Correlating Climate and Wildfire Data to Predict Wildfires in Colorado

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Team Members

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Introduction

- Especially in recent years, wildfires have ravaged a large area of wilderness; specifically in the western United States.
- This has had an effect on thousands of people, their homes, and their lives.
- Our goal is to look at some of this data in an effort to predict when and where the next big blaze will occur.
- If accurate predictions can be made, similar algorithms may be able to even save the lives of those closest to the areas.
- Challenges include sorting through all of the relevant data and validating our model.

Related Work

- National Park Service's National Fire Danger Rating System
  - Level system (green through red)
  - Uses Relative Humidity, Fuel Moisture, Drought Index, Haines Index, Lightning Activity Levels
- "A Data Mining Approach to Predict Forest Fires using Meteorological Data"
  - Cortez, Morals, 2007
  - (PDF) A Data Mining Approach to Predict Forest Fires using Meteorological Data (researchgate.net)
- "Leveraging Machine Learning to predict wildfires using PyTorch Lightning"
  - Machine learning based approach to predict wildfires, local blog
  - Leveraging Machine Learning to predict wildfires using PyTorch Lightning | by Aishwarya Srinivasan | Towards Data Science
- "Data-Driven Wildfire Risk Prediction in Northern California"
  - Malik et. al., 2021
  - Used data parameters such as powerlines, terrain, and vegetation in different perspectives to train a model that improved the spatial and temporal accuracy in predicting the risk of wildfire including fire ignition.

Proposed Work

- A Colorado-centric approach to modelling the relationship between climate and wildfires.
- Possible Datasets:
  - Drought Data
    - Historical Data and Conditions | Drought.gov
  - Weather Data
    - Custom Options - Daily Summaries | Climate Data Online (CDO) | National Climatic Data Center (NCDC) (noaa.gov)
- Subtasks:
  - Collect all relevant climate, weather, and wildfire data.
  - Clean data to prepare for analysis.
  - Model the relationship between climate and wildfires to help make predictions.
  - Compare model to last 10 years of historical wildfire data to determine level of success

Evaluation

- Compare model results to last 10 years of historical data
- Find correlations between the weather and the wildfires
- Accuracy
  - If predicted wildfire locations match historical wildfire locations with >50% accuracy in a year long time span, this project will be a success
- Ideal output is a wildfire risk metric based on region

Milestones

- By the end of week 9
  - Collect all relevant data
- By the end of week 11
  - Have all data cleaned and ready for analysis
- By the end of week 13
  - Have the analysis of the data completed
- By the end of week 14
  - Have final correlation relationship between weather and climate completed
- By the end of week 15
  - Finish the the final project report

Resources

- Historical Data and Conditions | Drought.gov
- Where can I find historical humidity data? – Visual Crossing Weather
- Custom Options - Daily Summaries | Climate Data Online (CDO) | National Climatic Data Center (NCDC) (noaa.gov)
- (PDF) A Data Mining Approach to Predict Forest Fires using Meteorological Data (researchgate.net)
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