Developing Random Forest Models Towards Generating LAI From VIIRS Data

Beatrice Polk
Mentors: Dr. Heshun Wang, Dr. Emily Faber

Objectives

- Explore data quality control effects on model operation
- Balance model hyperparameters between accuracy and runtime length
- Tune model efficiency for underperforming biomes

Data Overview

- Surface reflectance bands (I1, I2, I3) taken from J01
- Existing LAI products including VNP, MCD, GLASS, GEO
- Filtered data to reduce noise via examining quality flags, temporal consistency, NDVI outliers, etc.

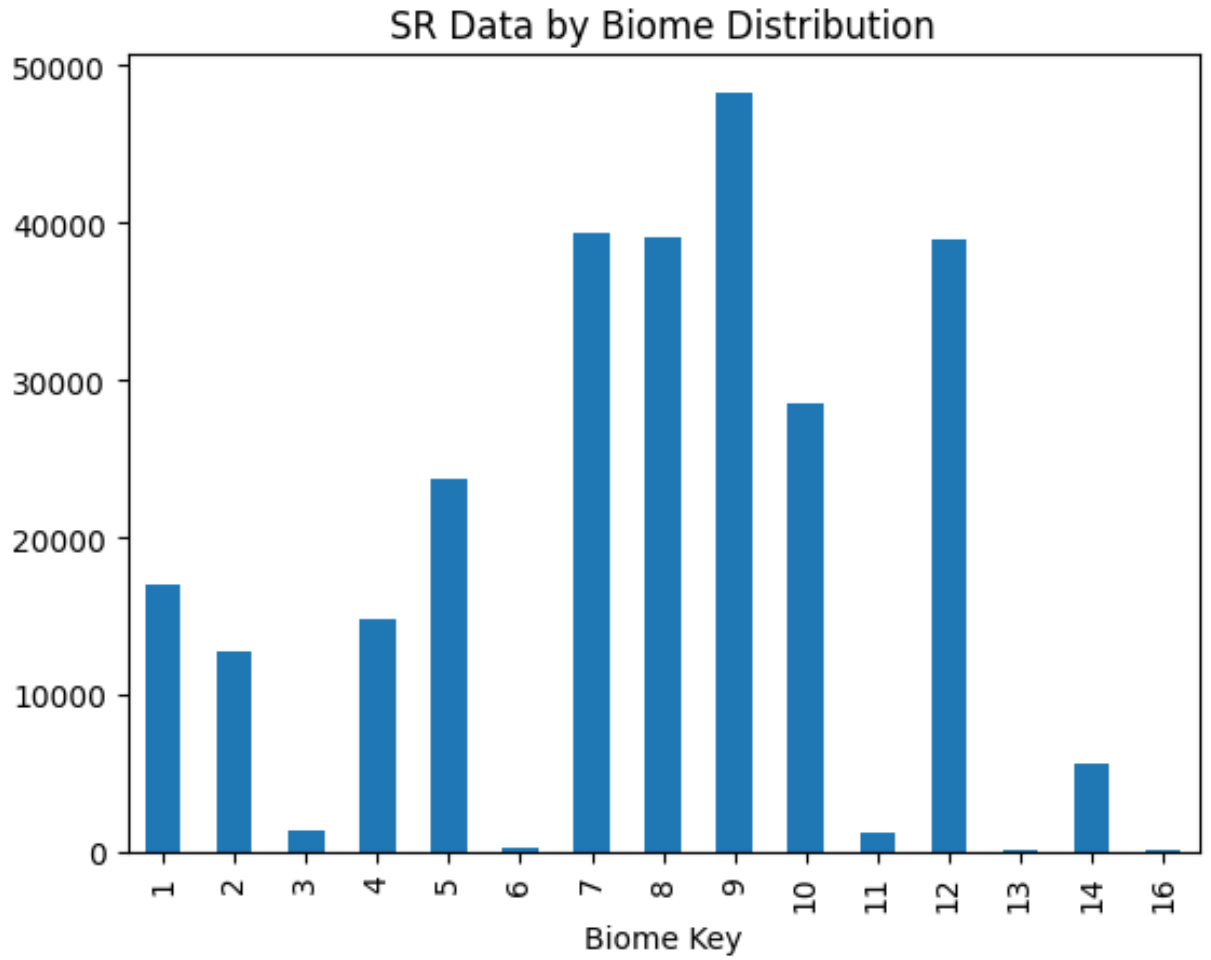


Figure 1: Surface reflectance training data grouped to show the distribution of biomes

