

HOW RANDOM IS YOUR FOREST?

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5/14/2018

Agenda

1. Background & Objectives
2. Exploratory Data Analysis
3. Models Overview
4. Conclusion

A photograph of a lush, green forest. Tall, straight tree trunks are visible in the background, and the foreground is filled with dense ferns and other undergrowth. Two people are walking away from the camera on a narrow dirt path that leads into the forest. The overall atmosphere is serene and natural.

BACKGROUND & OBJECTIVES

Background

- Forest fire in Roosevelt National Forest
- Severely damages soil quality
- Harms biodiversity and overall health



Objectives



1. Predict the predominant tree type
2. Determine the optimal soil type

A photograph of a dense forest with tall, straight trees and a path leading into the distance. The forest floor is covered in green ferns and moss. The lighting is soft and diffused, suggesting an overcast day. The overall tone is green and natural.

EDA

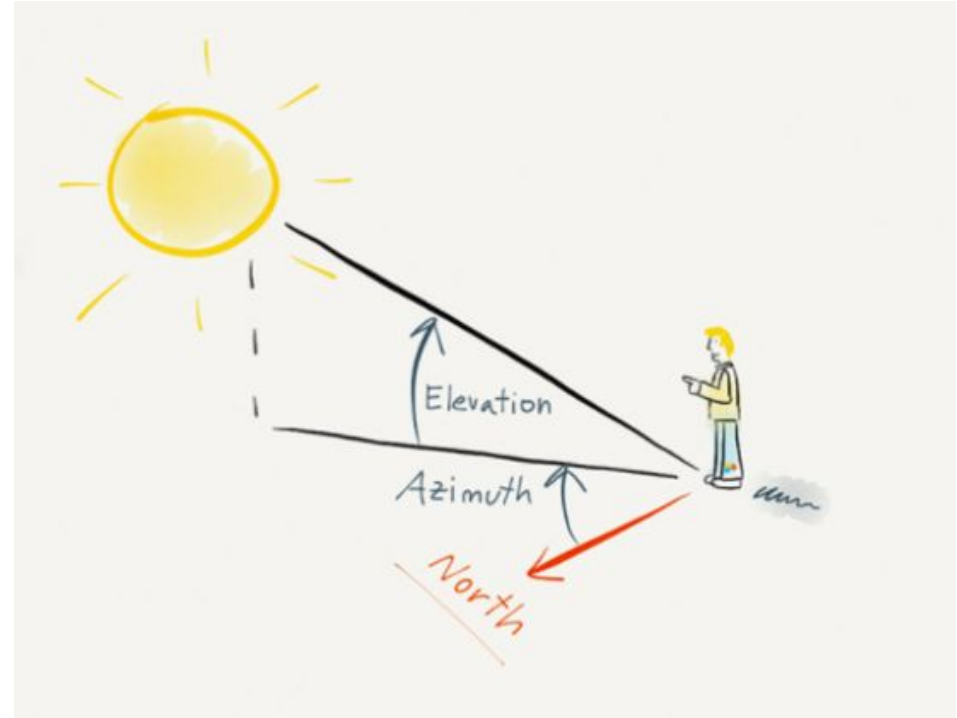
Data

Cartographic Variables:

- Elevation
- Slope
- Aspect (Azimuth)
- Distance to water, road, fire

Environmental Variables:

