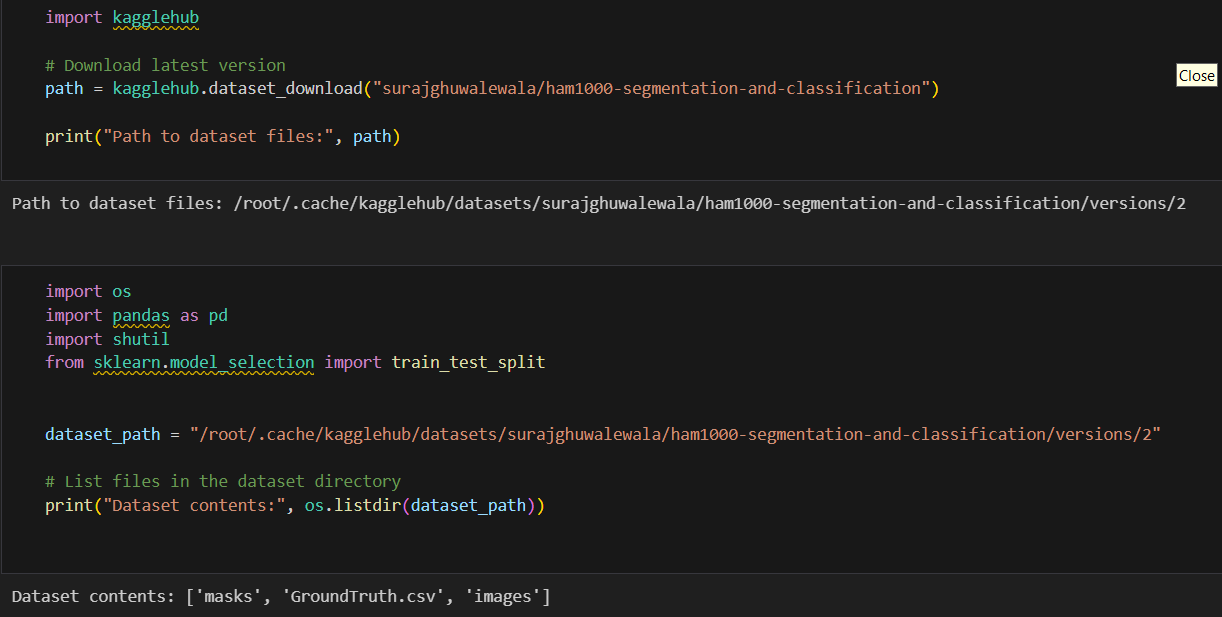
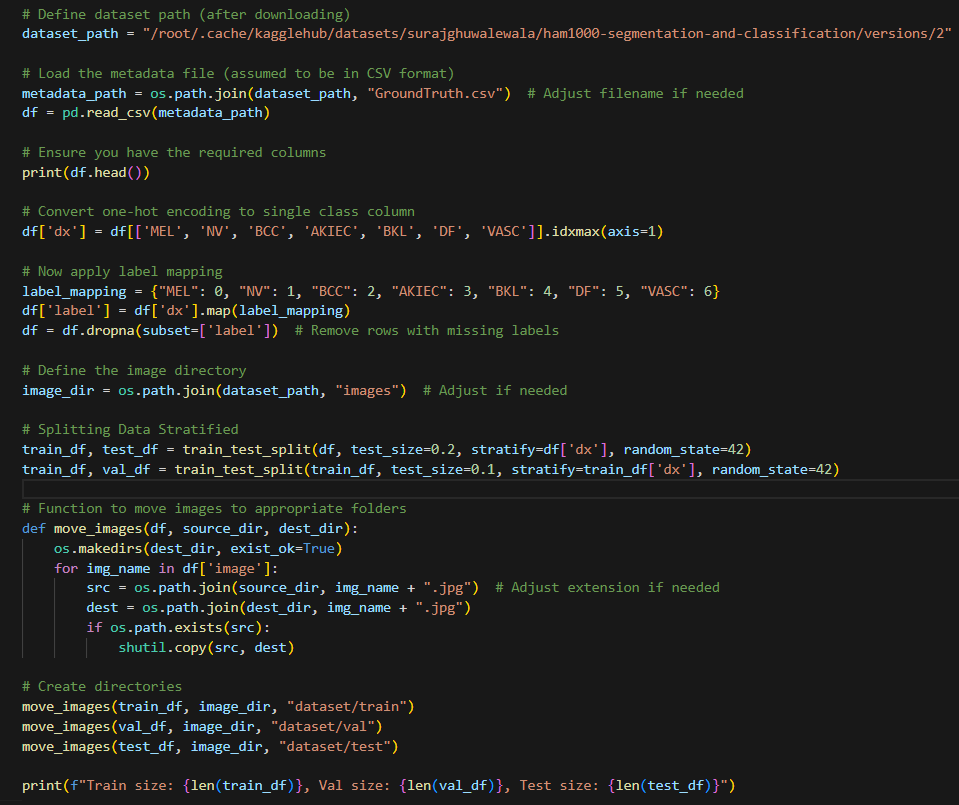
Pattern lab1

## Done By: Ahmed Nasser – 8350 Baher Ahmed Hosny – 8165

**Part1:**



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AI-generated content may be incorrect.Notes:

* Downloaded dataset using Kaggle
* Add labels to the data
* Split them evenly using stratify
* Move data to train, validation, and test folders.

