1. EDA REPORT

Land Type Classification - Exploratory Data Analysis Report

Date: [Current Date]
Project: Land Type Classification using EuroSAT Sentinel-2 Images
Dataset: EuroSAT RGB (27,000 images, 10 classes)

Executive Summary

This exploratory data analysis examines the EuroSAT dataset containing 27,000 satellite images across 10 land type categories. The analysis reveals a moderately balanced dataset with some class imbalances, diverse visual characteristics across categories, and good potential for deep learning model development.

Dataset Overview

```text
AnnualCrop: 3,000 images (11.1%)
Forest: 3,000 images (11.1%)
HerbaceousVegetation: 3,000 images (11.1%)
Highway: 2,500 images (9.3%)
Industrial: 2,500 images (9.3%)
Pasture: 2,000 images (7.4%)
PermanentCrop: 2,500 images (9.3%)
Residential: 3,000 images (11.1%)
River: 2,500 images (9.3%)
SeaLake: 3,000 images (11.1%)
```

Key Findings

1. Data Quality Assessment

All images are properly labeled and accessible

Consistent 64x64 pixel resolution across dataset

RGB color space uniformity maintained

No corrupted or missing images detected

2. Class Balance Analysis

The dataset shows moderate class imbalance

Pasture class has the fewest samples (2,000)

Seven classes have adequate representation (2,500-3,000 samples)

Data augmentation recommended for minority classes

3. Visual Characteristics

Clear visual distinctions between natural and man-made classes

Seasonal variations visible in agricultural classes

Urban classes show structural patterns

Water bodies exhibit distinctive color signatures

Recommendations

Implement class-weighted loss functions to handle imbalance

Apply data augmentation for underrepresented classes

Consider transfer learning for improved feature extraction

Monitor model performance across all classes during training