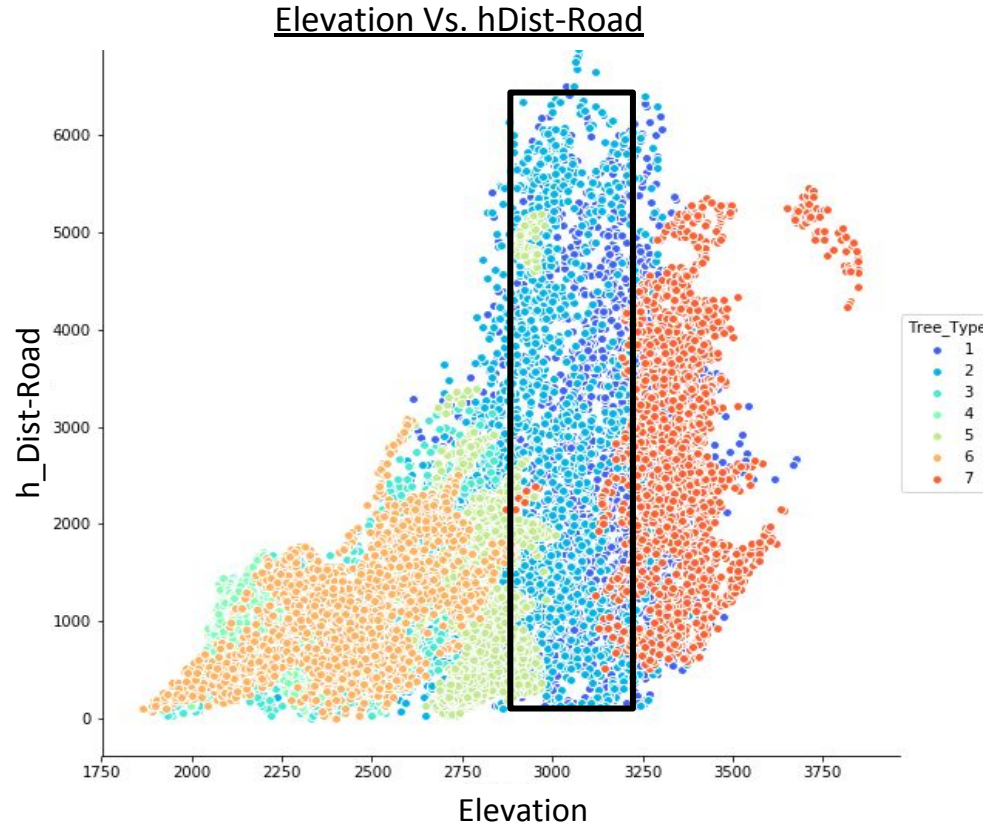
- Tree Type* (7)
- Wilderness areas* (4)
- Soil types* (40)
- Shade levels



* = Categorical

EDA

- Visualized the highest correlated features in respect to Tree Type



MODELS OVERVIEW



Models Overview

Base



```
graph TD; Base[Base] --> GaussianNB[Gaussian N.B.]; KNN[KNN];
```

Gaussian N.B.

KNN

Models Overview

Base



```
graph TD; Base[Base] --> Gaussian["Gaussian N.B.  
(0.54)"]; Gaussian --> KNN["KNN  
(0.83)"]
```

Gaussian N.B.
(0.54)

KNN
(0.83)

Models Overview

Base



Gaussian N.B.
(0.54)

KNN
(0.83)

Advanced



SVC (Built-in)

SVC (Manual)

Models Overview

Base



Gaussian N.B.
(0.54)

KNN
(0.83)

Advanced



SVC (Built-in)
(0.84)

SVC (Manual)
(0.79)

Models Overview

Base



Gaussian N.B.
(0.54)

KNN
(0.83)

Advanced



SVC (Built-in)
(0.84)

SVC (Manual)
(0.79)

Tree Methods



Decision Tree

Extra Trees

Random Forest

Models Overview

Base



Gaussian N.B.
(0.54)

KNN
(0.83)

Advanced



SVC (Built-in)
(0.84)

SVC (Manual)
(0.79)

Tree Methods



Decision Tree
(0.8)

Extra Trees
(0.84)

Random Forest
(0.87)

Models Overview

Base



Gaussian N.B.
(0.54)

KNN
(0.83)

Advanced



SVC (Built-in)
(0.84)

SVC (Manual)
(0.79)

