Overview of Demo

(see Demo_Instructions.doc for further detail)

DEFENSE INNOVATION UNIT

Given:

Clear and easily labeled training/validation sets to tune a model for a CV classification task (classes=ship, plane, empty seabed)

Training/Validation Data (80/20 random split)

-239 Large Ships (military, logistic, etc)

-38 Planes (single-engine, multi-engine, military, etc)

-378 Empty Seabed/Seafloor images (no manmade objects in FOV)

Datasets:
1. Seabed_Objects_Demo/unbalanced_training_validation_set
2. Seabed_Objects_Demo/balanced_training_validation_set

Train and Validate a model:

Achieve a nominal, acceptable level of performance (>95% e.g.)

Problems to address

-Imbalanced dataset, model bias

-Tuning

-Automated/User-friendly data pipeline

-Clear performance metrics

Two trained and validated models and a PyTorch notebook
1. unbalanced_model.pth
2. balanced_model.pth
3. DIU_AMMO_Demo.ipynb

Enter a "new environment":

Ingest test data and assess model

Test Data

-138 Small or Limited-detail Ships

-24 Fractured or Limited-detail Planes

-199 New Empty Seabed/Seafloor images

Test set:
Seabed_Objects_Demo/test_set

Assess model under test conditions

Possible issues that arise:

-Unacceptable performance degradation

-Incongruous data

-The need to retrain the model

-Contested/degraded operations

Initial test set results included in DIU_AMMO_Demo.ipynb notebook with saliency maps and T-SNE plots

Implement MLOps concepts and capabilities:

Continue the ML lifecycle and update

Addresses some/all of the following:

-Model management, version tracking, storage, CI/CD

-OOD and data drift detection

-Experiment tracking, hyperparameter search metadata/results

-Management of data provenance and quality