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Report for test task 4:

For this image segmantation problem, U-Net architecture was used. It was intended for medical purposes when it was published in 2015, but it works well for many other segmentation tasks, as demonstrated in Andrew Ng's convolutional neural networks course.

The particular architecture used in this taks was adopted as an MVP from https://github.com/bnsreenu/python\_for\_microscopists/blob/master/219-unet\_model\_with\_functions\_of\_blocks.py

The dataset for training was manufactured by spitting the satellite image and applying data augmentation steps to it, e.g. translation, reflection, and rotation. These steps could produce tens of thousands of instances, but, unfortunately, Google Colab could only handle the dataset of 8028 images.

Consequently, the model was trained on 6502 images, validated on 723 images and tested on 803 images.

The MVP model hyperparameters were selected imperically as follows:

-batch\_size = 16,

-epochs=20

-loss='binary\_crossentropy'

-metric='MeanIoU'

Binary cross-entropy is a basic metric to measure similarity between two probability distributions.

Mean IoU metric measures how much two masks overlap.

Measured at the end, the resulting model shows a relatively high score of 92%.

To achieve a higher score, we would want to try tweaking those hyperparameters:

-increasing the number of training epochs

-choosing a different loss function, e.g. Jaccard Loss

-increasing the dataset size by applying additional augmentation steps

-increasing the size of the patches cropped from the initial satellite image tile - the larger the image, the better context about erosion the model would have

-applying additional filters to the original image to make the land features more vivid.

-trying a different model architecture, for example LinkNet or PSPNet

-lastly, adding more satellite data would also immensely increase the accuracy of the segmentation model.