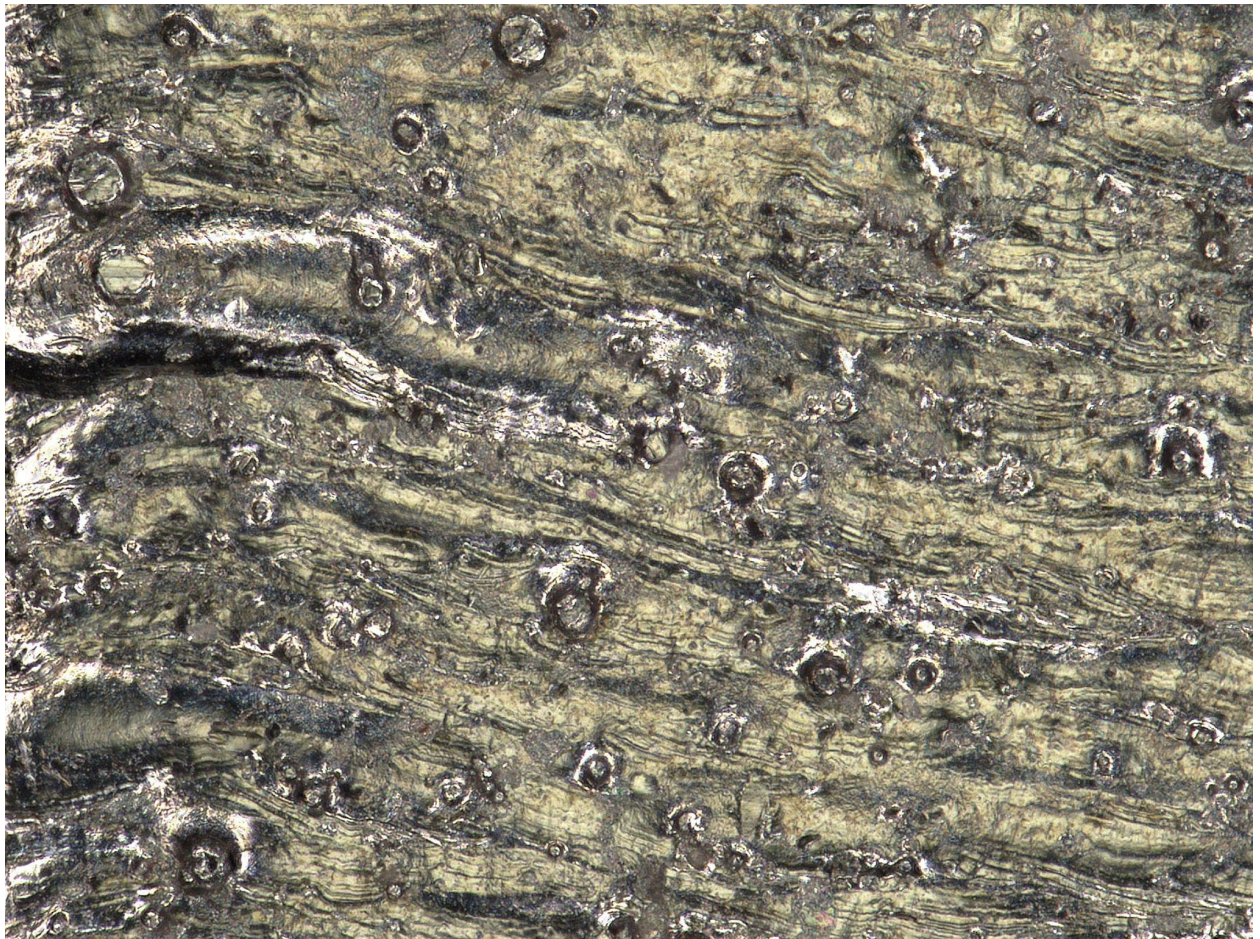


Pores Segmentation

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INTRODUCTION

The aim of the project is to create a generalized algorithm capable of identifying pores from different terrain images.