Tree Methods

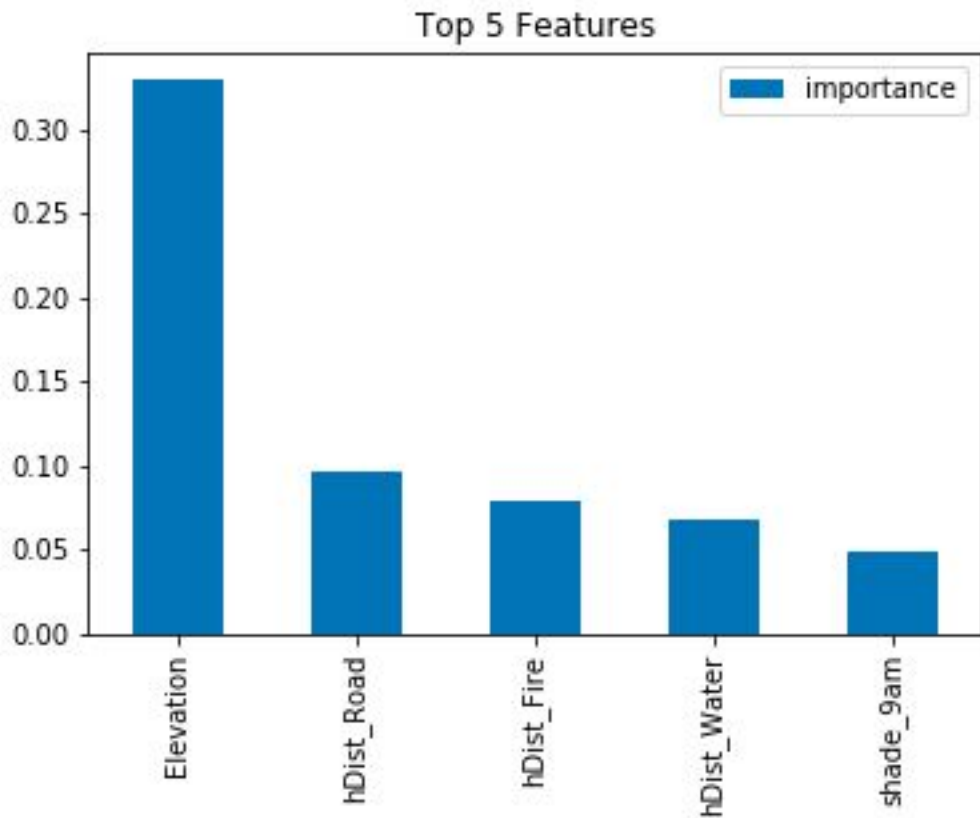


Decision Tree
(0.8)

Extra Trees
(0.84)

Random Forest
(0.87)

