Identifying Planes in Satellite Imagery

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Problem Statement & Analysis

- Machine learning model to identify changes in satellite imagery
- To address the need for automated airport monitoring
    - Manual monitoring of airports is labor intensive
    - Cost inefficient
    - Prone to human error
- Projects significance lies in:
    - Enhancing security
    - Improving operational efficiency
    - Reducing costs
    - Minimizing impact on environment by airports
- Broader use cases are possible other than airports such as defense

Use Case Scenarios

1. Environmental Impact Assessment and Management:

- Detect changes in vegetation, water bodies, and land use.
- Assess ecological footprint and plan green initiatives.
- Aid in compliance with environmental regulations.

2. Optimized Airport Expansion and Development Planning:

- Analyze land use for strategic expansion.
- Monitor construction activities and compliance.
- Identify suitable areas for new infrastructure.

3. Disaster Response and Crisis Management:

- Quick assessment of damages in natural disasters or accidents.
- Guide emergency operations and infrastructure repair.
- Enhance response effectiveness and minimize operational downtime.

AI Algorithm and Model

-   Prepare Data: Normalized images from our data set, then split the data into a training, testing, and validation set
-   Model: We designed two Convolutional Neural Network (CNN) using the Tensorflow library for one and PyTorch for the other
-   Our CNNs had 9 layers, one input layer, 7 hidden layers, and one output layer
-   For one of the CNNs categorical cross entropy was used as the loss function in training and the other used binary cross entropy
-   The models were then tested against the test portion of the data set after training to report a percent accuracy.
-   After this we attempted to then scan over a larger image and identify where planes were within them

Results and Demonstration

Predictions on Scene
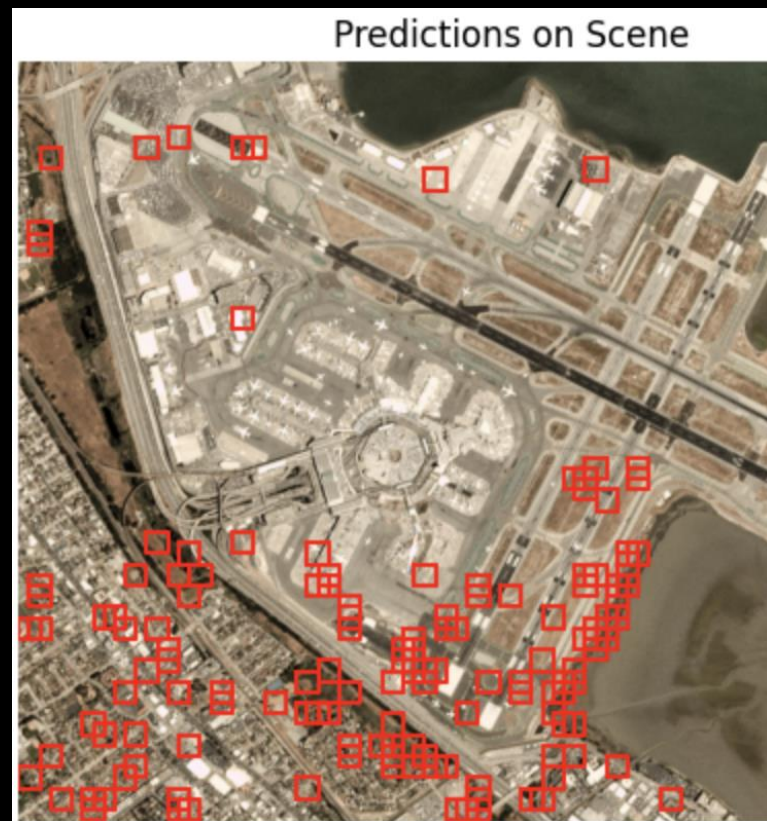
Lessons Learned

- Importance of a robust data set
- Algorithm selection
- Model selection
- Performance optimization

Questions?