PROCEDURE

1. Transfer Learning has been used solve the given problem. I have performed image segmentation using UNET with backbone of resnet34 and weights of imagenet.
2. 11 images from different experiments have been used for training & 6 images for testing, I have broken down the image into several small images of 256x256 and performed Data Augmentation to generate train, validation and test data.
3. The labeling of input images was done using the apper.com website.
4. I have used IOU_score metric to measure its performance.

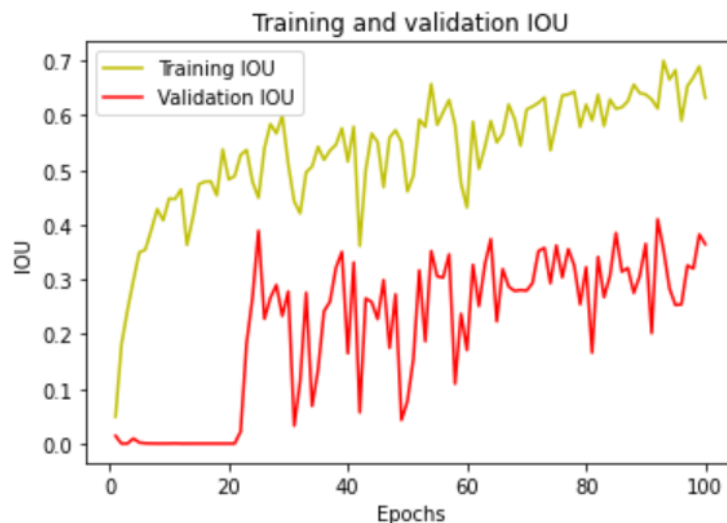
Metric Selection : The IOU (Intersection over Union) score is preferred over accuracy for semantic segmentation tasks because accuracy alone may not be a good measure of performance. This is because in semantic segmentation, a pixel-wise classification problem, the vast majority of pixels in an image may belong to the background class, which can lead to a high overall accuracy even if the segmentation is poor.

The IOU score, on the other hand, measures the overlap between the predicted segmentation and the ground truth segmentation on a per-pixel basis. It takes into account both false positives and false negatives and provides a more precise measure of how well the segmentation model is capturing the object boundaries and shapes. A higher IOU score indicates better segmentation performance, and it is a more robust evaluation metric that is widely used in semantic segmentation tasks.

The "goodness" of an IOU score depends on the specific task and dataset being used. Generally, an IOU score above 0.7 is considered good, and scores above 0.9 are considered excellent. However, it is important to note that the threshold for a "good" IOU score may vary depending on the complexity and variability of the segmentation task.

RESULTS

1. We have achieved an IOU score of 0.7 on training data, 0.42 on validation data. The gap between train and test accuracy could be decreased by increasing the training data. Currently we have just trained on 11 images.



