Rainforest Image Recognition

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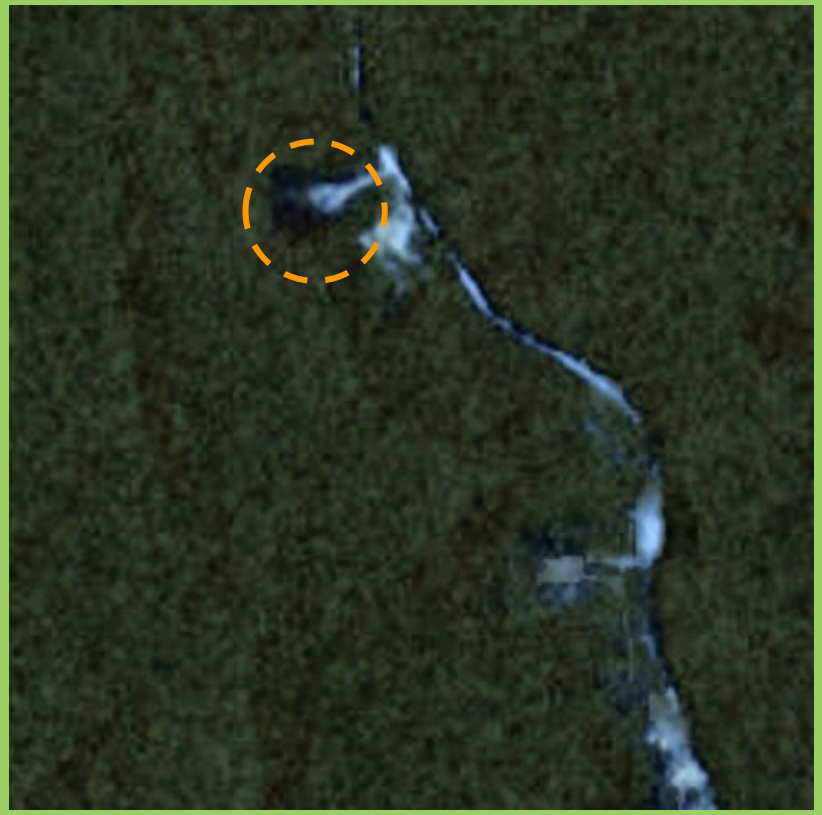
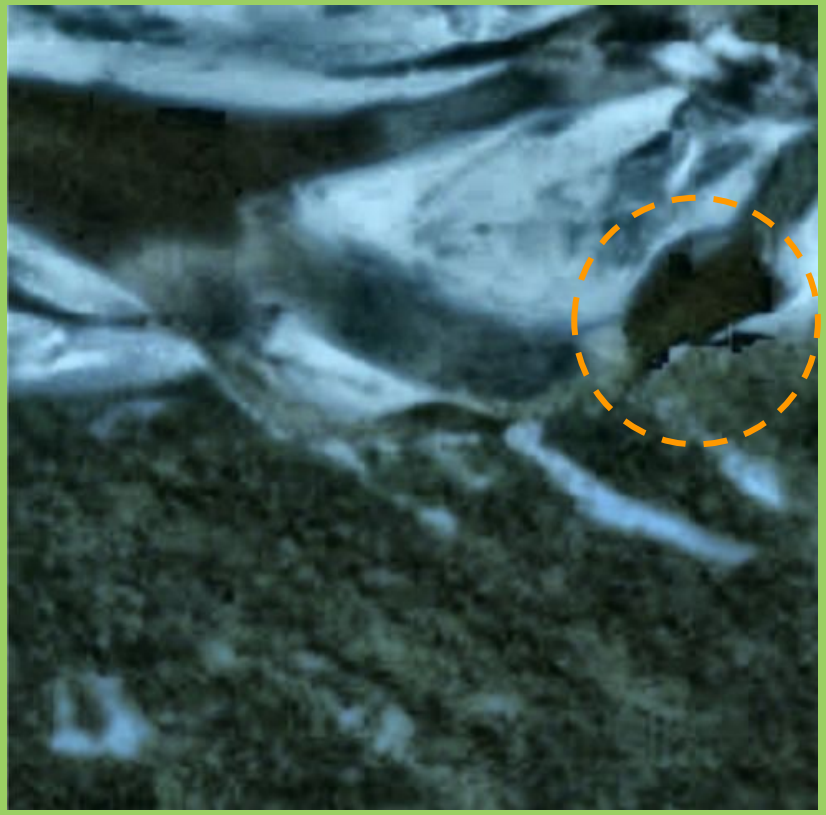
Illegal Gold Mine /Artisanal Mine on Amazon rainforest



