

Diving Deeper into Understanding California Fires

COGS219 Final

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Part I. Introduction

Deeper Look into California Forest Fires

- According to [CAL Fire 2025 Incident Archive](#)
 - 545 wildfires report with a total of 58,085 acres burned
 - 29 recorded fatalities
- Major damages and costs include
 - \$20 billion in insured losses
 - Economic costs to recover totalling to \$50 billion



Part II. Datasets

Datasets

- **California wildfire data (2000 - 2022)**

This dataset is based on NADA MODIS satellite NRT near real time data. You will find both USA and California daily wildfire details in this dataset from 2000 - March 25th 2022.

- **California environmental conditions data**

This dataset is an environmental conditions dataframe scraped from CIMIS weather stations using a selenium chromedriver.

Part III. Data Analysis & Results

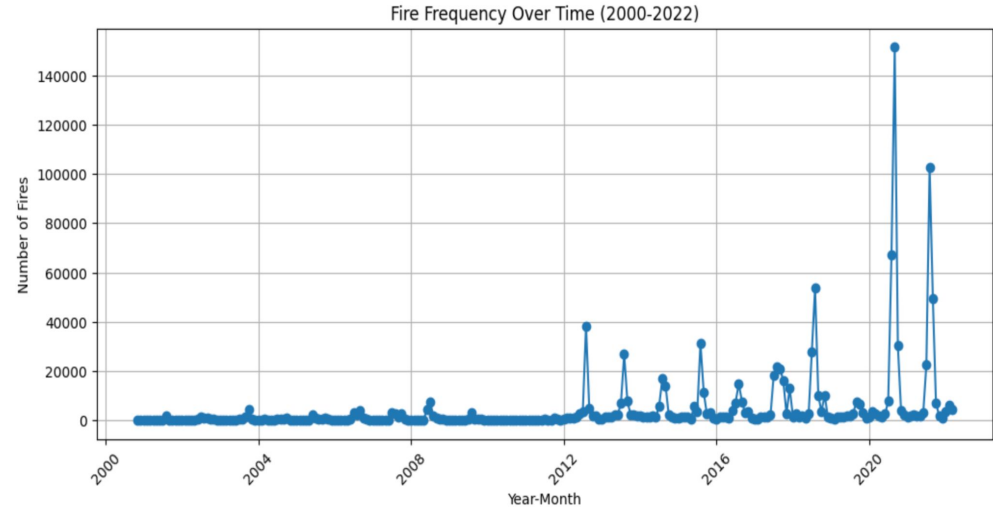
Question 1

Which factors have the greatest influence on fire frequency?

Question 1

How Often Do Fires Occur?

- Fire frequency has fluctuated but generally increased over time.
- Yearly trends show an overall upward trajectory.