✓
1s

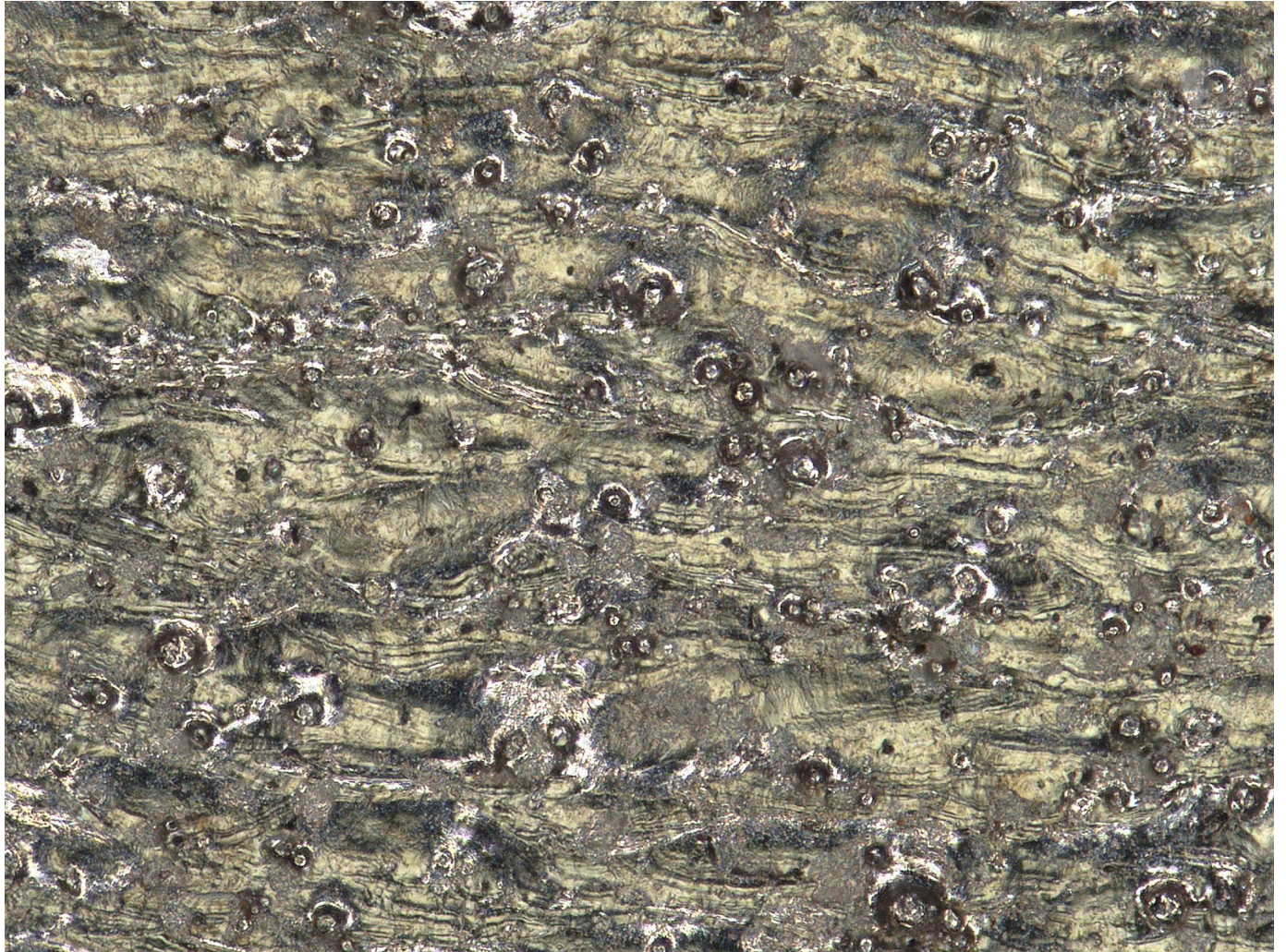
```
#IOU on Test image
y_pred=model.predict(X_test)
y_pred_thresholded = y_pred > 0.5

intersection = np.logical_and(y_test, y_pred_thresholded)
union = np.logical_or(y_test, y_pred_thresholded)
iou_score = np.sum(intersection) / np.sum(union)
print("IoU socre is: ", iou_score)
```