Artisanal mine, primary, clear, water



Artisanal mine, clear, habitation

Problem Overview

- Deforestation in the Amazon basin is a growing concern due to its devastating impact on biodiversity, habitat loss and climate change
- Aim to use the satellite images to better understand about the deforestation locations and detect human activities such as illegal mining
- The objective is to generate labels for satellite image chips from the Amazon

Data Source

Data (From Planet)

- 40,789 labelled image
- 61,192 unlabelled image
- 17 unique labels
- Highly imbalanced
- A few labeling error
- Some images are blurry

Tools

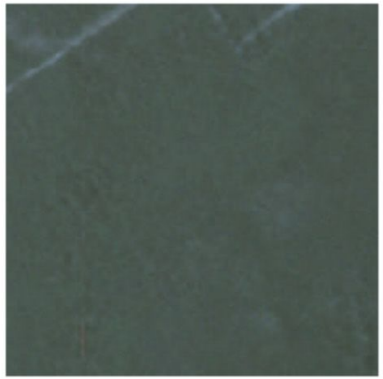
- Keras, Tensorflow, opencv

Evaluation

- **F beta score β** = 2
- F2 $\sim \frac{pr}{4p+r}$

planet.

clear, primary road



haze, primary, water

agriculture, clear, habitation, primary, road, water

Labels

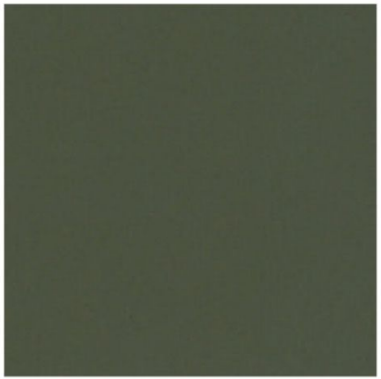
Weather (1)

Land use (0 or more)

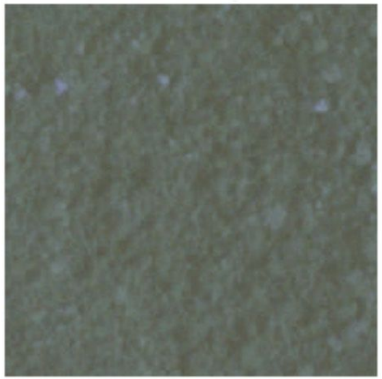
Each chip will have one atmospheric label and zero or more common and rare labels