Question 1

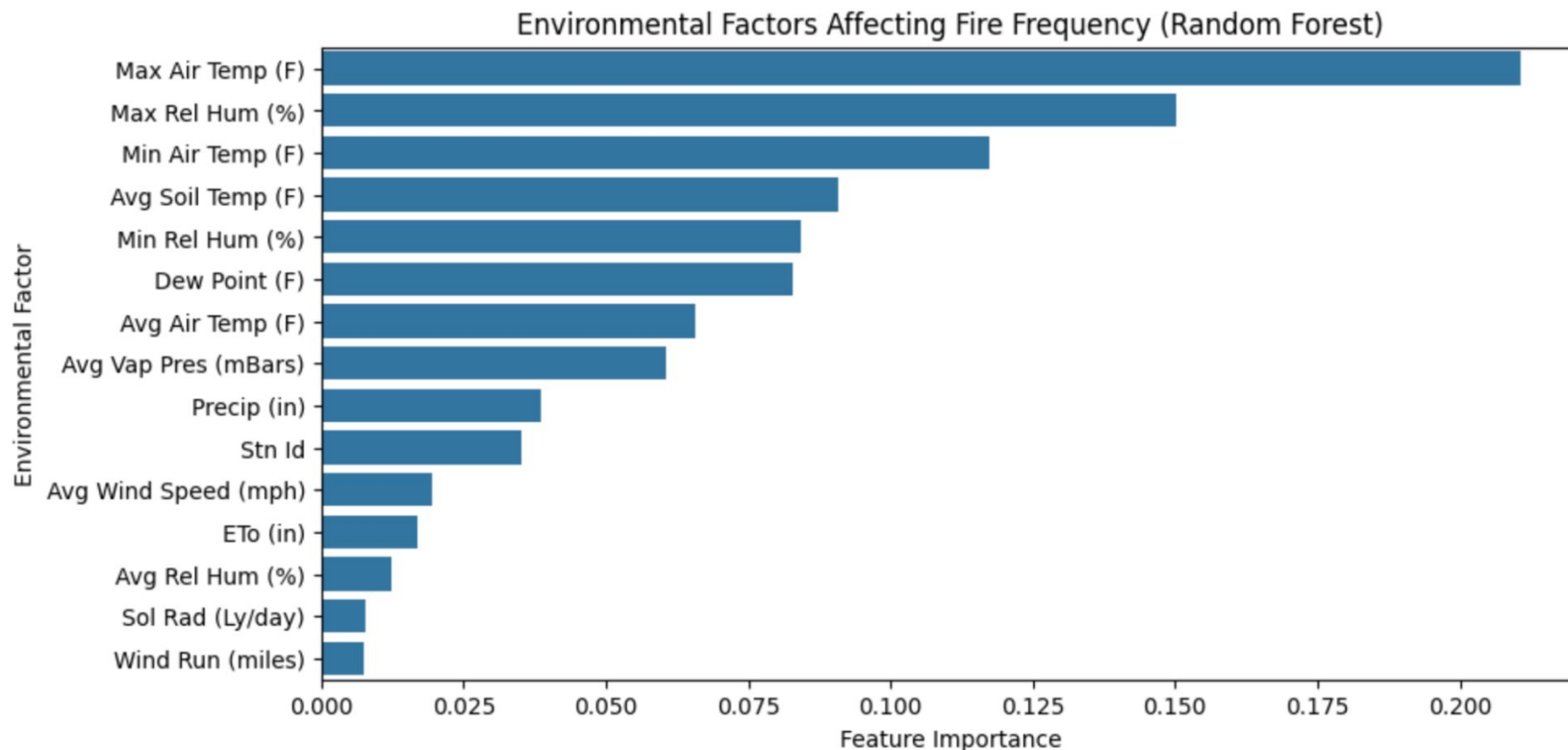
What Factors have the greatest influence?

- Match the fire frequency data and environmental conditions data on **Date** (Year - Month)
- Merged data

Random Forest

- RandomForestRegressor
- X - features
- Y - fire count
- Top environmental factors affecting fire frequency