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Random Forest Performance

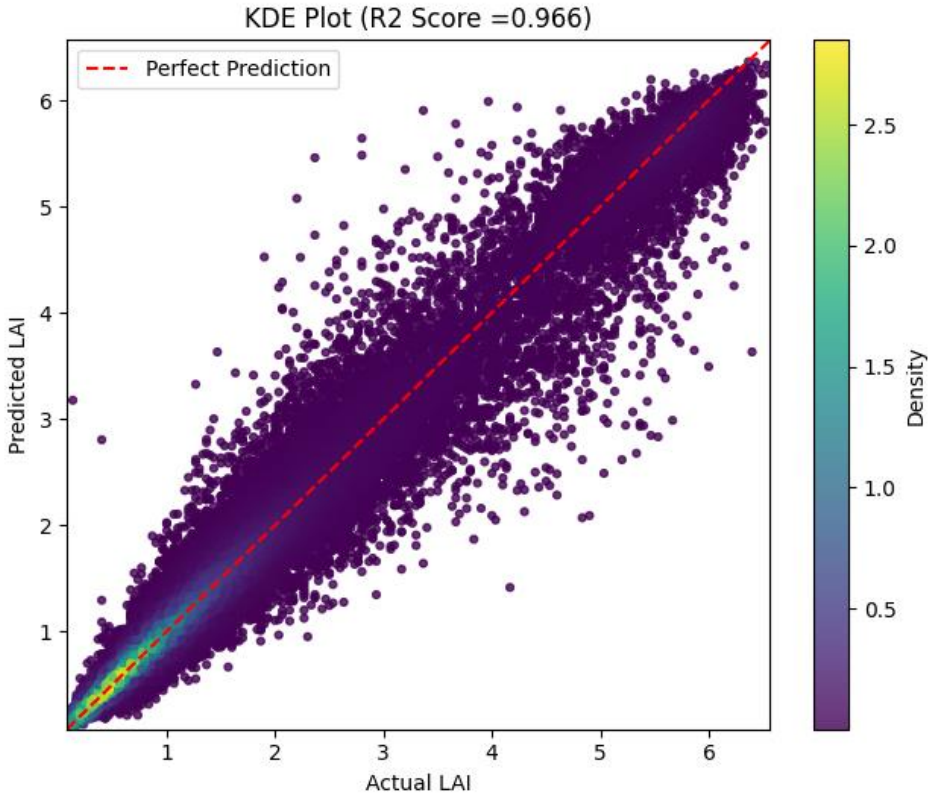


Figure 2: Density Plot of Actual Observed LAI v. LAI Model Prediction

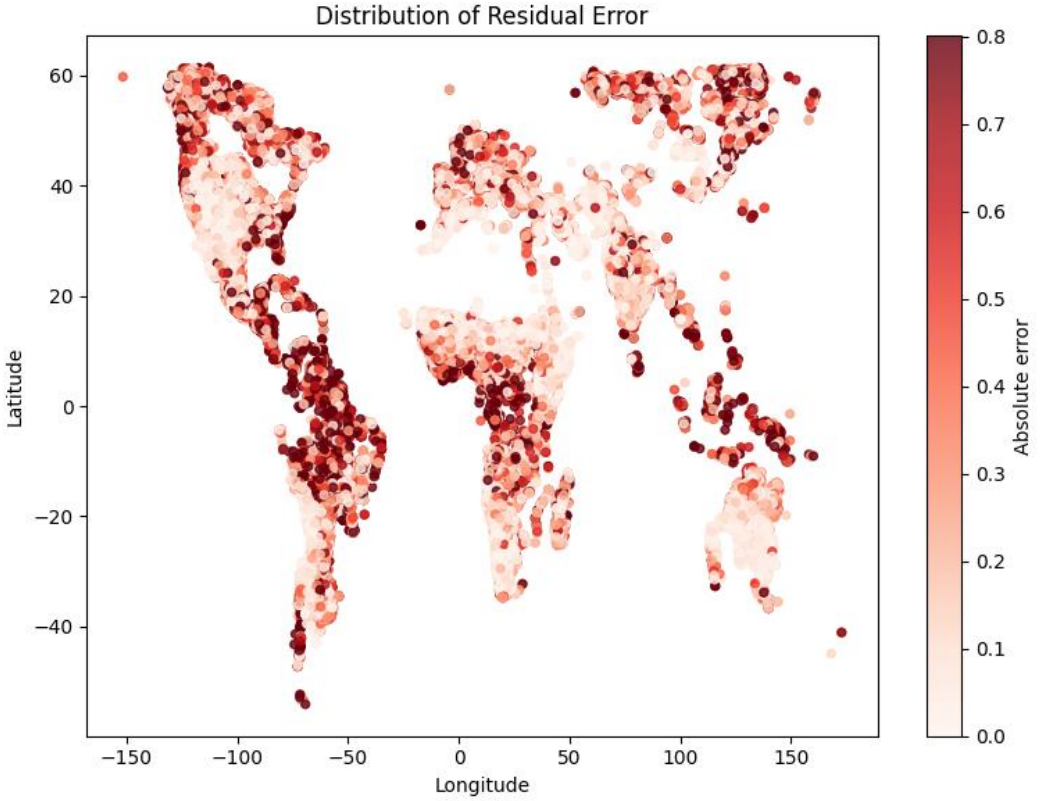


Figure 3: Distribution of the Residual (Actual – Predicted Value) Across Lat & Long

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Biome Specific Improvement

I. Focus on Improvement in Overall Model

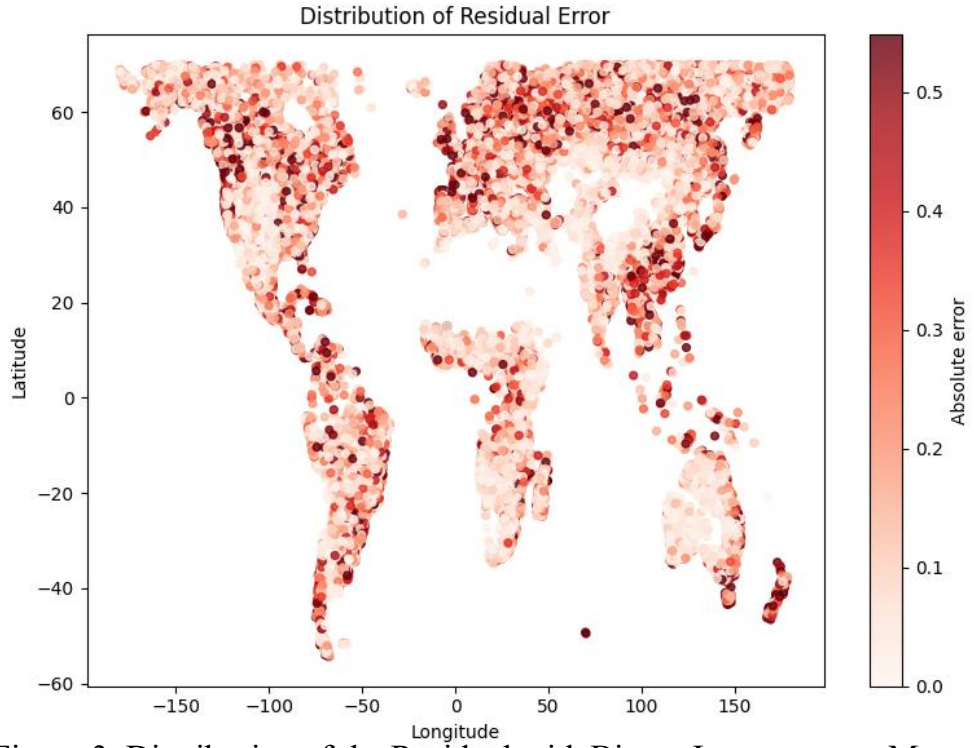


Figure 3: Distribution of the Residual with Biome Improvement Measures

II. Create Biome Specific Models

Usage of Biome Data within Model	Biome 2 R^2 Score
Overall Model (Includes Data with All Biomes)	0.655
Biome Specific Model using 50 Estimators	0.684
Biome Specific Model using 200 Estimators	0.715

Table 1: Demonstration of Improvement Achieved From Biome Specific Models Using Biome 2

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