

Documentation Task 2

Students

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Project structure

```
.  
├── dat/ # Default directory for dataset  
├── doc/ # Assignment documentation  
├── hpc/ # Slurm-scripts for high performance computing  
└── results/ # Results task 2  
    ├── task2_finetuned/ # Fine-tuned model for hand-in (Task 2)  
    │   └── best_model.pt # Trained model from the two augmentations  
    │   └── test_logits_best_model.npy # Saved logits on test split  
    │   └── training_history_**.png # Training history for each  
    augmentation  
    |   └── training_results.json # JSON dump for training history on both  
    augmentation  
    └── test/ # Directory which is created when reproduction script is  
    run  
        └── task3_finetuned/ # Fine-tuned model for hand-in (Task 3)  
            └── best_model.pt # Trained model from the two augmentations  
            └── test_logits_best_model.npy # Saved logits on test split  
            └── training_history_**.png # Training history for each  
    augmentation  
        └── training_results.json # JSON dump for training history on both  
    augmentation  
    └── test/ # Directory which is created when reproduction script is  
    run  
        └── run_YYYYMMDD_hhmmss/ # New run of fine-tuning script  
└── src/ # Source code for task 1 to 3  
    ├── task1/  
    ├── task2/  
    ├── task3/  
    └── util/
```

How to run the code

Getting Started

- Create a virtual environment `python -m venv .venv`
- Activate virtual environment `source .venv/bin/activate`
- Install requirements `pip install -r requirements.txt`
- Download zipped data files (`EuroSAT_MS.zip` and `EuroSAT_RGB.zip`) to a `DAT_DIR` directory of your choice. This `DAT_DIR` directory must be provided as argument when running the script (see below). This repository provides a default `DAT_DIR` at `/dat`.

- Set working directory to project root

Task 1

Unzip raw files and split data into train, test, val set. Split files and classname-index associations are saved to **DAT_DIR**.

```
python -m src.task1.split_data -D <ABSOLUTE_PATH_TO_DAT_DIR>
```

Task 2

This project has fine-tuned [ResNet50](#) model on image classification on the [EuroSAT Dataset](#). The model is provided as **.pt** file in **results/task2_finetuned/best_model.pt**.

Reproduce results

Load the saved model at **./results/task2_finetuned/best_model.pt**. Runs predictions on model on test split and prints results to terminal. Creates images for top/bottom 5 best scoring models for 3 classes.

