

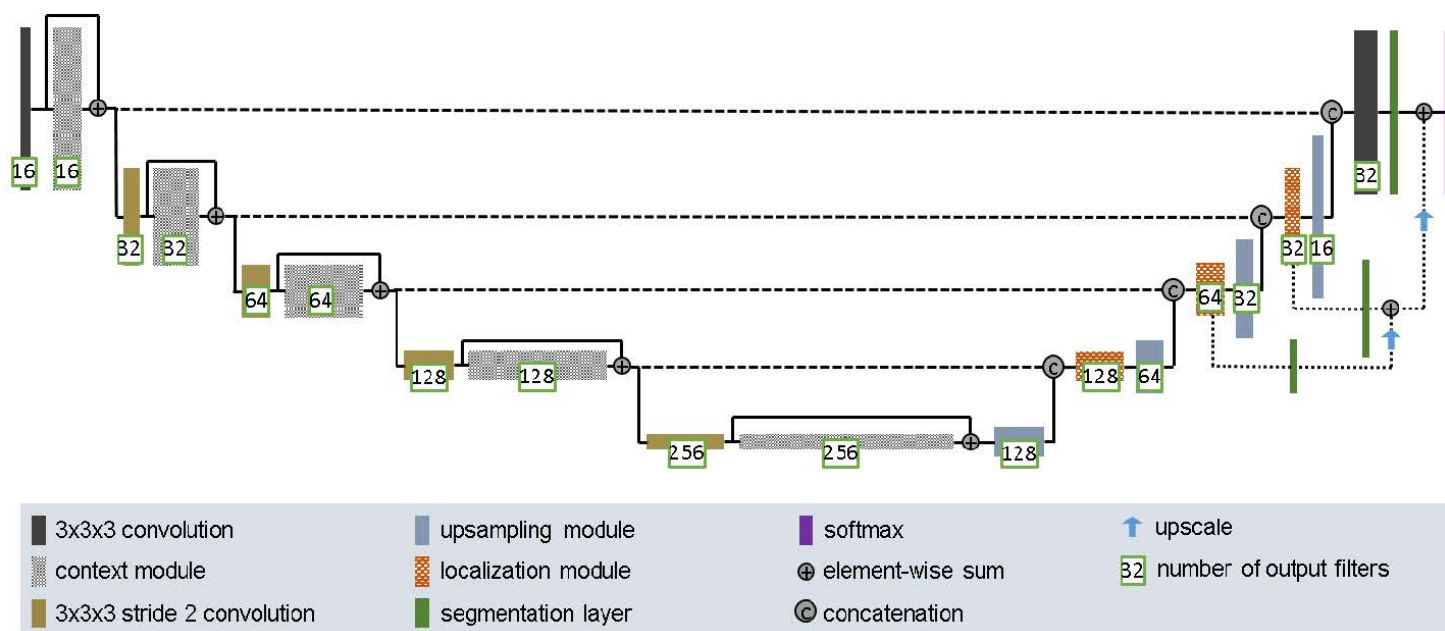
Segment the ISICs data set with the Improved UNet

Author: Tuo Yuan (46095312)

Discription

This module uses an improved U-Net neural network with all labels having a minimum DICE similarity coefficient of 0.8 for image segmenetation on the ISICs 2018 dataset.

Network architecture



this method make use of the U-Net network archietecture[1].
The context pathway aggregates hih level information that is subsequently localized precisely in the localization pathway.

Challenge

[1]In medical image segmentation problem, due to the class imbalance in the datasets, Dice coefficient performs better at class imbalanced problems than cross-entropy, it measures the similarity between two sets of data, in this case, it compare pixel to pixel between mask labels and train_data.

Usage

run the `preprocessing.py` to load the data from ISIC dataset,
it splite the data to

- `data_train`
- `data_test`
- `data_val`
- `mask_train`
- `mask_test`
- `mask_val`

as `.npy` file.

