Forest Cover Type Classification

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INTRODUCTION

- The United States of America has many diverse biomes (deserts, forests, mountains...etc.).

- Forests have many trees that form a cover over the forest. The types of these covers can be determined from certain factors; such as **elevation** and **soil types**.

PROBLEM STATMENT

What are the factors that determine the types of forest covers?

OBJECTIVE

Predict forest cover types based on certain factors

DATA SET

Data Source:
archive.ics.uci.edu

Before Cleaning:

581012 rows

55 columns

After Cleaning:

536431 rows

53 columns

EXPLANING DATA

- The dataset contains **54** features and **1** target variable.
  - **10** numeric features.
  - **44** categorical (dummies) features.

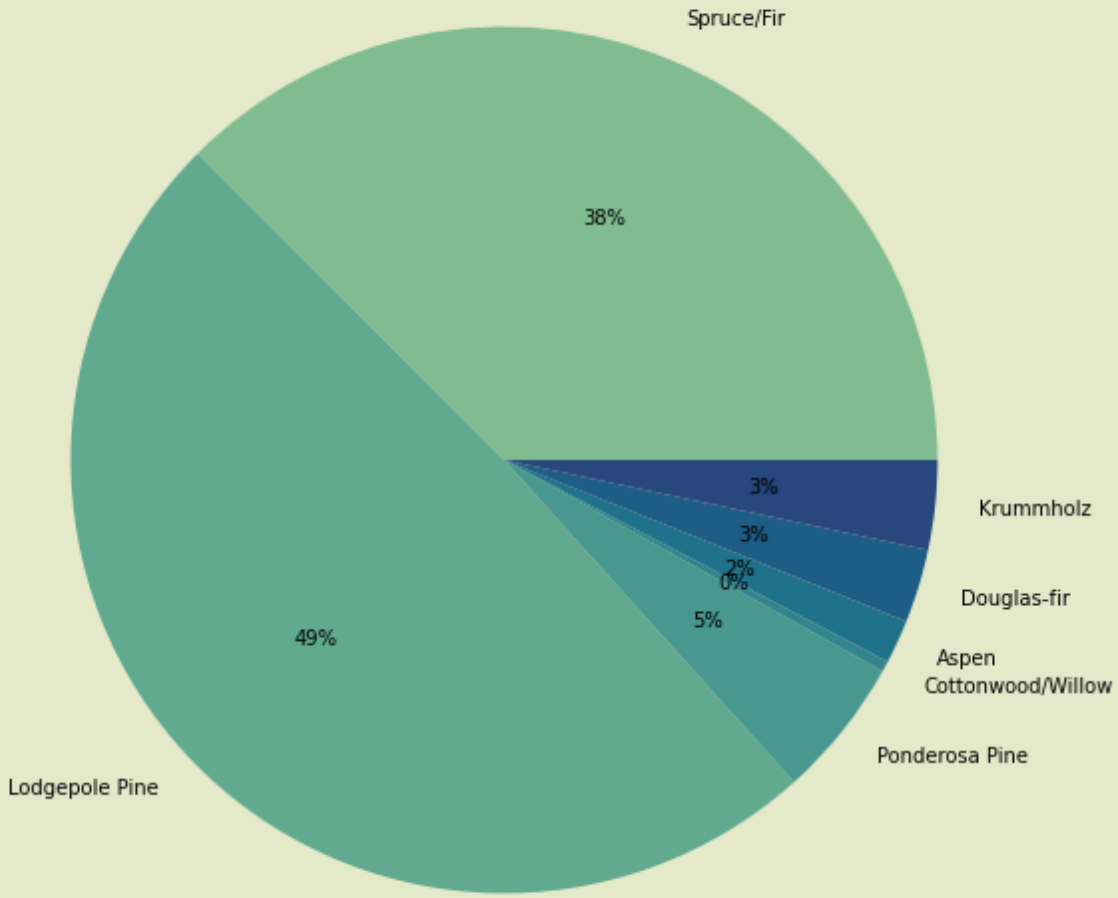
- The target has **7** classes represented as numbers ranging from **1** to **7**.

- Each number represents a type of forest cover.

Class	Name
1	Spruce / Fir
2	Lodgepole Pine
3	Ponderosa Pine
4	Cottonwood / Willow
5	Aspen
6	Douglas-fir
7	Krummholz

TARGET IMBALANCE

- To reduce the imbalance in the data, all the classes were grouped together except for Spruce/Fir and Lodgepole Pine which make up 87% of the data.



TOOLS

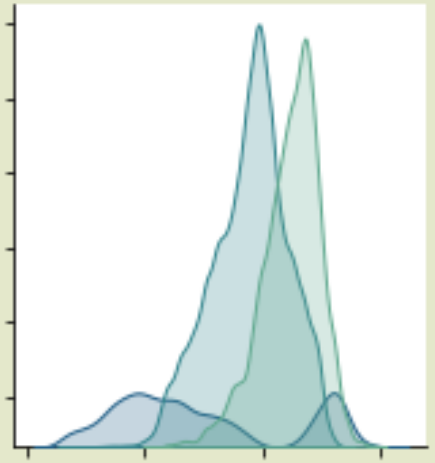

pandas
seaborn
scikit
learn
SciPy
NumPy
SQLAlchemy
matplotlib

PROJECT WORKFLOW

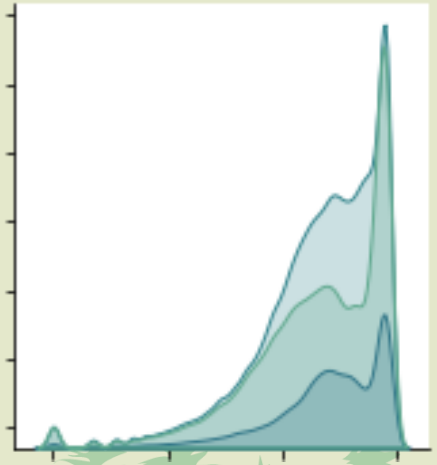
FEATURE ENGINEERING

- Tried many feature engineering techniques but most did not affect the model scores, or affected them negatively.
- Only 2 columns were modified, Elevation and Aspect.
- Log value was taken for each column which helped with the skewness and distribution of the data.

