Title Page

Earth Observation Classification — Automated Report

Generated by the EO training pipeline.

Abstract:
This automated report documents the remote sensing pipeline built for ESA WorldCover land-cover classification. It combines Sentinel-2 RGB tiles (128×128) with the ESA WorldCover 2021 map to derive per-pixel land-cover labels across the Delhi NCR bounding box.

Datasets & Preprocessing

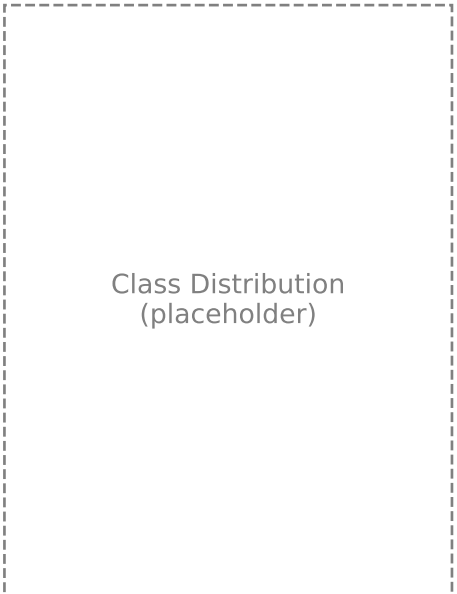
Inputs:
- Data/worldcover_bbox_delhi_ncr_2021.tif (ESA WorldCover land-cover raster)
- Data/rgb/ (Sentinel-2 RGB tiles named with latitude/longitude)

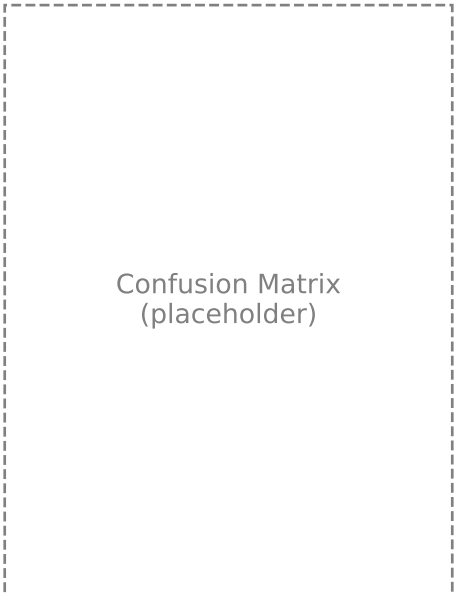
Preprocessing steps:
1. Parse filenames or supplied metadata to build Dataset/metadata.csv.
2. Sample ESA WorldCover patches to derive labels (assigned_code, label, dominance, keep).
3. Split data into train/test manifests with optional dominance filtering and stratification.

Methods

Labeling ensures coordinates are reprojected into the raster CRS before reading boundless 128×128 patches. Mode class and dominance drive quality control. The classifier uses a ResNet18 backbone with torchvision weights, heavy data augmentation, and optional class weighting.

Results Overview





Results & Metrics

Macro F1: <pending>
TorchMetrics Macro F1: <pending>

Discussion & Next Steps

Review the confusion matrix, per-class counts, and qualitative grids to identify systematic errors. Consider collecting more balanced samples for under-represented ESA classes and experimenting with alternative architectures (e.g., EfficientNet, ViT) or multi-temporal stacks.

Appendix: Reproduction Steps

Reproduction commands:
1. python scripts/create_metadata.py
2. python scripts/label_from_landcover.py
3. python scripts/split_dataset.py
4. python scripts/train_model.py --model cnn --epochs 10 --batch-size 32 --img-dir Data/rgb
5. python scripts/visualize_results.py --img-dir Data/rgb
6. python scripts/grid_map.py