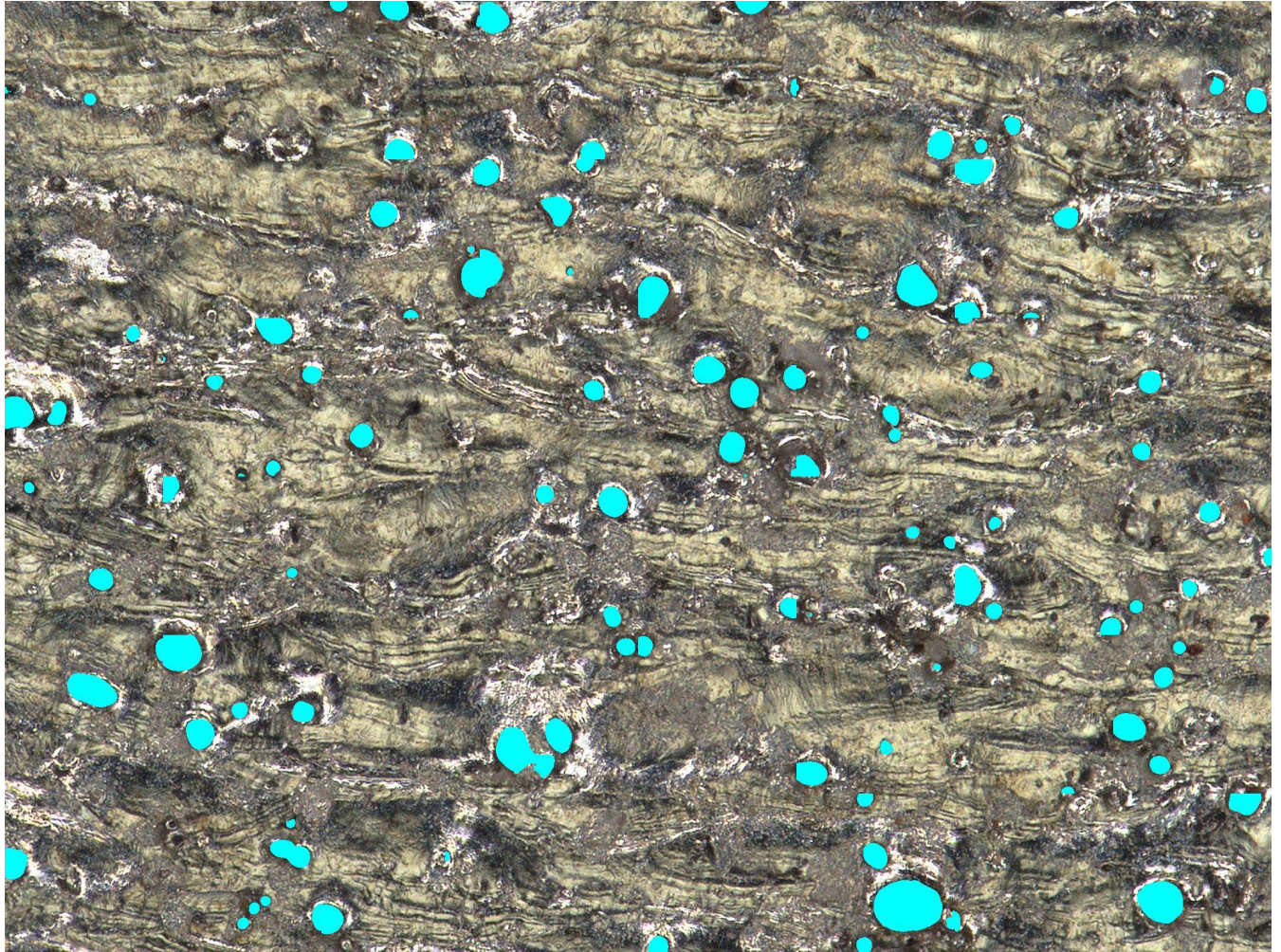
5/5 [=====] - 1s 131ms/step
IoU socre is: 0.5752734942171932

2. A test accuracy of 0.57 was achieved on the test data. This is a reasonable good accuracy given the results achieved shown below.

Sample Input Test image



Output of Sample Test Image: The blue pixels represent the pores detected.



REFERENCES

1. [Data](#) - The above folder includes a test input image, test output image, model weights file.
2. Training link : [Train.ipynb](#)
3. Testing link : [Predict_unseen_image.ipynb](#)
4. You need to add the path of the new test image, and the path of the model weights file(model_2.h5) which is shared in one drive.
5. The code will return you the segmented output image.