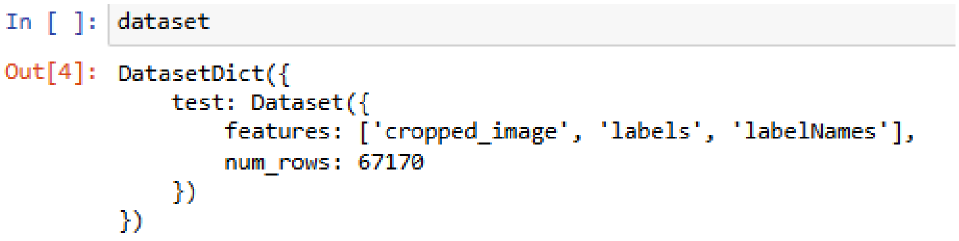
Part 1 (Spoof Detection)

Dataset preparation:

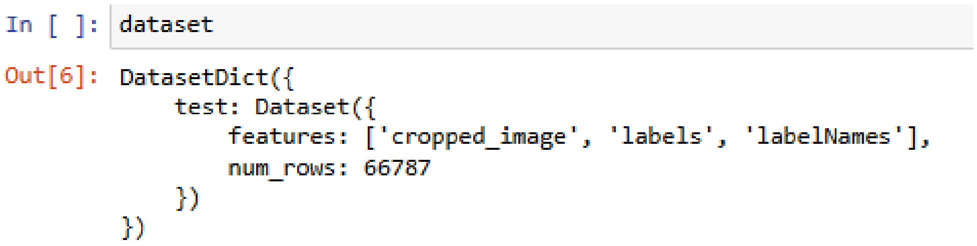
- Loaded the dataset “nguyenkhoa/celeba-spoof-for-face-antispoofing-test”



```
In [ ]: dataset

Out[4]: DatasetDict({
            test: Dataset({
                features: ['cropped_image', 'labels', 'labelNames'],
                num_rows: 67170
            })
        })
```

- There were some null values in ‘cropped_images’, so I removed them.

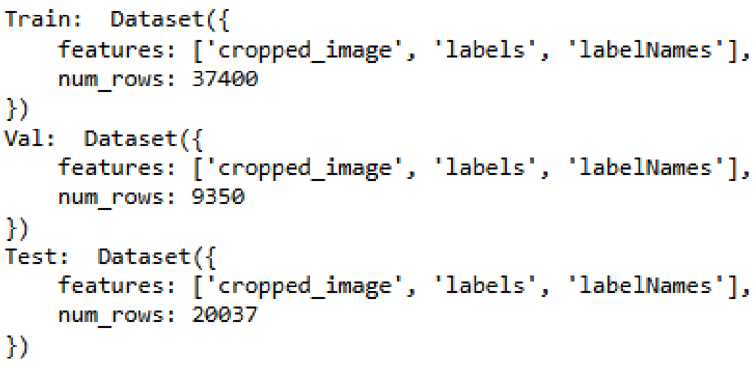


```
In [ ]: dataset

Out[6]: DatasetDict({
            test: Dataset({
                features: ['cropped_image', 'labels', 'labelNames'],
                num_rows: 66787
            })
        })
```

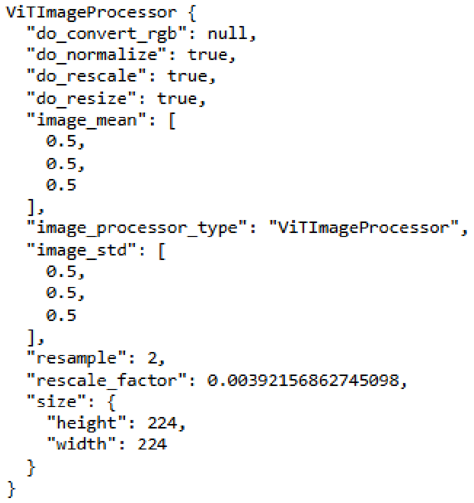
- Visualized the images in the dataset

- Used train_test_split to split data in 70% training and 30% testing data. Further divided the training data for 80% training and 20% validation.



```
Train:  Dataset({
    features: ['cropped_image', 'labels', 'labelNames'],
    num_rows: 37400
})
Val:  Dataset({
    features: ['cropped_image', 'labels', 'labelNames'],
    num_rows: 9350
})
Test:  Dataset({
    features: ['cropped_image', 'labels', 'labelNames'],
    num_rows: 20037
})
```