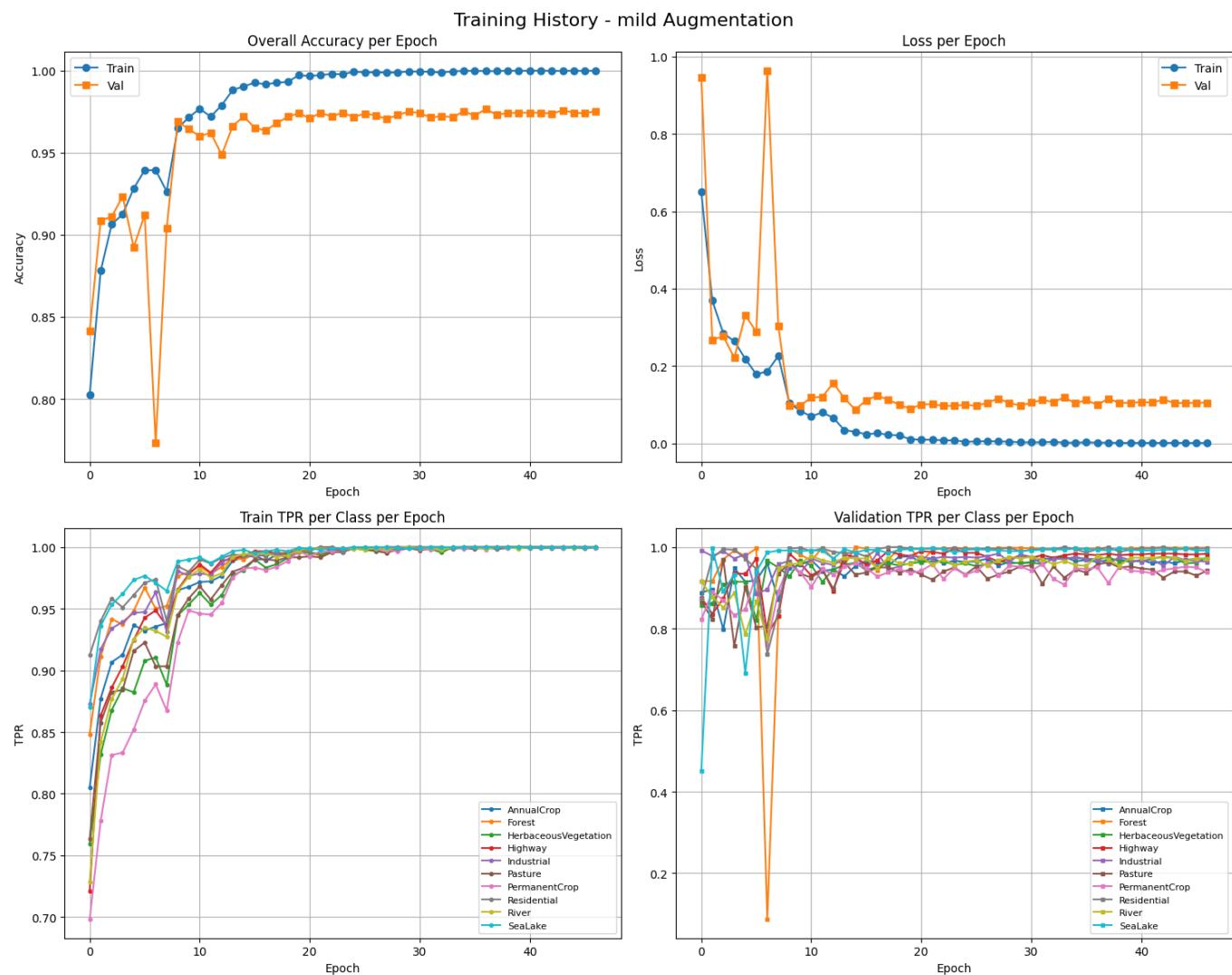
```
python -m src.task2.reproduce -D <ABSOLUTE_PATH_TO_DAT_DIR>
```

Fine-tune your own model

You can fine-tune ResNet50 model for RGB data. When script is run, a new directory named **run_YYYYMMDD_hhmmss** is created and hyper parameters from **constants.py** are used for training.

```
python -m src.task2.fine_tune -D <ABSOLUTE_PATH_TO_DAT_DIR>
```

Training Performance



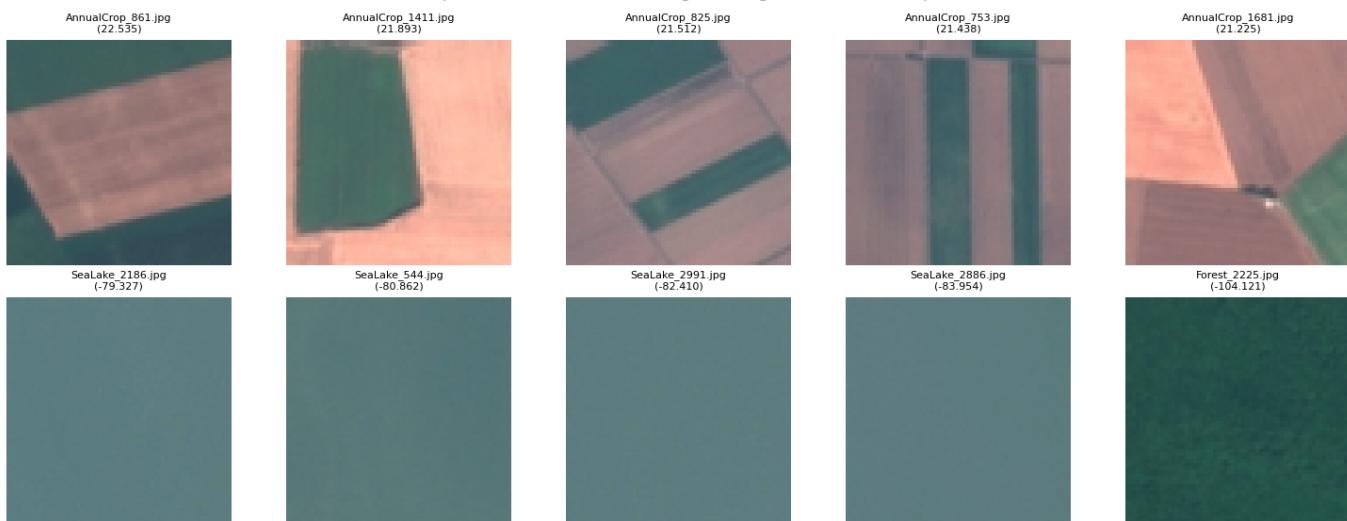
Test Performance

```
{
    "overall_accuracy": 0.9729629629629629,
    "per_class_accuracy": [
        0.9716666666666667,
        0.9916666666666667,
        0.98,
        0.978,
        0.96,
        0.955,
        0.922,
        0.9966666666666667,
        0.958,
        0.9983333333333333
    ]
}
```