clear, primary

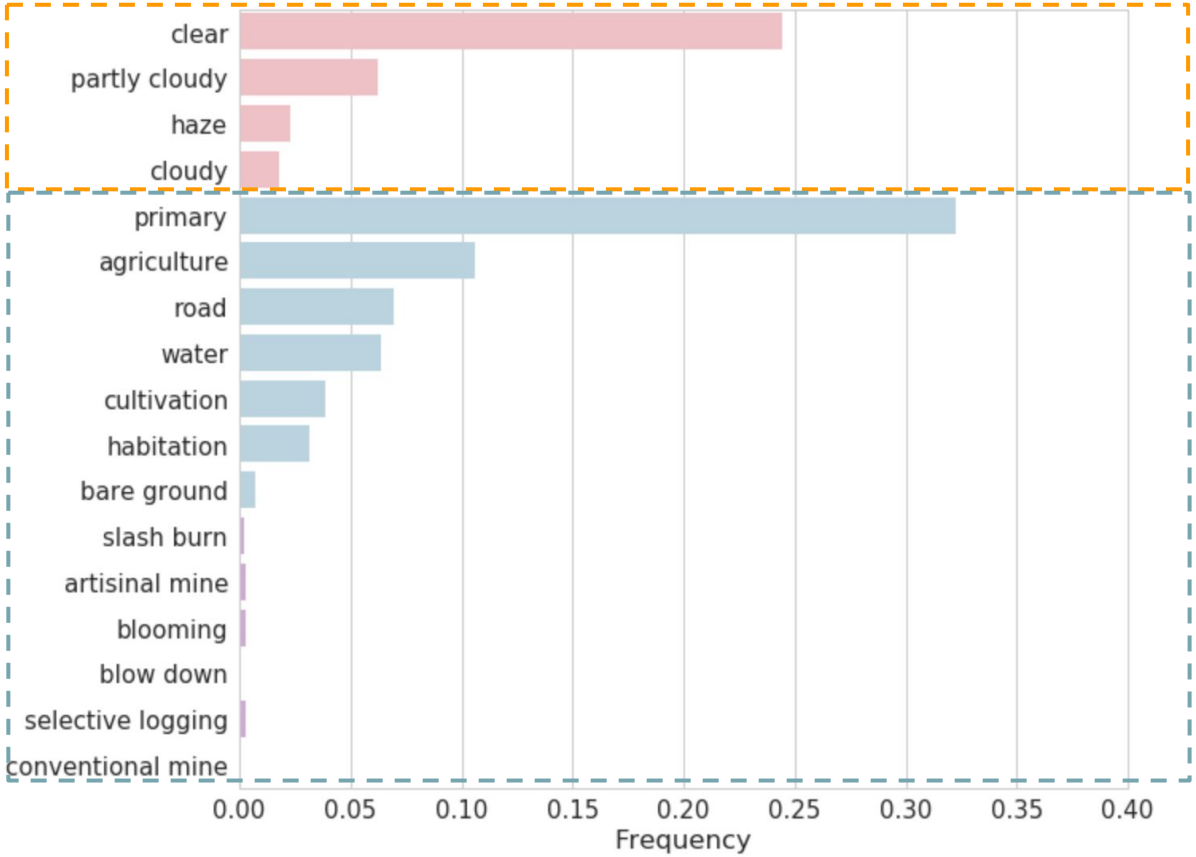
clear, water



blooming, clear, primary



Labels Distribution



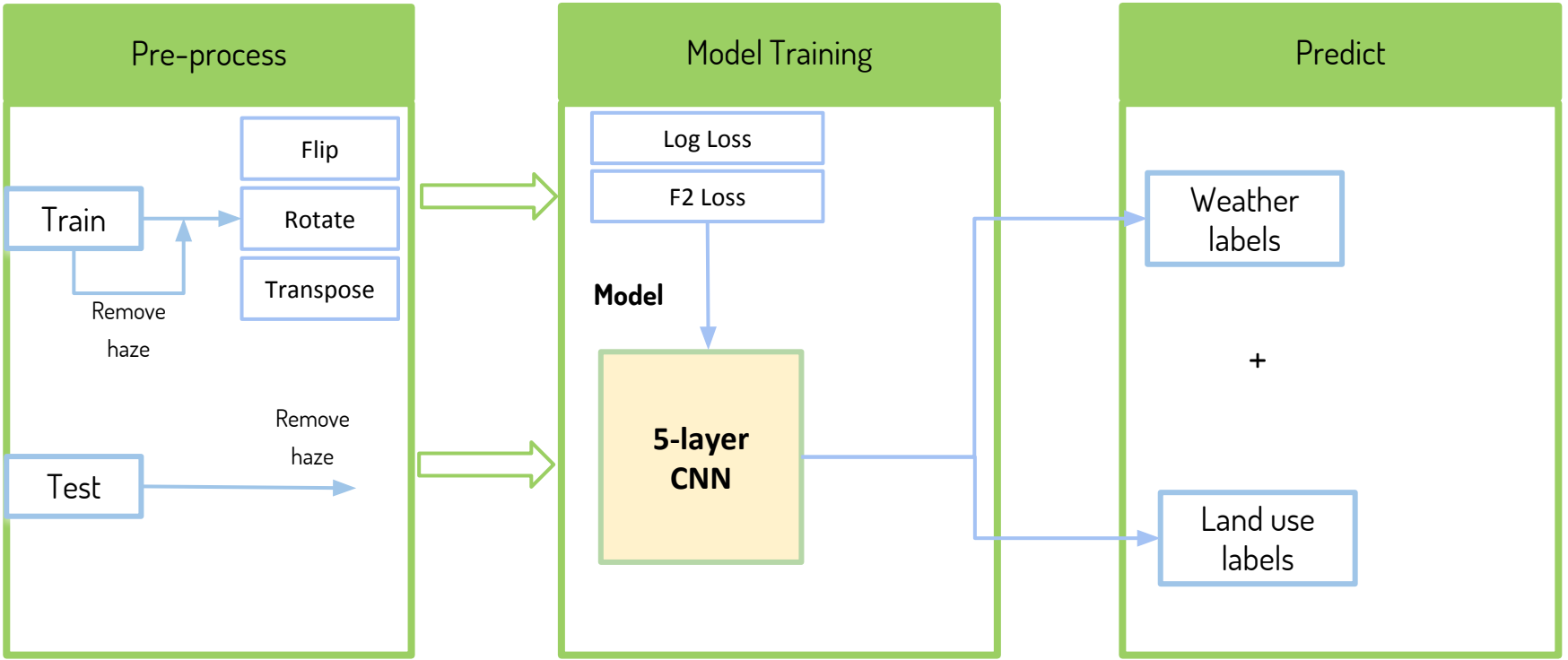
Labels =

- atmospheric conditions
- common land use
- rare land use

Techniques:

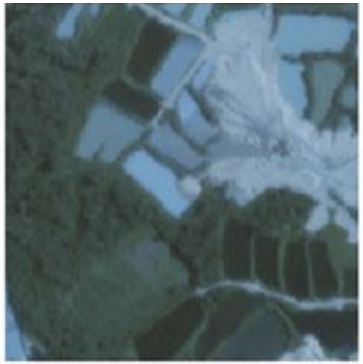
Class weights

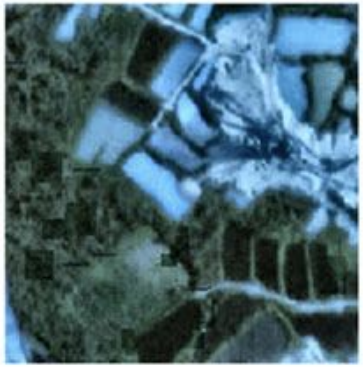
Workflow


Pre-process
Flip
Train
Rotate
Transpose
Remove haze
Remove haze
Test
Model Training
Log Loss
F2 Loss
Model
5-layer CNN
Predict
Weather labels
+
Land use labels

