

Road Extraction Update 1

April 28, 2020 (Monday)

This update contains the first implementation of the road extraction phase using matterport's implementation. [1] The model was trained using **coco weights, local dataset** for **30 epochs** using the **original matterports' parameters**.

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1 Inspecting the Data

[Open Notebook to see full](#)

Data: 2000 Google Satellite Images (includes negative and positive samples)

Split: 1400 Training

400 Valid

200 Test

Image Highlights:

Display Samples

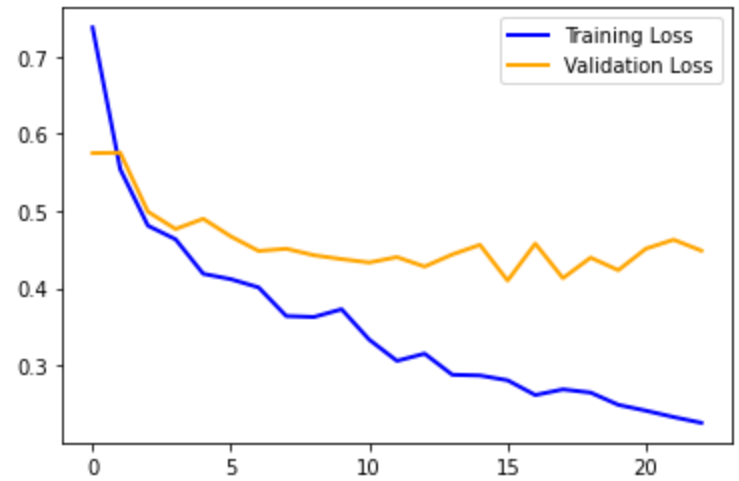


Bounding Boxes and Resized Image

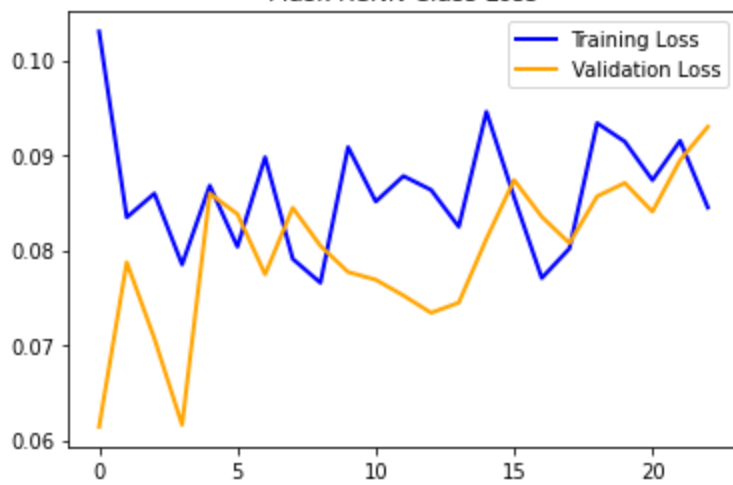
ROIs

2 Results

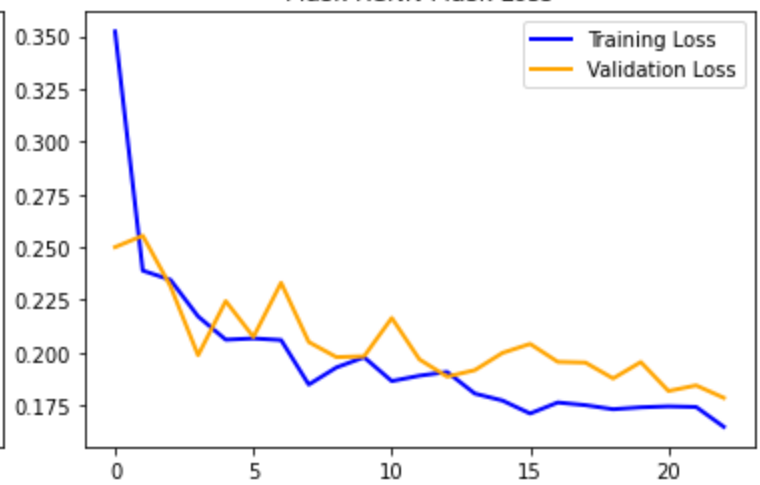
Mask RCNN BBox Loss



Mask RCNN Class Loss



Mask RCNN Mask Loss



3 Sample Output



Note: Problem with accessing notebooks

4 Inspecting Model

[Open Notebook to see full](#)

If the link above doesn't work, [see this html version](#).

Note: No parameters have been tweaked yet. The model was trained using the original matterport parameters.