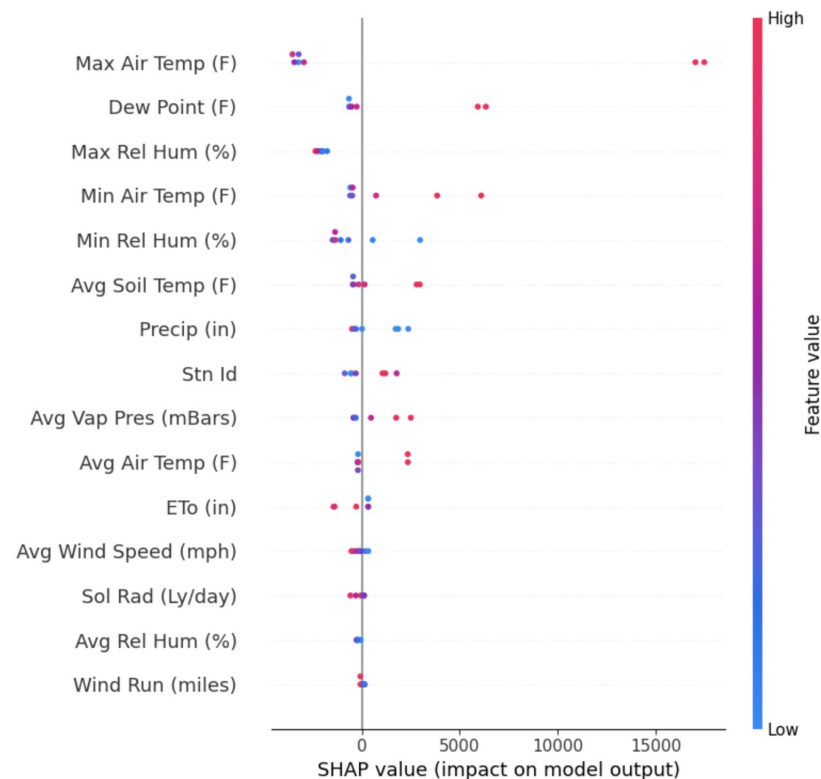
Question 1



Question 1

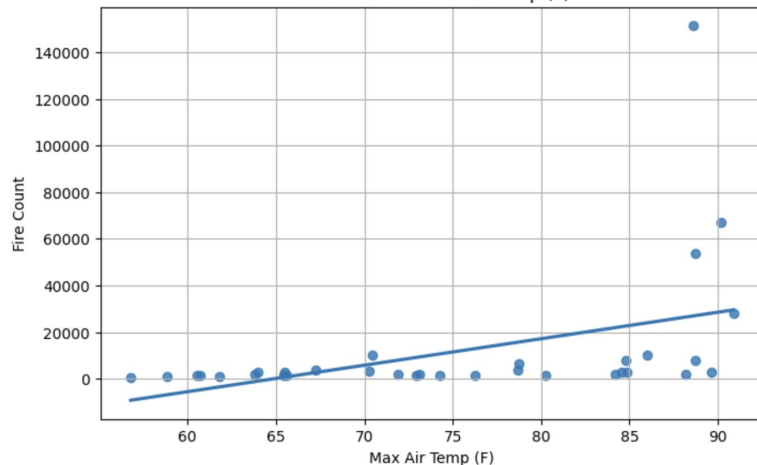
SHAP Analysis

- Max Air Temp
- Dew Point
- Max Rel Hum

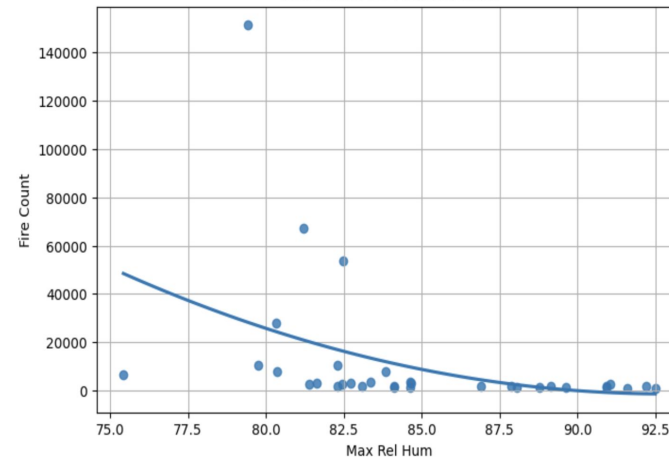


Results

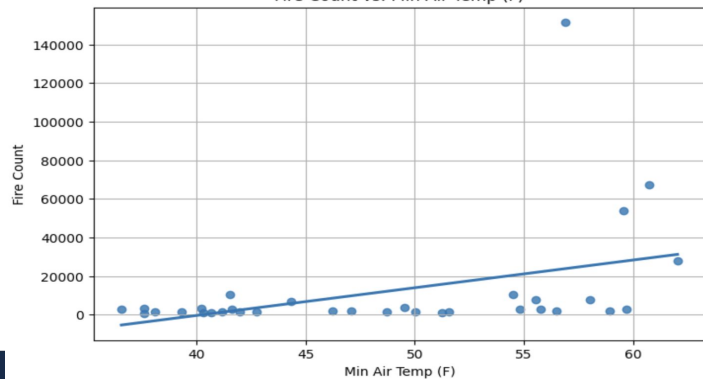
Fire Count vs. Max Air Temp (F)



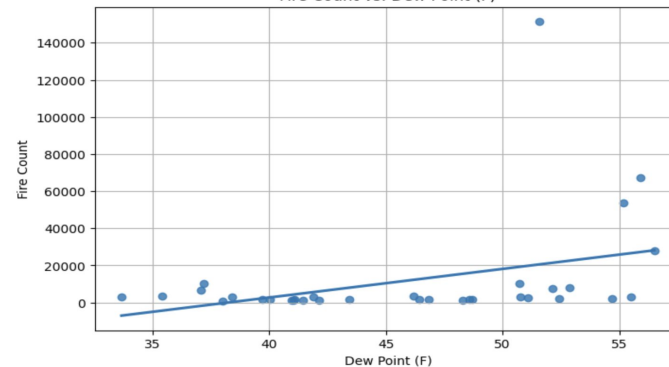
Fire Count vs. Max Rel Hum



Fire Count vs. Min Air Temp (F)