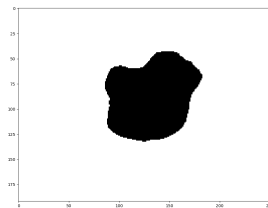
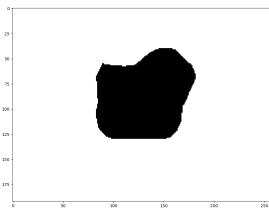
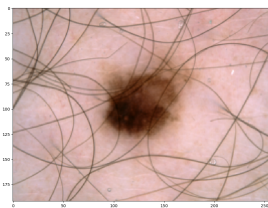
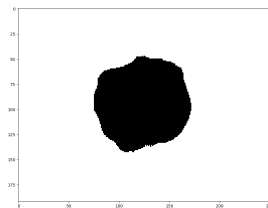
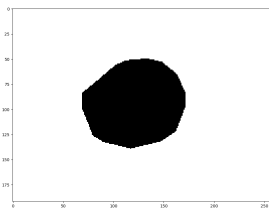
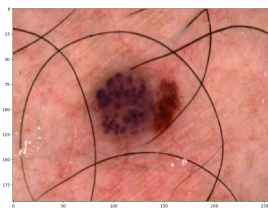
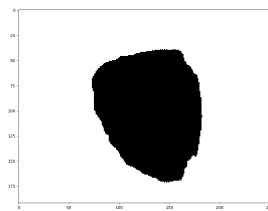
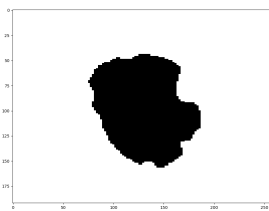
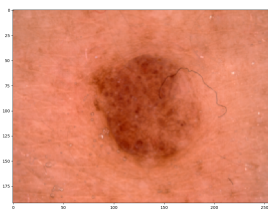
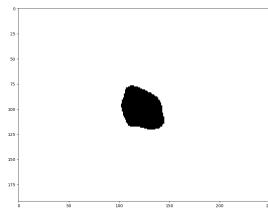
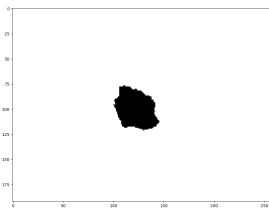
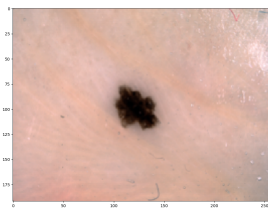
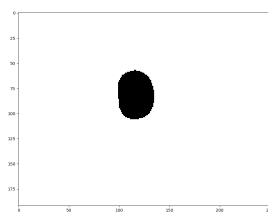
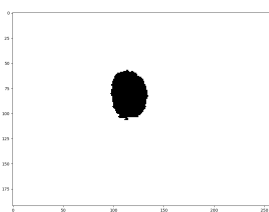
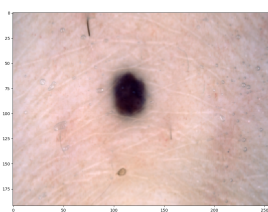
run `train.py` [2] to start training the model which is in the `model.py` [3]