Feature Importance

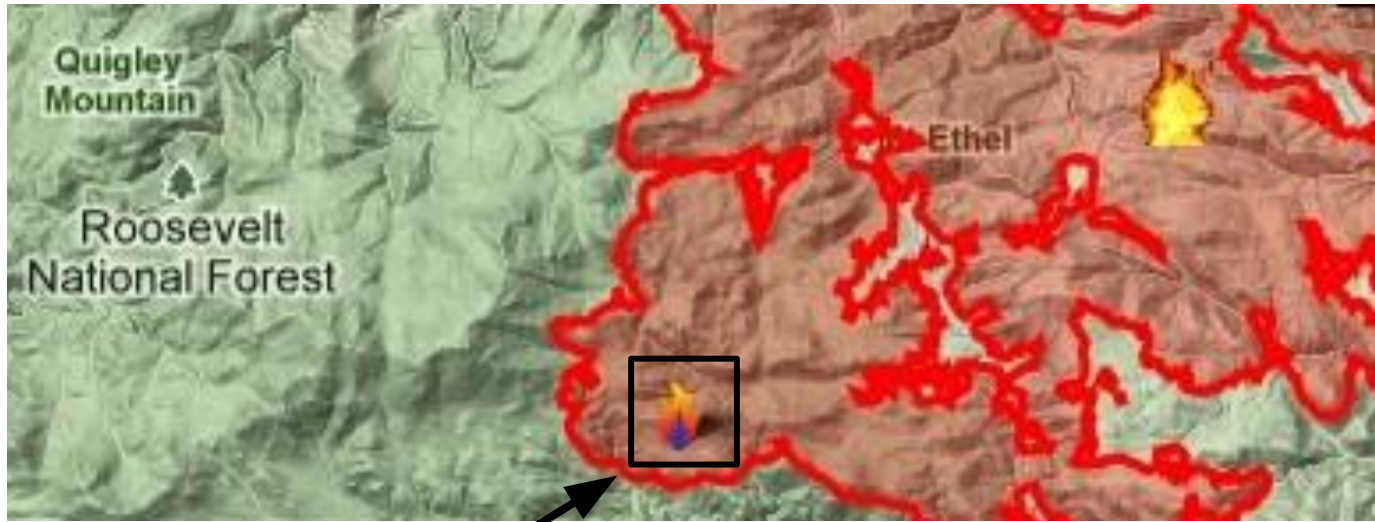


CONCLUSION

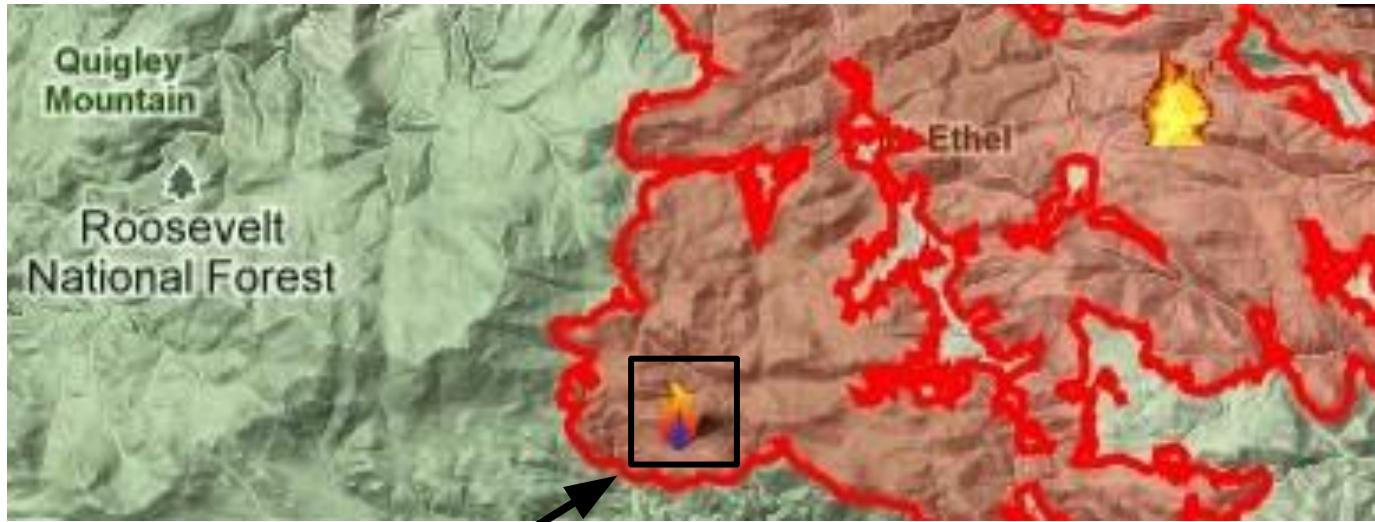




1. Predict tree type
2. Determine optimal soil type



1. Predict tree type: **Tree Type 5 - Cottonwood**
2. Determine optimal soil type: ???



1. Predict tree type: **Tree Type 5 - Cottonwood**
2. Determine optimal soil type:
 - **Wilderness Area: 1 (Rawah)**
 - **Elevation: 2771**

Soil Types for Cottonwood

- Depending on it's wilderness area and elevation

Tree Type 5 - Cottonwood

WA1 - Rawah		WA3 - Comanche Peak	
Elevation	Soil Type	Elevation	Soil Type
2509	ST18	2597	ST2
2645	ST16	2634	ST28
2770	ST30	2640	ST20
2781	ST29	2737	ST10
2830	ST24	2748	ST17

Conclusion



1. Predict tree type: **Tree Type 5 - Cottonwood**
2. Determine optimal soil type: **ST30 - Como Soil**

THANK YOU!