Highlights:

Run Detection

Step by Step Prediction:

**Stage 1 Region Proposal Network
1a RPN Targets**

1b RPN Predictions



(left) unrefined. (right) refined

Final Proposal

Stage 2 Proposal Classification

2a Proposal Classification

Stage 3 Generating Masks



Mask Targets



Predicted Masks

Stage 4 Visualizing Activations

Original Image

Backbone Feature Map

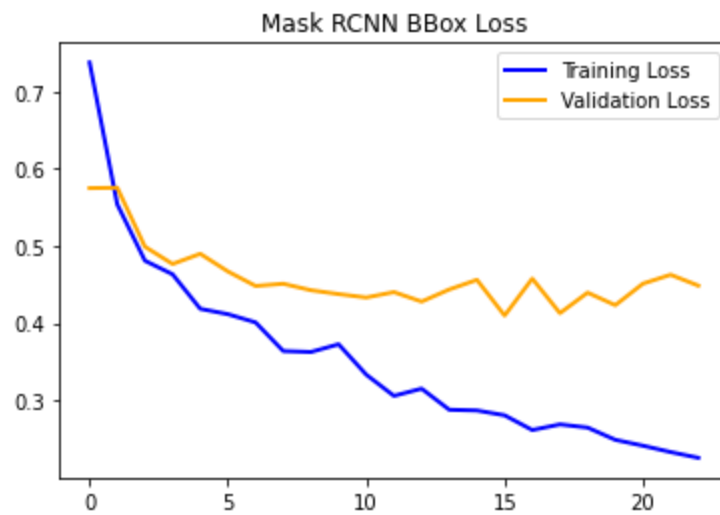
5 Comments

On Results

- **Loss**

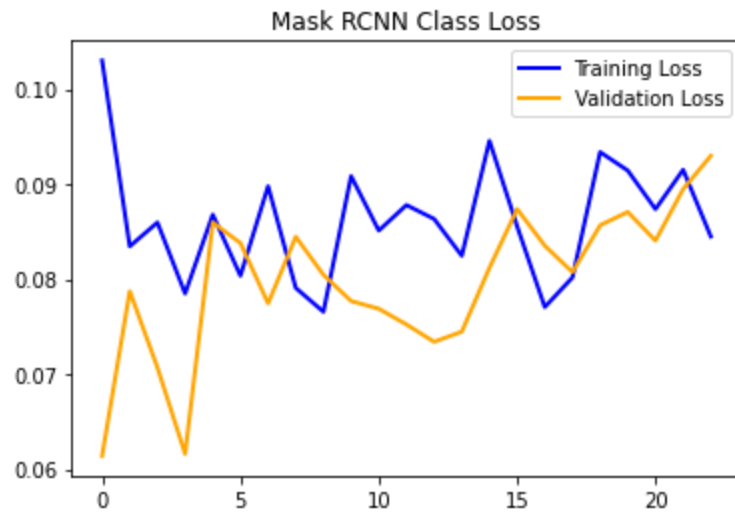
- Overfitting is observed.
- Though the validation loss is oscillating, it looks like it has a downward trend.

- **Mask RCNN BBox Loss**



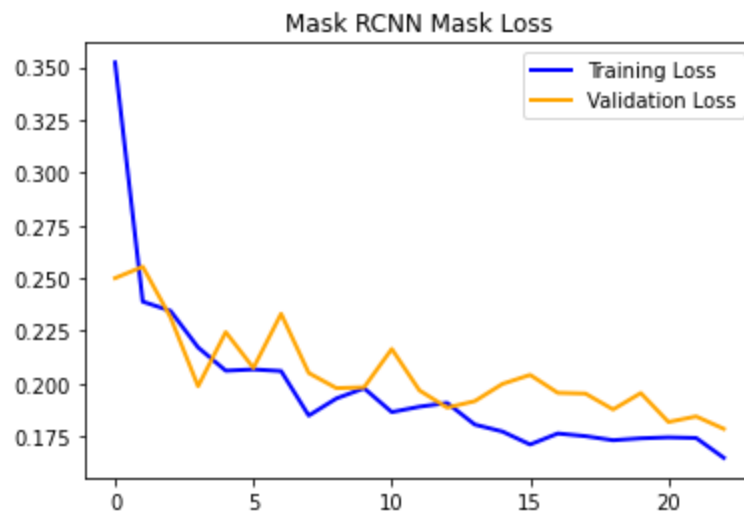
- Overfitting is observed.
- Though the validation loss is oscillating, it looks like it has a downward trend.

- **Mask RCNN Class Loss**



- Very bad. The Validation Loss has an upward Trend
- The training loss also is very high given this scale.

- **Mask RCNN Mask Loss**



- Overfitting can be seen.
- This is very good since it has a downward trend, both training and validation loss but still, after the 13th epoch, the validation loss has consistent higher values than the training loss.

- **RPN BBox Loss**

- Overfitting can be observed.
- The training loss is nicely going downward; however, the validation loss seems to be settling in some range.

- **RPN Class Loss**

- Very nice. Most validation loss values are below the training loss values.

6 Improvements

Lots of improvements should be done given that this is the initial run

- Dataset
 - Clean the dataset such that connected roads won't have separated annotation
This is a challenge since what was used was the polygon tool.
- Pre-trained Weights

- Try using ImageNet instead of Coco
- See how the trends will go after training for more than 30 epochs
- Study the implementation and concepts
- Read the official papers for the architectures
- Start Tweaking the Parameters
- Research on how to improve the output

7 References

- [1] https://github.com/matterport/Mask_RCNN
- [2] <https://engineering.matterport.com/splash-of-color-instance-segmentation-with-mask-r-cnn-and-tensorflow-7c761e238b46>