What Caused These Wildfires?

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Project 03 - Classification
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Introduction

- Motivation

- Goals

➔ Help decrease wildfire occurrence

➔ Speed up the process for holding people accountable

Introduction

- Motivation

- Goals
  → Automate the process for determining the cause of a wildfire

  → Optimize use of investigatory manpower

Methods

- Data

- Tools

- Metrics

- Models

➔ Kaggle dataset:
- ◆ SQLite database
- ◆ 1.88 million U.S. wildfires
- ◆ Limit to Western U.S.

➔ Data labels:
- ◆ 13 unique cause codes
- ◆ Aggregate into 4 categories

Methods

- Data

- Tools

- Metrics

- Models

→ SQLite
  - ◆ data management
→ SciKit-Learn
  - ◆ modeling, metrics
→ Matplotlib
  - ◆ visualization

Methods

- Data

- Tools

- Metrics

- Models

→ <u>A</u>rea <u>U</u>nder the *Receiver Operating Characteristic* <u>C</u>urve (AUC)
  - ◆ classifies output quality
  - ◆ true positives vs. false positives
  - ◆ perfect score: AUC = 1.0

Methods

- Data

- Tools

- Metrics

- Models

➔ "One vs. All" combinations
➔ Tune parameters
➔ Model types:
   ◆ Logistic Regression
   ◆ K Nearest Neighbors
   ◆ Decision Tree
   ◆ Random Forest

Results
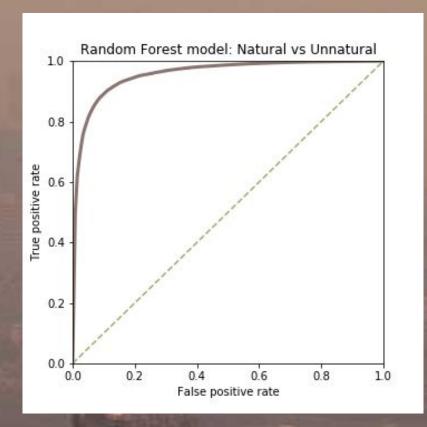
- Final Model

- Scores

- Graph

➔ Binary classification
  ◆ "natural" vs. "unnatural"
➔ Random Forest Classifier
  ◆ n = 50 estimators

Results

- Final Model

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➔ Accuracy = 90.6%
➔ AUC = 0.956

Results

- Final Model

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Random Forest model: Natural vs Unnatural

Recommendation

1. Predict whether a fire's cause is natural

2. If not natural, proceed with investigation

Future Work

- Extend to all of U.S.

- Predict individual causes

Thank You

Appendix

Data source: https://www.kaggle.com/rtatman/188-million-us-wildfires

Appendix

Those of us who were here last summer
Witnessed smoke from hundreds of wildfires
Shrouding the famously clean air of
Our emerald green city with poison,
A miasma that choked our lungs and stung our eyes.

We confined ourselves to our homes
And sensitive groups missed work
While ash fell from the sky like snow.