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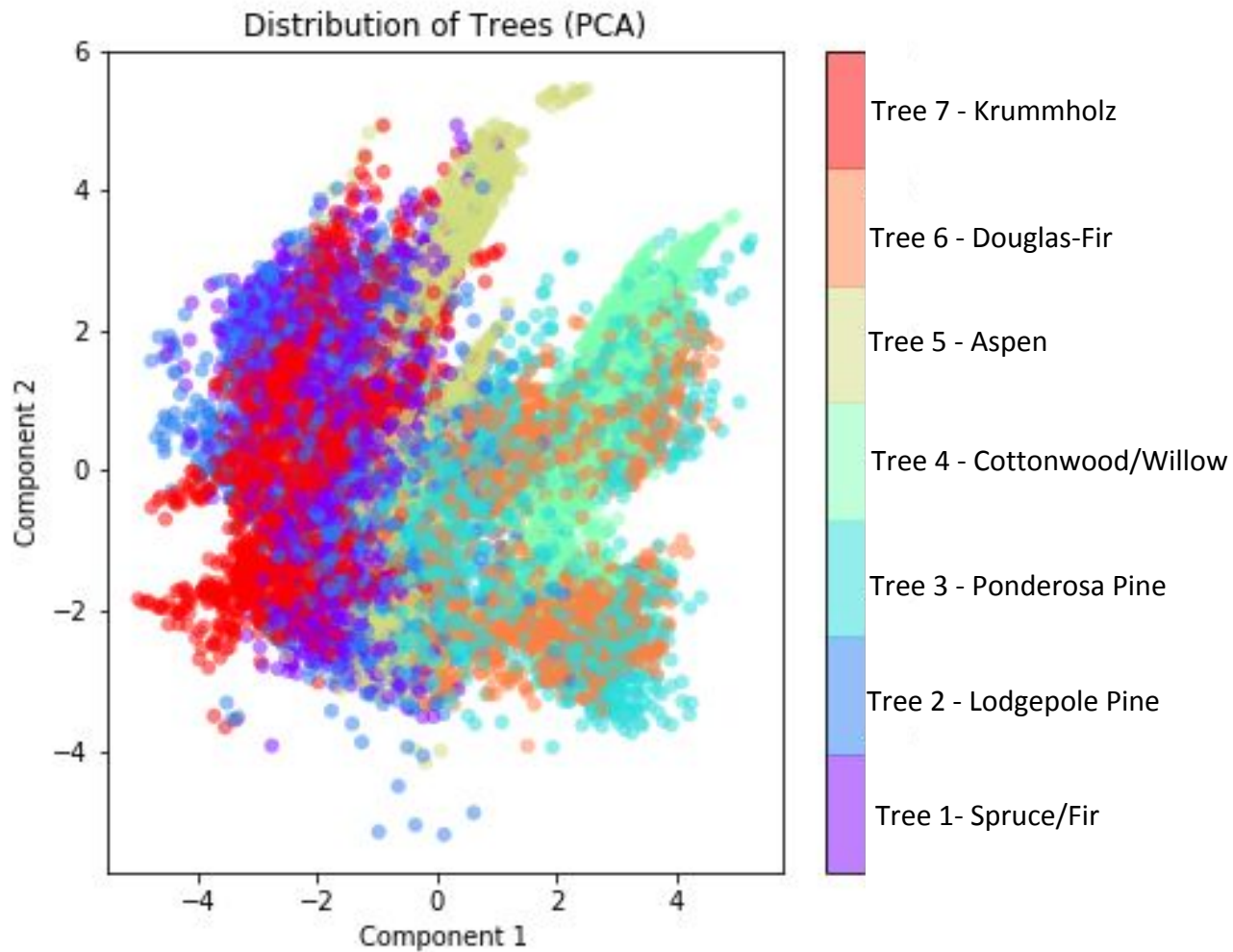
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GITHUB: [GITHUB.COM/BENLIN100](https://github.com/BENLIN100)

A photograph of a dense forest with tall, straight trees and a path leading into the distance. The scene is misty or foggy, creating a soft, ethereal atmosphere. The trees are mostly evergreens, and the ground is covered in ferns and other forest floor vegetation. Two people are visible in the distance, walking along the path. The word "APPENDIX" is overlaid in the center of the image in a large, black, handwritten-style font.