finally, run `test.py` [2] to evaluate the performance

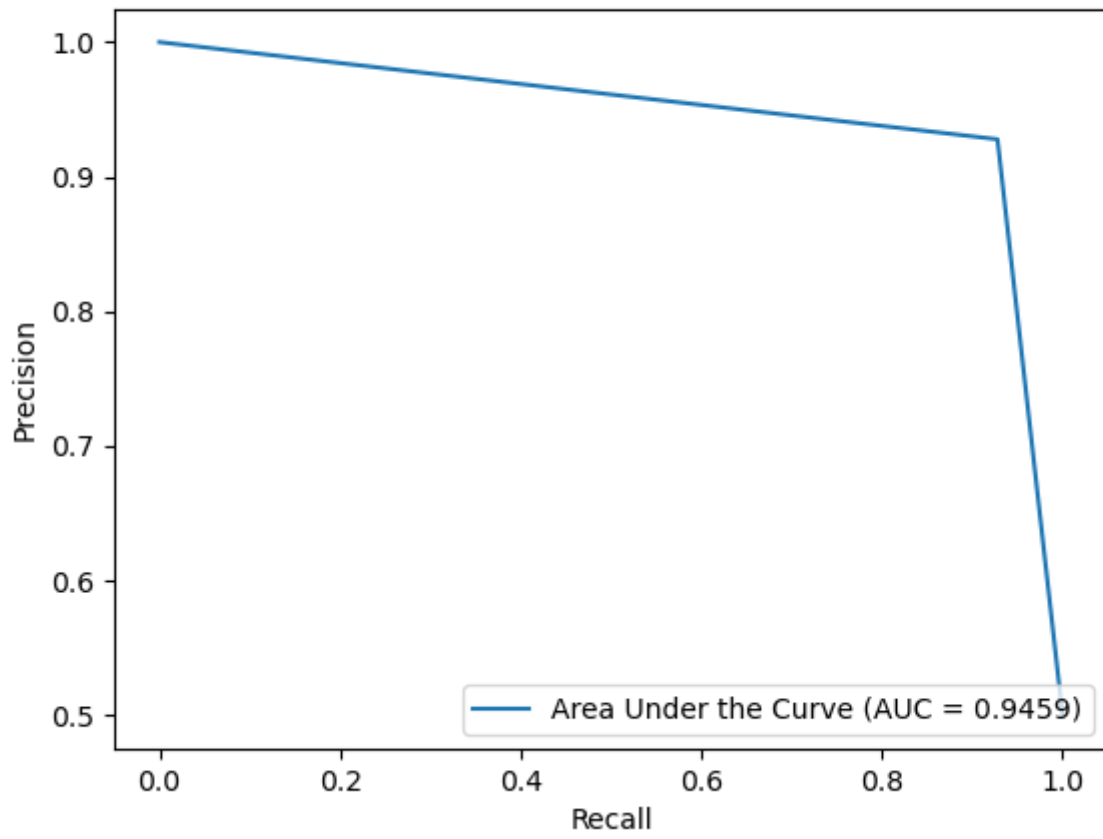
Results

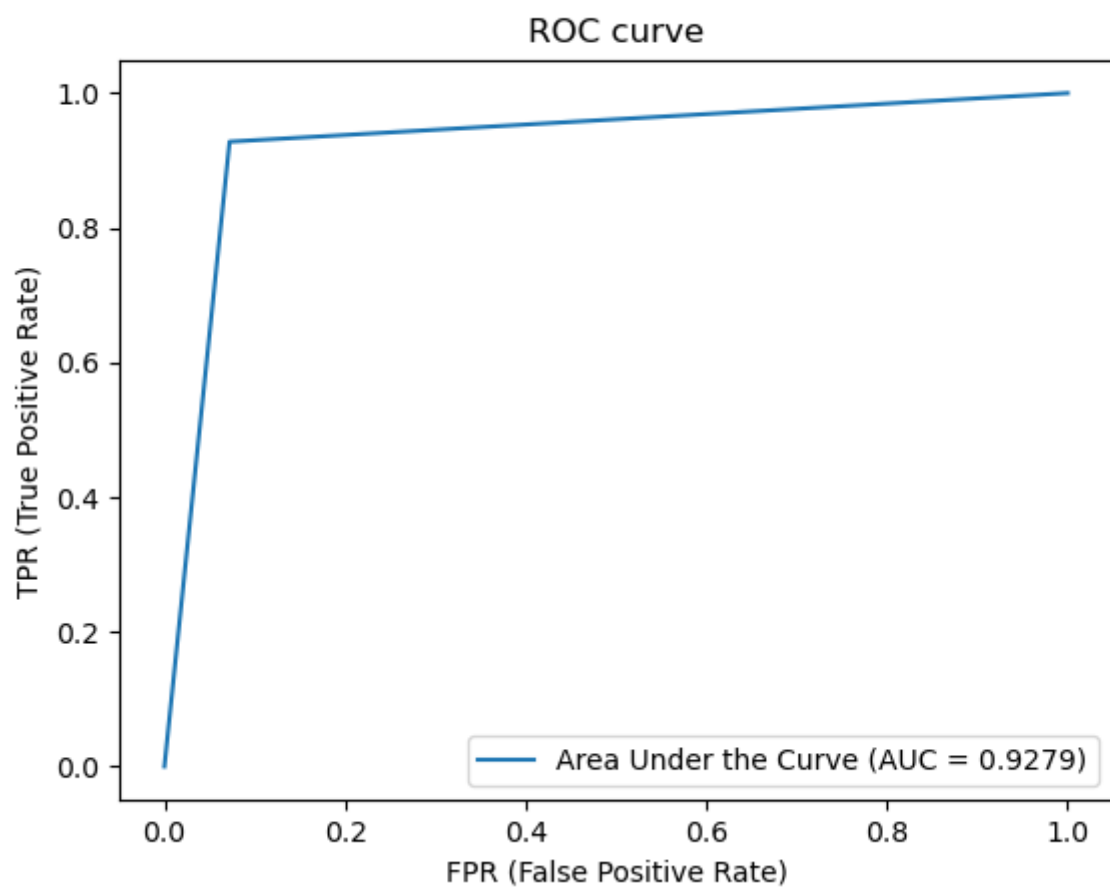
output performance

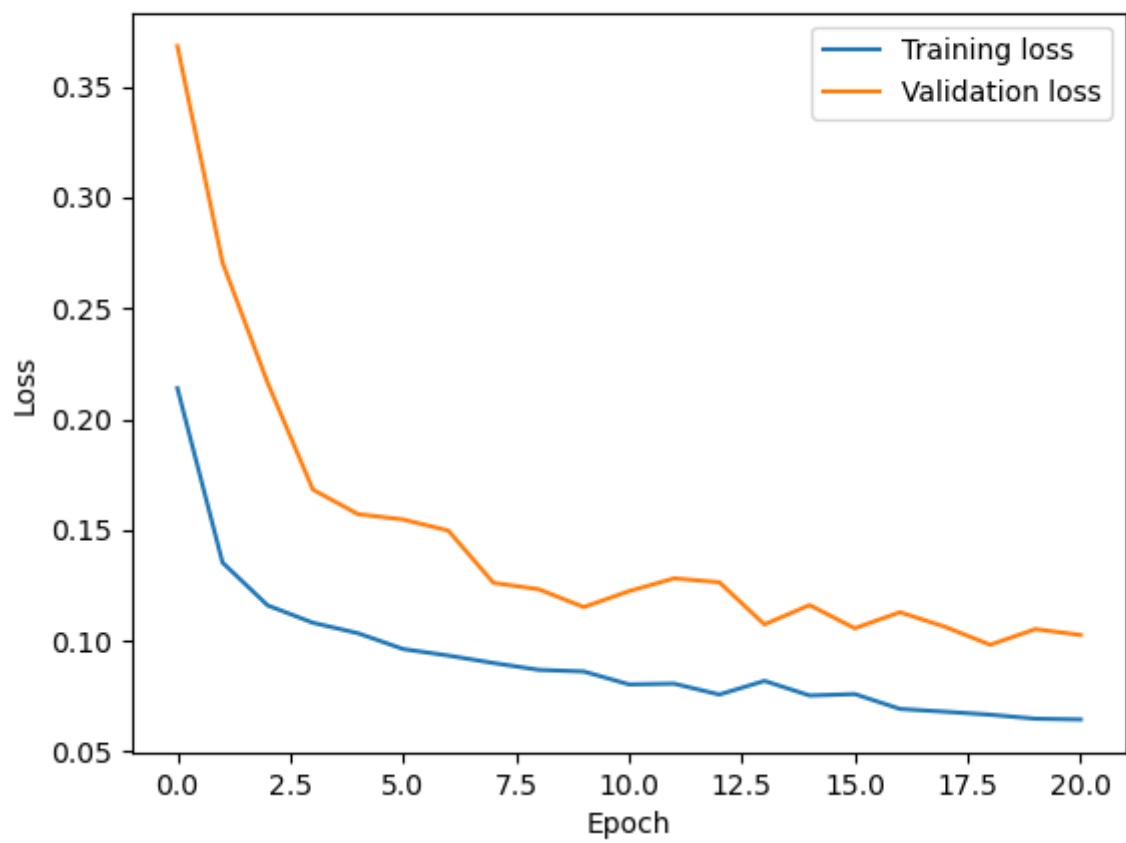
- **Area under the ROC curve:** 0.8567094851762822
- **Area under Precision-Recall curve:** 0.8925321138822117
- **Jaccard similarity score:** 0.7493366507185417
- **F1 score (F-measure):** 0.8567094851762821

