Wildfire Prediction

Use Machine Learning to Predict Wildfire in Particular Area

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December 6, 2021

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1 INTRODUCTION

1.1 Background

Every year, wildfires destroy massive number of homes and acres of lands and properties around the world. Most fires are caused by human, however climate change is also a contributing factor. There are various reports from United Nations on increasing temperatures across the globe, which can be a contributing factor. In 2019, Australia had one of the biggest and dangerous wildfires in the history. It burned down approximately 5.4 million hectares of land; this was due to extreme hot weather. It is important to study these factors to minimize the risk of wildfires.

1.2 Business Problem

The problem with wildfires is it is uncontrolled burning of forest, grassland, etc and there can be many factors which contribute to it. By understanding these factors that contribute to the wildfire, it allows experts to take action to minimize the risks and threats it poses. Below are a few questions that I will be exploring in this project:

1. Is there any relationship between climate change and wildfires?
2. Are the number of acres burned increases with each year?
3. Predict when and where the wildfire may develop.
4. Identify the hotspots of wildfires by predicting the confidence of wildfire for location.

1.3 Scope

Within Scope:

- Develop a model capable of predicting wildfire and the confidence of the wildfire.
- Analyse geospatial data from credible resources.
- This project should apply Machine Learning techniques.

1.4 Document Overview

In this document, I will be describing preliminary requirements for the project, data, technical approach, ethical considerations and challenges.

2 PRELIMINARY REQUIREMENTS

2.1 Data

Datasets I will be using is from NASA Earth Data database (see References for the link). This type of analysis will require multiple combinations of datasets. Some attributes that I will be exploring is location (Long and Lat), brightness, scan, etc. Below is the list of datasets that I plan on utilize:

- NASA Active Fire and Thermal Anomalies dataset.
- Burned Areas dataset
- Precipitation dataset

2.2 Technical Approach

For this project, I will be following CRISP-DM model for technical approach.

1. Business Understanding: I already roughly defined the project and its business problem and scope.
2. Data Understanding: My next step is to explore is collection of data. NASA Earth Data is open access and free to use for research. I will be collecting data from this database. I will use EDA techniques to explore features and its data types.
3. Data Preparation: I will perform data cleaning using pandas library. I will split the data into two sets: train set and test set. After that I will do feature selection/extraction.
4. Modelling: I will be applying ML techniques for modelling. Some of the techniques that I may apply are RandomForest, CNN and SVM.
5. Evaluation: I will be evaluating accuracy metrics for each model to see which model is performing best.

2.3 Ethical Considerations

Because wildfires are dangerous and can be a threat to human life. It is crucial to choose right data and correct modelling approach. For this project, I intend to collect data from credible resources such as NASA Earth Data. For modelling, I intend to do thorough evaluation to make sure the model is not overfitting or underfitting by testing the model and checking for accuracy.

2.4 Challenges and Issues

- This project requires multiple datasets with little time to do analysis. Most likely, time will be the main issue.
- This type of data is completely new to me, and I have less knowledge on how NASA datasets are and what each variable means. Majority of the time will go to data collection, understanding and preparation.

3 REFERENCES

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