Top & Bottom 5 Images of Classes 0 to 2

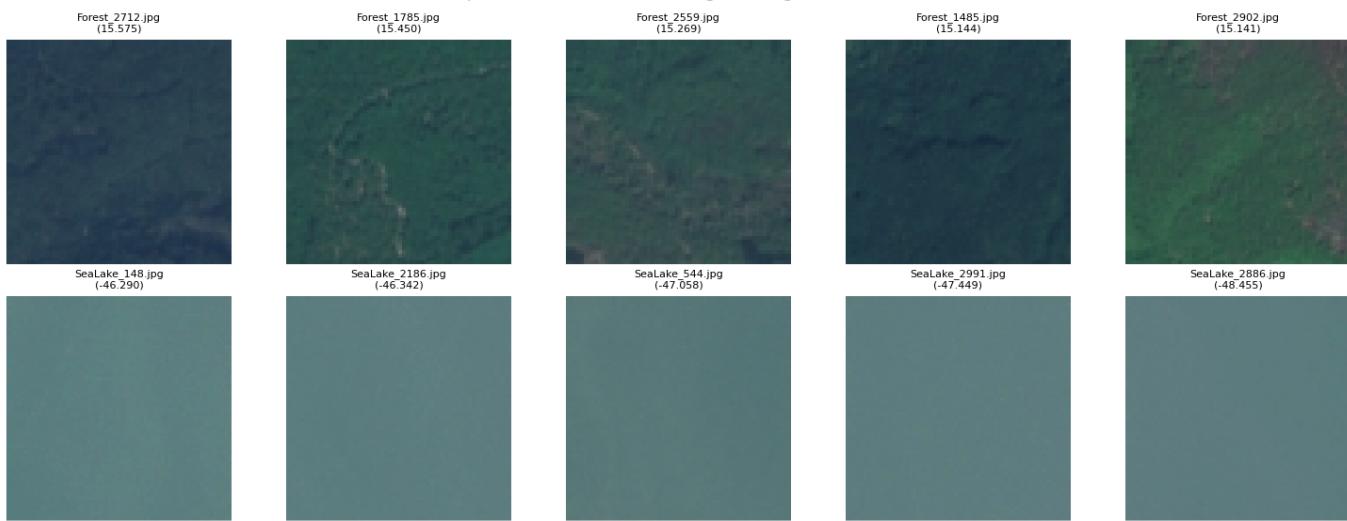
0 - Annual Crop

Top-5 (left) and Bottom-5 (right) Images for AnnualCrop



1 - Forest

Top-5 (left) and Bottom-5 (right) Images for Forest



2 - Herbaceous Vegetation

Top-5 (left) and Bottom-5 (right) Images for HerbaceousVegetation

