Team 7 – Group Project
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An Annual Comparison of Relationship of Weather to Wildfires in California

Project Proposal

Our project is to determine if there is a correlation between weather and fires in California. We'll look at various weather variables, including temperature, humidity, wind speed, and wind gusts on the day fires start to see if a relationship exists. We'll pull data from three years, including the "worst" year for fires on record to compare.

Finding Data

Fire data obtained from the archived incident data from https://www.fire.ca.gov/. Historical weather data obtained using the World Weather Online API (https://www.worldweatheronline.com/).

Hypothesis

2018 was the worst year of fire damage, with more than 1.8 million acres burned by wildland fires. That's the highest number of acres burned in the recorded history of California. 2018 was also one of the hottest years on record. Is there a relationship to climate, more specifically the daily weather, and the date a wildfire starts? Looking at locations by latitude and longitude and by year, are there patterns that exist between weather and fires? How does temperature, humidity, wind speed, and wind gust factor into the start of a fire? How did the weather influence the severity of the fire (based on the numbers of acres burned)? Are fires more severe in specific locations and at certain times in the year? We asked these questions to determine some of the factors that can contribute to a fire breaking out.

Gathering Data

For a list of recorded fires from 2013, 2015, and 2018, we used the incidents archive from CAL Fire. For historical weather by location (pulled from the sites of the fires listed on CAL Fire), we used the World Weather Online API.

The exploration process was the most significant part of the work we did. Obtaining data from CAL Fire took a few tries as we needed to get the data from the website and format it in a way we could use it with the weather data. Gathering historical data was an elaborate process as we were unable to get data from the first source we identified (NOAA) and had to switch to a new source (the World Weather Online API).

Data Analysis

First, we chose three years to compare based on the data available and to include a year with low, average, and high fire damage in California. 2013 was the earliest year of archived data on

CAL Fire and represents one of the years with the least amount of fire damage. 2015 is close to an average of the fire damage sustained in recent history. 2018 is known as the worst year of fire damage ever recorded.

We then thought about the various variables that could impact when a fire starts, including the location, time of year, and weather elements like temperature, humidity, wind speed, and wind gusts. We searched for a source that would provide historical weather data. We also needed to be able to format the weather dataset in a way that we could connect the weather to the fire.

Questions and Findings

Q: Location of fire by location (latitude and longitude) compared to the temperature the day the fire started
A: Location doesn't factor into where a fire starts, but the temperature does

Q: Location of fire by location (latitude and longitude) compared to humidity levels the day the fire started
A: Location doesn't factor into where a fire starts, but humidity levels do. Lower levels of humidity (meaning drier conditions) can attribute to a fire starting

Q: Do temperature and month increase the likelihood a fire will break out?
A: Yes, during the hotter and drier months, fires are more likely to start

Q: Do wind speed and wind gusts lead to fires starting?
A: Surprisingly, wind isn't a factor in the start of a fire. However, we believe that if we looked at wind during the duration of a fire, we would find that it does impact the severity

Summary and Conclusion

As stated, some of our findings confirmed our hypothesis, while others did not. Our data found a direct relationship between temperature and humidity levels to fires breaking out. We were surprised that wind speed and wind gusts didn't play a more significant role in when a fire started. There was also no apparent correlation to location throughout the state that influenced the start of a fire. Also, we found that in previous years, the typical "fire season" was limited to hotter and drier months of the year, but during 2018 (the year with the highest amount of fire damage), fires broke out every month of the year.

Given more time to gather additional data and conduct further analysis, we would look at weather throughout the entire duration of each fire incident. We believe there would be benefits at looking at the weather variables during a fire to see how those variables impacted fires, and, in turn, if fires change the weather.