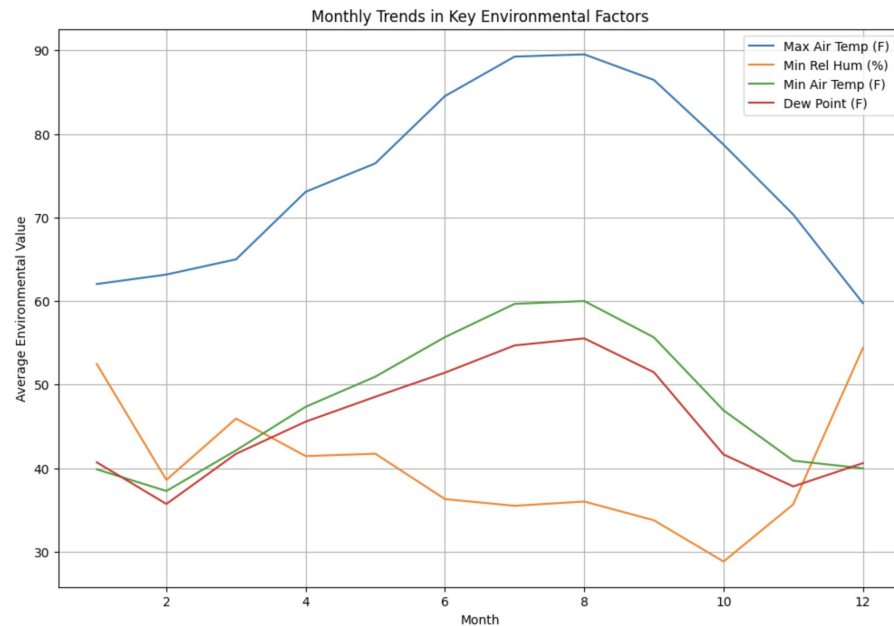
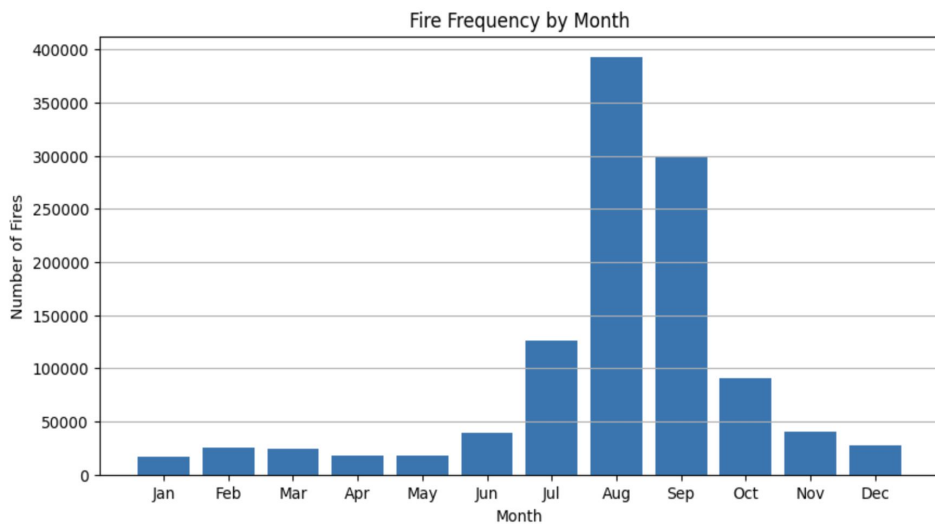
Fire Count vs. Dew Point (F)



Question 2

Can environmental factors help predict the frequency of fires in a given month?

Question 2



Part IV. Conclusions & Discussion

Sources

1. <https://www.fire.ca.gov/incidents/2025>
2. <https://www.latimes.com/business/story/2025-01-24/estimated-cost-of-fire-damage-balloons-to-more-than-250-billion>