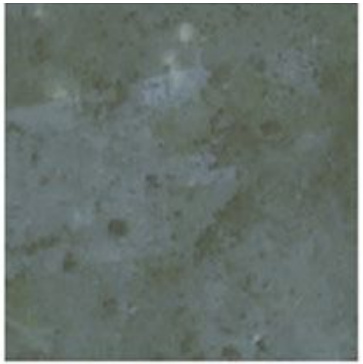
Pre-process: Dehaze

Illegal mining, clear, primary

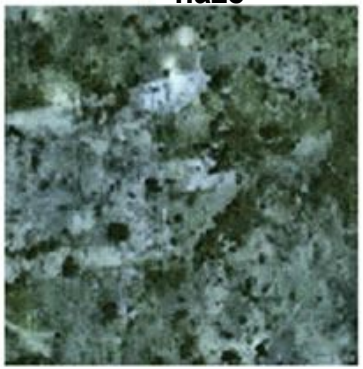




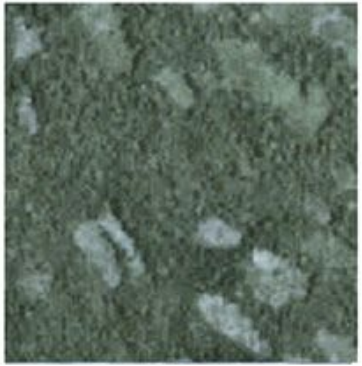
cultivation, partly cloudy



Remove haze



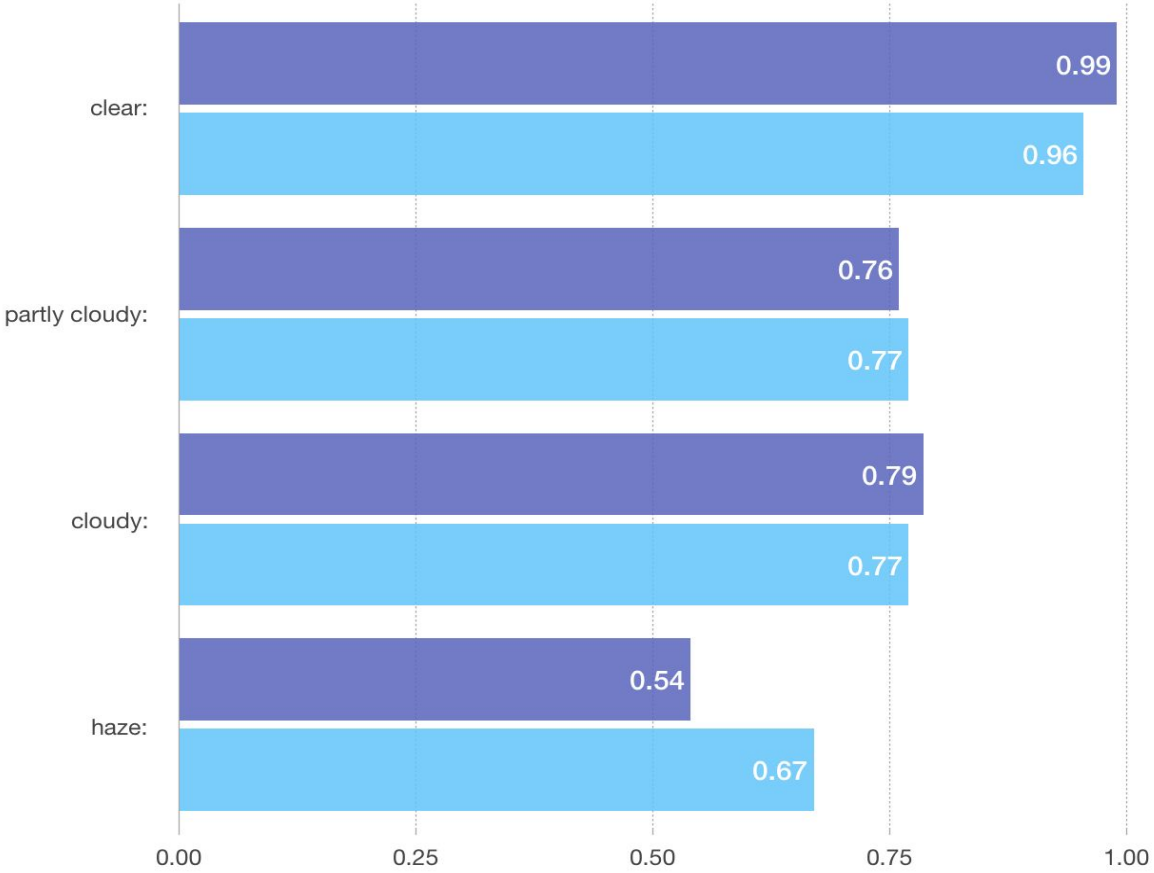
agriculture, haze , primary



The brightest pixels in the hazy image are considered to be scatter light.

