

# **Proposal For ML System On Remote Sensing**

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## **Introduction**

Remote sensing is a novel technology that is able to detect and monitor the physical characteristics of an area by measuring its reflected and emitted radiation at a distance (typically from satellite or aircraft). The special images are collected by special cameras, which help researchers identify things about the Earth. For instance, people can locate the airport or measure the area of farmland. However, it is inefficient to identify these objects with human labor since satellites will produce thousands of images everyday. With the emergence of deep learning, these tasks can be hopefully implemented by deep learning models with accuracy and efficiency. In our project, we hope to combine the state-of-the-art deep learning algorithms with remote sensing technology.

## **Problem Statement**

In our project, we aim to solve the following the problems related to remote sensing images:

- How do we apply the current technology from computer vision on the remote sensing images for further analysis?
- How long does it take for a system to train the model on single GPU and multiple GPU, respectively?
- What is the performance of deep learning models on the analysis of remote sensing images, compared to results from human labor?

## **Objective**

The objective of our project is to establish a solid and comprehensive evaluation of the deep learning models on the analysis of the remote sensing images. Basically, the objective can be divided into three parts. First, we want to investigate the performance of the off-the-shelf deep learning models on remote image analysis. Second, we would like to evaluate the time consumed by the model when they are running on single GPU and multiple GPU. Last, we hope to propose some novel components on the models to further improve the performance of the models on the tasks.

## **Methodology**

The first step for our project is the literature review. Currently there is work on this topic. Some datasets from remote sensing have been released publicly. According to the dataset, the tasks we can implement include image classification, object detection and semantic segmentation. Up to now some latest work has proposed new models on these tasks including YOLO and Deeplab. The second step is to further train these models on the new datasets and evaluate their performance on

these tasks as well as their time consumed. At last, we would further propose new ideas on the models to see if it can further improve the performance of the model.

## **Reference**

[1] Zhu, Xiao Xiang, et al. "Deep learning in remote sensing: A comprehensive review and list of resources." *IEEE Geoscience and Remote Sensing Magazine* 5.4 (2017): 8-36.

[2] Redmon, Joseph, et al. "You only look once: Unified, real-time object detection." *Proceedings of the IEEE conference on computer vision and pattern recognition*. 2016.

[3] Chen, Liang-Chieh, et al. "Deeplab: Semantic image segmentation with deep convolutional nets, atrous convolution, and fully connected crfs." *IEEE transactions on pattern analysis and machine intelligence* 40.4 (2017): 834-848.