Protecting National Airspaces: Improved Object Detection and Classification

Author: Prarabdha (Osho) Yonzon
Lincoln Laboratory Advisors: Dr. Lily Lee, Dr. Joe Belarge, and Justin Yao
Faculty Advisor: Jordan Levine

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Problem Statement

Problem: Classify 20 unique objects, including aircraft, vehicles, people, and animals in different images.

Importance: Fine-grain information enables operators, ranging from military to national and state agencies, to make critical decisions accurately.

Objective

Our goal is to develop a model pipeline capable of both fast inference time and high accuracy in an effort to improve on established MIT LL algorithms.

Model Pipeline 1

Models: DEtection TRansformer (DETR)

Model Pipeline 2

Models:
- DETR & Residual Network (ResNet)
- DETR & Context-aware Attentional Pooling (CAP)

Results

Model Pipeline 2’s DETR & CAP was the best performing model.

CAP obtained 0.47% class error which is a 89.52% point class error improvement from Model Pipeline 1.

Impact

Curated a unique fine-grain classification dataset.

Created a model pipeline capable of giving end users fine-grain information allowing them to make informed decisions regarding airspace safety.

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