Restore the image by removing the scatter light

Weather

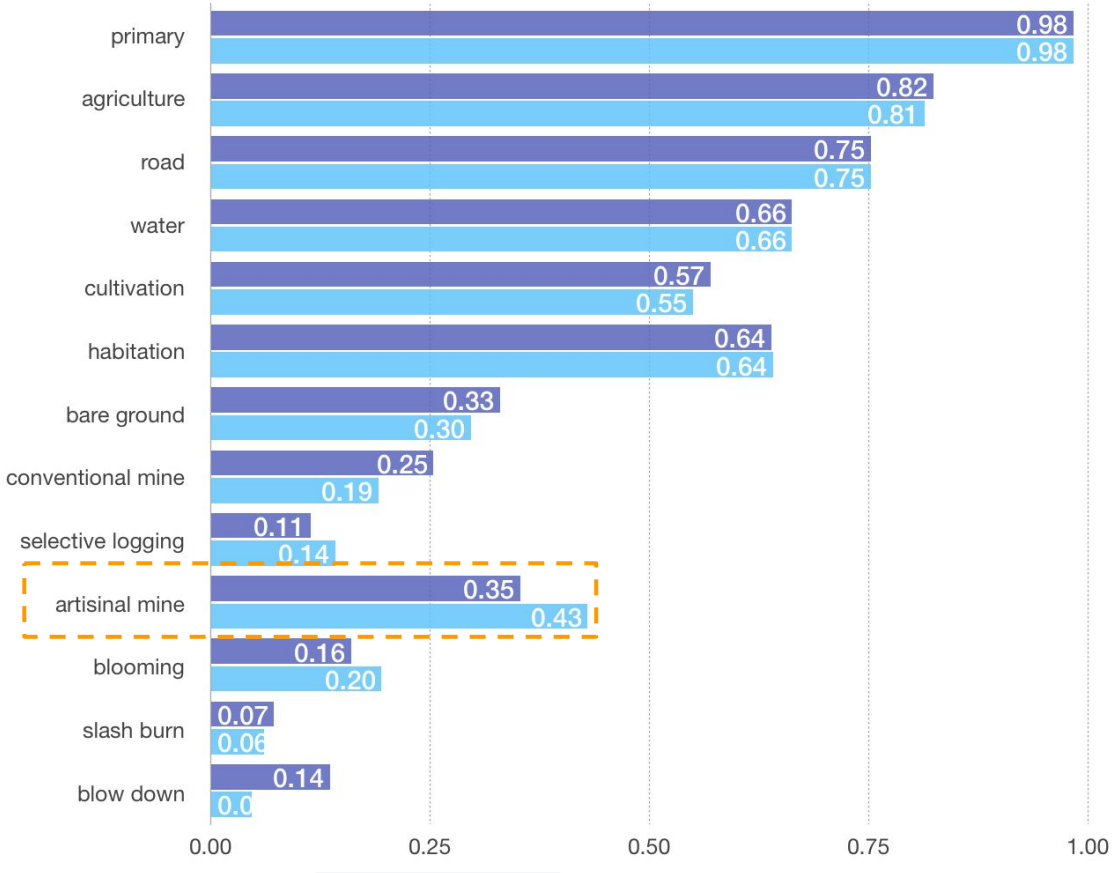


F2 score

- Original image
- Haze free image

Haze free increases F2 score on haze

Land cover



F2 score

- Original image
- Haze free image

Haze free increases F2 score on rare labels such as selective logging and artisanal mine

Weather + Land cover

Average F2 score : 0.81

Precision : 0.85

Recall : 0.73

Thanks

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