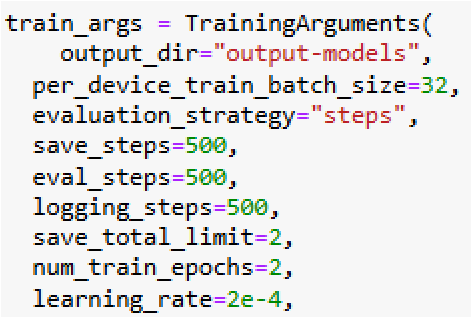
- Loaded the image processor with same configurations as the model (google/vit-base-patch16-224). And applied these transformations to train, test and validation images.



```
ViTImageProcessor {
  "do_convert_rgb": null,
  "do_normalize": true,
  "do_rescale": true,
  "do_resize": true,
  "image_mean": [
    0.5,
    0.5,
    0.5
  ],
  "image_processor_type": "ViTImageProcessor",
  "image_std": [
    0.5,
    0.5,
    0.5
  ],
  "resample": 2,
  "rescale_factor": 0.00392156862745098,
  "size": {
    "height": 224,
    "width": 224
  }
}
```

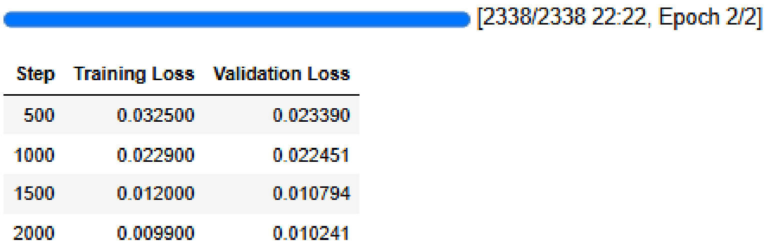
Model Training:

- Training arguments:



```
train_args = TrainingArguments(
    output_dir="output-models",
  per_device_train_batch_size=32,
  evaluation_strategy="steps",
  save_steps=500,
  eval_steps=500,
  logging_steps=500,
  save_total_limit=2,
  num_train_epochs=2,
  learning_rate=2e-4,
```

- Results for 2 epochs:

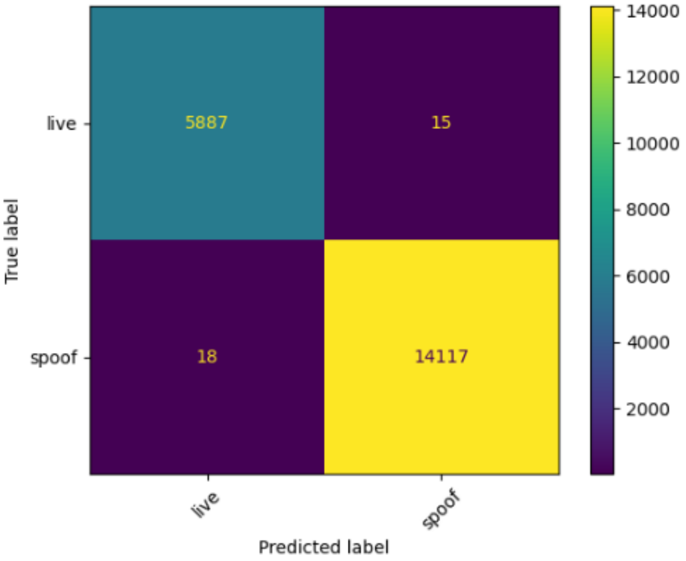


[2338/2338 22:22, Epoch 2/2]

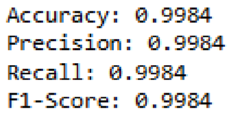
Step	Training Loss	Validation Loss
500	0.032500	0.023390
1000	0.022900	0.022451
1500	0.012000	0.010794
2000	0.009900	0.010241

Evaluation:

- Confusion Matrix:



- Accuracy and ‘Weighted’ precision, recall and F1



```
Accuracy: 0.9984
Precision: 0.9984
Recall: 0.9984
F1-Score: 0.9984
```