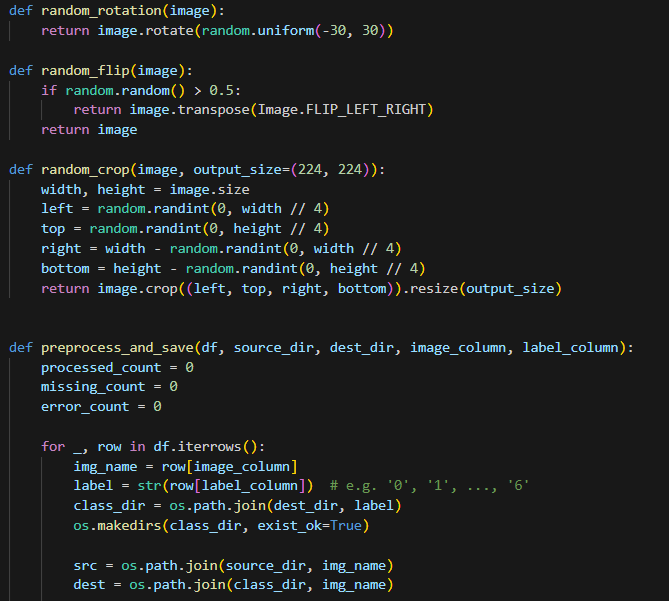
**Part2:**

A screenshot of a computer program

AI-generated content may be incorrect.

A computer screen shot of text

AI-generated content may be incorrect.



A screen shot of a computer program

AI-generated content may be incorrect.

Notes:

* First remove duplicate entries from each folder with each other
* Remove repeated patient ID’s in different folders
* Move each image according to split and verify if its corrupt, if so add to corrupted\_images array.

**Part3: (Pre-Trained Model)**

**A computer screen shot of code

AI-generated content may be incorrect.**

**A computer screen shot of text

AI-generated content may be incorrect.**

A screen shot of a computer program

AI-generated content may be incorrect.A screen shot of a computer program

AI-generated content may be incorrect.

A screen shot of a computer program

AI-generated content may be incorrect.A screenshot of a computer

AI-generated content may be incorrect.A screenshot of a graph

AI-generated content may be incorrect.

A computer screen shot of a program

AI-generated content may be incorrect.**Part3: (Custom CNN)**

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A graph of a training and valdalation loss

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A screen shot of a computer program

AI-generated content may be incorrect.

A computer screen shot of a program

AI-generated content may be incorrect.

A screenshot of a graph

AI-generated content may be incorrect.A screenshot of a computer screen

AI-generated content may be incorrect.

Notes:

* Use ResNet18 which is a CNN architecture which is implemented using pytorch.
* We check parameters are less than 60 million and display them
* Print a confusion matrix and display recall and F1 score

**A screen shot of a computer program

AI-generated content may be incorrect.A computer screen shot of a program

AI-generated content may be incorrect.Part4:**

**A screen shot of a computer code

AI-generated content may be incorrect.**

**A computer screen shot of a program

AI-generated content may be incorrect.**

**A computer screen shot of text

AI-generated content may be incorrect.**

**A screen shot of a computer program

AI-generated content may be incorrect.**

A screen shot of a computer program

AI-generated content may be incorrect.

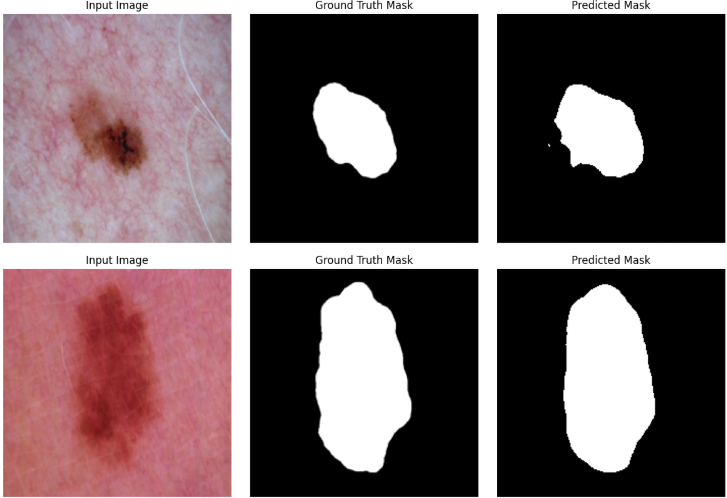
A computer screen shot of a program code

AI-generated content may be incorrect.

A screenshot of a computer program

AI-generated content may be incorrect.





Notes:

* Used a UNET architecture for segmentation
* Read images and masks from folders and applies some transformations for preprocessing and augmentation.
* Training and validation done and calculate effectiveness of model using IoU (Intersection over Union) and Dice coefficient.

A computer screen with text and images

AI-generated content may be incorrect.**Bonus 1:**

A screenshot of a computer program

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A computer screen with white text and numbers

AI-generated content may be incorrect.

A screen shot of a computer program

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AI-generated content may be incorrect.

Notes:

* A screen shot of a computer program

  AI-generated content may be incorrect.Classification predicts class and segmentation predicts a pixel level mask showing where the class is
* They both share a stack of Conv2D, ReLU and maxpool layers with the last layer being flattened and linear being used extra on the classification part while the segmentation had ConvTranspose2D used
* Classification outputs 7 logits, one per class and uses cross entropy loss
* Segmentation outputs 1 channel mask and uses BCEWithLogitsLoss
* Model is efficient because less parameters, computation, and memory used than 2 separate models. Less computation because only 1 forward pass is done instead of 2.