

CS 230: Project Proposal

Planet: Understanding the Amazon from Space (Computer Vision Project)

Bernardo Casares Rosa

bcasares@stanford.edu (06191000)

February 2, 2018

The problem that will be investigated for the final project for CS230 is the Kaggle data-set from planet lab: "Planet: Understanding the Amazon from Space".

The project is interesting because deforestation contributes to reduced biodiversity, habitat loss, climate change, and other devastating effects. Understanding the location of deforestation and human activity on forests can help governments and local authorities to respond quickly and effectively [Click here to see the Kaggle competition](#).

Additionally, the project is exciting because planet lab is the largest constellation of Earth-imaging satellites and familiarization with the data can lead to other interesting projects in the future.

There are several challenges for this project. First, there is no guarantee that the labeling is correct for all the images; scenes may either omit class labels or have incorrect class labels (as detailed in the data description). Additionally, most of the images have several labels. The fact that the images have several labels makes it hard to predict accurately and several simplifications could be made.

There are other implementations for the problem. However, the implementation for this project will be made from scratch. The first steps will be to analyze the data-set with machine learning algorithms from `sklearn`. Some possible algorithms include classification and clustering (k-means, nearest neighbors). Then, once an implementation is working, a convolutional neural network (CNN) is probably the best way to analyze the problem.

The project I am proposing has been solved by at least three other groups at Stanford University for CS231N. I plan to learn from their techniques and hopefully implement something better. In recent years, several papers have also been published for CNN and I hope to learn how to implement efficient CNN for visual recognition for the final report.

The kaggle competition (when active) used the F2 evaluation measure which is what I plan to use to evaluate my results.

The F2 evaluation is as follows: Let N be the total number of test samples, L_i and \hat{L}_i be the true and predicted labels for the i 'th test sample, respectively. Then:

$$P_i = \frac{|L_i \cap \hat{L}_i|}{|\hat{L}_i|}$$

$$R_i = \frac{|L_i \cap \hat{L}_i|}{|L_i|}$$

$$F2 = \frac{5}{N} \sum_{n=1}^N \frac{P_i R_i}{4P_i + R_i}$$

F2 penalizes false negatives more heavily than it penalizes false positives.

References

Kaggle Competition: <https://www.kaggle.com/c/planet-understanding-the-amazon-from-space>