330M [00:31<00:00, 11.0MB/s]

Some weights of the model checkpoint at google/vit-base-patch16-224-in21k were not used when initializing ViTForImageClassification: ['pooler.dense.weight', 'pooler.dense.bias']

- This IS expected if you are initializing ViTForImageClassification from the checkpoint of a model trained on another task or with another architecture (e.g. initializing a BertForSequenceClassification model from a BertForPreTraining model).

- This IS NOT expected if you are initializing ViTForImageClassification from the checkpoint of a model that you expect to be exactly identical (initializing a BertForSequenceClassification model from a BertForSequenceClassification model).

Some weights of ViTForImageClassification were not initialized from the model checkpoint at google/vit-base-patch16-224-in21k and are newly initialized: ['classifier.weight', 'classifier.bias']

You should probably TRAIN this model on a down-stream task to be able to use it for predictions and inference.

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C:\Anaconda\envs\CEML\lib\site-packages\transformers\optimization.py:309:

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

FutureWarning,

***** Running training *****

Num examples = 8886

Num Epochs = 5

Instantaneous batch size per device = 12

Total train batch size (w. parallel, distributed & accumulation) = 12

Gradient Accumulation steps = 1

Total optimization steps = 3705

{'0': 'bright_dune', '1': 'crater', '2': 'dark_dune', '3': 'impact_ejecta', '4':

```

'other', '5': 'slope_streak', '6': 'spider', '7': 'swiss_cheese'}
{'bright_dune': '0', 'crater': '1', 'dark_dune': '2', 'impact_ejecta': '3',
'other': '4', 'slope_streak': '5', 'spider': '6', 'swiss_cheese': '7'}
Trainer builded!
Start Training!

<IPython.core.display.HTML object>

***** Running Evaluation *****
  Num examples = 1569
  Batch size = 12
***** Running Evaluation *****
  Num examples = 1569
  Batch size = 12
***** Running Evaluation *****
  Num examples = 1569
  Batch size = 12
***** Running Evaluation *****
  Num examples = 1569
  Batch size = 12
***** Running Evaluation *****
  Num examples = 1569
  Batch size = 12

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

```

```

Saving model checkpoint to hirise-map-
proj-v3/out/HIRISE_20EPOCH/5_2022-05-08-12-02-34/trainer/
Configuration saved in hirise-map-
proj-v3/out/HIRISE_20EPOCH/5_2022-05-08-12-02-34/trainer/config.json
Model weights saved in hirise-map-
proj-v3/out/HIRISE_20EPOCH/5_2022-05-08-12-02-34/trainer/pytorch_model.bin
Configuration saved in hirise-map-
proj-v3/out/HIRISE_20EPOCH/5_2022-05-08-12-02-34/model/config.json
Model weights saved in hirise-map-
proj-v3/out/HIRISE_20EPOCH/5_2022-05-08-12-02-34/model/pytorch_model.bin
Feature extractor saved in hirise-map-proj-v3/out/HIRISE_20EPOCH/5_2022-05-08-12-
02-34/feature_extractor/preprocessor_config.json

Model saved at: hirise-map-
proj-v3/out/HIRISE_20EPOCH/5_2022-05-08-12-02-34

```

```

[6]: import pandas as pd
import seaborn as sn
import matplotlib.pyplot as plt

```

```

from sklearn.metrics import confusion_matrix

cm = confusion_matrix(ref, hyp)
labels = list(label2id.keys())
df_cm = pd.DataFrame(cm, index = labels, columns = labels)

plt.figure(figsize = (10,7))
sn.heatmap(df_cm, annot=True, annot_kws={"size": 8}, fmt="")
plt.savefig("./hirise-map-proj-v3/out/"+model_name+"/conf_matrix_1.jpg")

print("Confusion Matrix saved to ./hirise-map-proj-v3/out/"+model_name+"/
↳conf_matrix_1.jpg")

```

Confusion Matrix saved to ./hirise-map-proj-v3/out/HIRISE_20EPOCH/conf_matrix_1.jpg

1.5 4. Evaluate CNN vs ViT - WIP

```

[ ]: # Evaluating the CNN - BEST IS 81% AFTER 5 EPOCHS
test_loss, test_accuracy = model.evaluate(test_images, test_labels)
print("Final loss was {}. \nAccuracy of model was {}".format(test_loss,
↳test_accuracy))

```

```

[5]: # Evaluate the ViT
ref, hyp = trainer.evaluate_f1_score()

```

100%| | 1569/1569 [07:57<00:00, 3.29it/s]

	precision	recall	f1-score	support
bright_dune	1.0000	0.9672	0.9833	61
crater	0.8333	0.8264	0.8299	121
dark_dune	0.9560	1.0000	0.9775	87
impact_ejecta	1.0000	1.0000	1.0000	1
other	0.9782	0.9790	0.9786	1239
slope_streak	0.8837	0.8837	0.8837	43
spider	1.0000	1.0000	1.0000	6
swiss_cheese	1.0000	0.8182	0.9000	11
accuracy			0.9643	1569
macro avg	0.9564	0.9343	0.9441	1569
weighted avg	0.9643	0.9643	0.9642	1569

Logs saved at: [hirise-map-proj-v3/out/HIRISE_20EPOCH/5_2022-05-08-12-02-34](#)