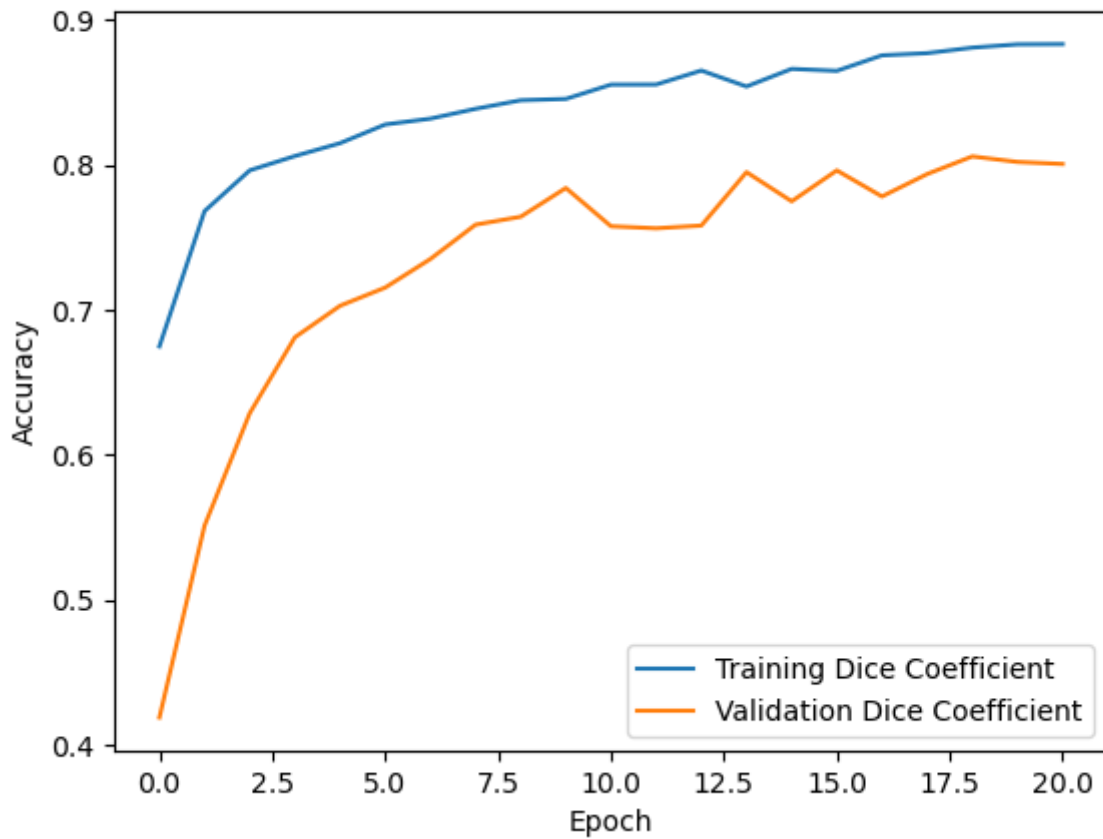


Precision - Recall curve









references:

- [1] F. Isensee, P. Kickingereder, W. Wick, M. Bendszus, and K. H. Maier-Hein, "Brain Tumor Segmentation and Radiomics Survival Prediction: Contribution to the BRATS 2017 Challenge," Feb. 2018. [Online]. Available: <https://arxiv.org/abs/1802.10508v1>
- [2] <https://github.com/languede/BCDU-Net>
- [3] <https://github.com/shakes76/PatternFlow>