APPENDIX

EDA

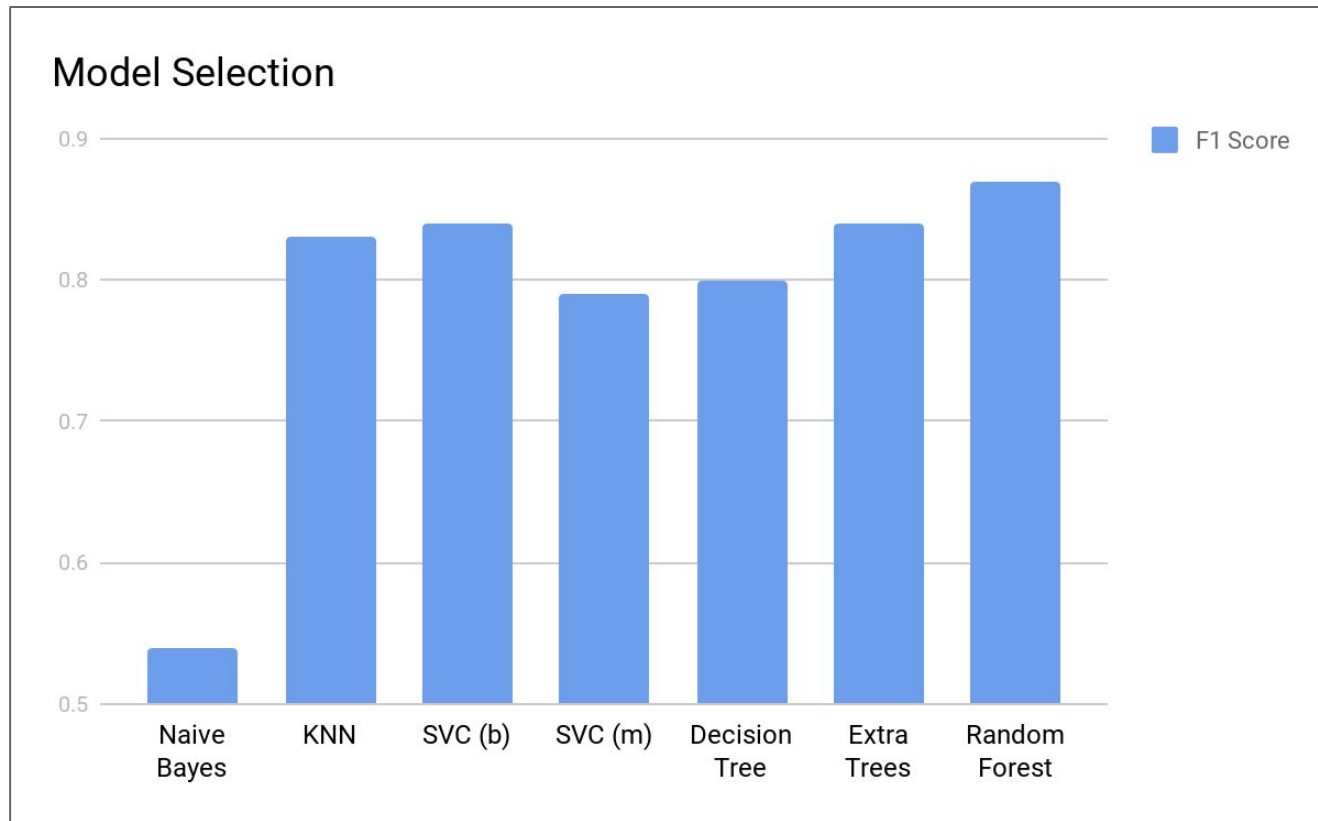


Models Overview

- Base Gaussian Naive Bayes model
- KNN
- Support Vector Classifier (One vs. Rest)
 - Built-in Vs. Manual
- Decision Tree Classifier
- Extra Trees Classifier
- Random Forest Classifier

Model Selection

- Main metric: F1 score (hold out test set)



Model Analysis

