

SYDE 522 Project

Basic Requirements

- OS: Windows
- [Python Version: 3.12.2\(64-bit\)](#)
- Packages

All required packages are listed in the `requirements.txt` file.

- Install packages with command line: `pip install -r requirements.txt`
- It is better if cuda is available on device. Running without cuda may take a long time to train and evaluate models.

Python Scripts Introduction

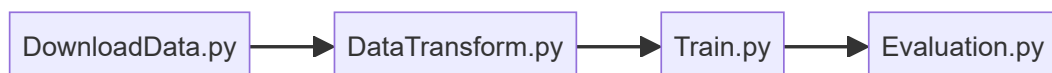
- `DownloadData.py`
 - Download eye diseases images data and trained models from google drive. Create necessary folders. **There is a limitation of download file by gdown. If download fail, you may need to download and unzip [Data.zip](#), [Saved_Models.zip](#) and [Losses Acc.zip](#) manually. Make sure the path is correct(`Data/train/*.png`, `Data/dataset.csv`, `Data/all_data.pkl`, `Saved_Models/*.pth`, `Losses_Acc/*.pkl`).**
- `DataTransform.py`
 - Class `DataTransform` loads original data sets and splits them into training and test sets. All data sets will be saved into `Data/all_data.pkl`.
 - Class `DataTransformSet` is used to load data sets such as PyTorch data set structures.
- `Models.py`
 - Class `ViT` is implemented by a [pre-trained structure of Vision Transformer](#)
 - Class `ResNet50` is implemented by a pre-trained structure of ResNet50 of `torchvision.models.resnet50`
- `Train.py`
 - The scripts of training model processes by provide suitable batch size, learning rate and epochs.
- `Evaluation.py`
 - The scripts of plot training process losses and accuracy of all models and report all final models' accuracy and f1-scores.

Folders Introductions

- **Data :**
 - `train/*.jpg` : Including all original image data.
 - `dataset.csv` : Features and labels of our data set.
 - `all_data.pkl` : Saved all images and feature data into a single file for future processing.
- **Losses_Acc :**
 - `*.pkl` : All losses and accuracy during the training processes.
- **Reports :**
 - `Acc_F1.txt` : The final selected models' prediction accuracy and f1-scores.
 - `*.png` : The plot of losses and accuracy during the training processes.
- **Saved_Models :**
 - `*.pth` : Trained models

Execution

- Introduction of all scripts
 - Run `DownloadData.py` to get all required files. Download eye diseases images data and trained models from google drive. Create necessary folders. **There is a limitation of download file by gdown. If download fail, you may need to download and unzip `Data.zip`, `Saved_Models.zip` and `'Losses Acc.zip'` manually. Make sure the path is correct(`Data/train/*.png`, `Data/dataset.csv`, `Data/all_data.pkl`, `Saved_Models/*.pth`, `Losses_Acc/*.pkl`).**
 - For generating data(e.g., resize the training and test set and shuffle the data set), just run `DataTransform.py`. You may select prefer training and test set size or shuffle data set. The file `all_data.pkl` in `Data` folder will be replaced.
 - For training models, just run `Train.py` or change some other value of learning rate, batch size or epochs. The models in `Saved_Models` will be replaced.
 - For model evaluations, just run `Evaluation.py`. The loss and accuracy file in `Losses_Acc` and plots in `Reports` will be replaced.
- Execution options
 - If you want to use new data to train some new models:



- If you just want to train new models by pre-processed training and test set:



- If you just want to check current models reports:

DownloadData.py



Evaluation.py

Some Parameters Values of Models

The following tables are recommended hyperparameters of the current data set(in folder `Data/all_data.pkl`) and models(in folder `Saved_Models`). If you want to regenerate the training or test set for training some new models, these values may need to be changed.

- ViT

	Batch Size	Epochs	Learning Rate
Normal	16	15	0.00000008
Diabetes	16	15	0.000000002
Glaucoma	16	15	0.000000001
Cataract	16	15	0.000000001
Age_related	16	15	0.000000001
Hypertension	16	15	0.0000000034
Pathological	16	15	0.000000001
Other	16	15	0.000000003

- ResNet50

	Batch Size	Epochs	Learning Rate
Normal	2	15	0.0000002
Diabetes	2	15	0.000000005
Glaucoma	2	15	0.000000005
Cataract	2	15	0.00000001
Age_related	2	15	0.000000005
Hypertension	2	15	0.0000000007
Pathological	2	15	0.0000000007
Other	2	15	0.000000004