Elevation



Aspect



CORRELATIONS WITH TARGET

Highest correlated Features with target:

- The Elevation feature has high negative correlation (**-0.54)** with the target Forest_Cover_Type

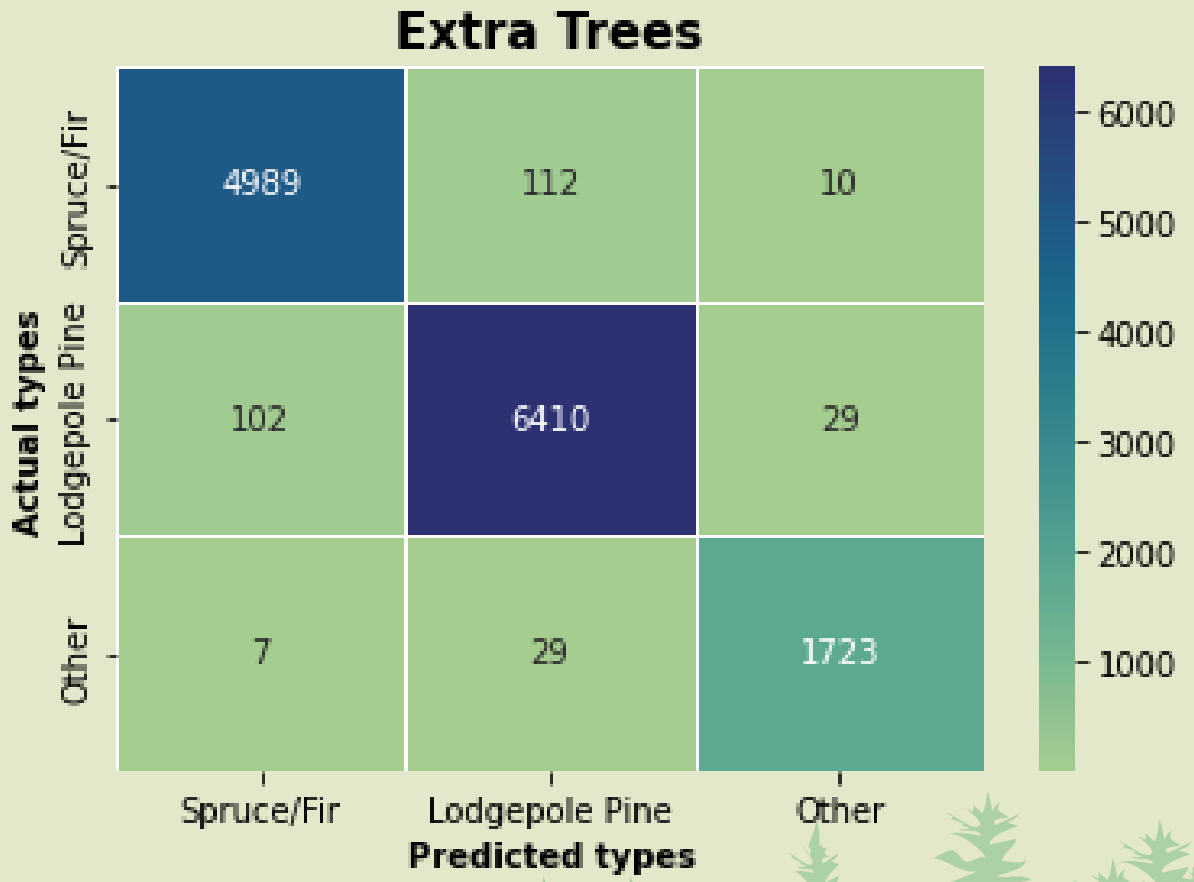
- The Horizontal_Distance_To_Roadways feature has high negative correlation (**-0.20)** with the target Forest_Cover_Type

MODEL TRAINING & VALIDATION SCORES (OneVsRest)

Model	Train		Validation	
	Accuracy	F1 Score	Accuracy	F1 Score
K-Nearest Neighbor (Neighbors=5)	89.57%	89.57%	81.06%	81.09%
Logistic Regression (C=100)	66.32%	65.74%	66.24%	65.70%
Decision Trees (Depth=4)	71.38%	71.02%	70.76%	70.42%
Random Forest (Trees=100)	100%	100%	96.62%	96.62%
Extra Trees Classifier (Trees=100)	100%	100%	96.68%	96.68%
Gaussian Naive Bayes	58.80%	56.08%	58.48%	55.58%
Bernoulli Naive Bayes	64.86%	64.36%	64.60%	64.17%

CONCLUSION

- As seen from the previous table, the best model in terms of performance is **Extra Trees**.
- Grid Search was used to tune and find the best hyper parameters for the chosen model.
- The test result after tuning was **97.85%**



Thanks!