

Analysis of Wildfires due to Climate Change

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INTRODUCTION

In this project, we are going to understand the relationship between climate change and wildfires to reach towards a better conclusion to understand the serious problem of effects of climate change on wildfires. It can include the origin of the effects, the nature of effects and the insights within the effects to understand the whole scenario. We are going to use several datasets related to wildfires and climate change to accomplish this project. This project will also include the prediction of burned or damaged area that a wildfire produces in wake of using the prediction to deploy the necessary forces for firefighting and to vaguely understand the urgency of the situation. As the title suggests, the problem of climate change is a serious concern for all of us right now and the recent incidents related to wildfires in several parts of the World are getting mostly ignited by Climate change. This project is being divided into two parts; first is the analysis of the effects of climate change on wildfires and the second is the prediction of burned or damaged area by wildfires to help authorities with deployment of firefighters and other personnel to access the situation and to understand the urgency of the situation for further evacuation purposes. This project will use the Machine Learning algorithms and the technique of data analysis to discover the beneficial insights for the sake of accomplishment of the project.

FEASIBILITY STUDY

The recent spike in the cases of Wildfires is a concern for the humanity. Most of the Wildfire incidents are highly linked with the Climate change. The most recent incidents that got the attention of general population are the Wildfires that happened in both the United States, Australia, Turkey, Greece, Siberia (Russia) and Amazon rainforests in Brazil. The Intergovernmental Panel on Climate Change (IPCC) predicts that increases in global mean temperature of 1 to 3 degree Celsius above 1990 levels will produce beneficial impacts in some regions and harmful ones in region. Most of the recent effects due to increase in the global temperature seems to be harmful for most of the World. Mostly, Wildfires are sometimes better for cleaning up the forests and increasing the soil cover of the forest floor but due to increased risk of climate change, it's absolutely becoming a mayhem. The condition and density of vegetation are fundamental factors that influence the behavior of wildfires and their ultimate wide-ranging impacts on surrounding agriculture, ecology, environments and forest. In terms of climate change, the warming of the planet Earth via emissions of fossil fuels is said to be in parallel with the rising sea and land temperatures that lead to dry conditions in the vegetation area and decrease in water table, resulting in increased frequency of wildfires. The increased frequency of wildfires is mostly harmful for the planet in terms of releasing the smoke into the atmosphere that can lead to health problems and contributes to more emissions, resulting in proportionality effect between climate change and wildfires. So, in this project, we are going to do an analysis on these factors and implement Machine Learning on such factors and will try to understand the whole connection between Climate Change and Wildfires.

METHODOLOGY / PLANNING OF WORK

1. **Formulation of problem:** This step requires us to formulate the problem statement for the project.
2. **Collection of data:** This step allows us to collect the designated datasets and other related data for the project.
3. **Data Pre-processing and Cleaning:** It requires us to perform the Data Pre-processing and Data cleaning for making the data desirable for the sake of performing manipulations.
4. **Data Analysis:** This step requires us to perform data analysis on the data to draw up statistical insights.
5. **Data Visualization:** This step requires us to perform data visualization in order to make the statistical insights more readable, accessible and understandable to the general population and drawing up new insights.
6. **Algorithmic Comparisons:** This step requires us to perform and test various Machine Learning algorithms for building a model with better algorithmic report and accuracy.
7. **Building the model:** This step requires us to build a model based on the algorithmic report for providing the best prediction that can be done with the dataset obtained.
8. **Testing the model:** This step requires us to test the model for checking the accuracy in terms of predicting the desired outcome for completing the satisfactory analysis of the project.

SOFTWARE AND HARDWARE REQUIREMENTS

- **Software Requirements:**

1. Anaconda Software: Usage of Anaconda Software is a must to support the project in the whole planning of work.
2. Jupyter Notebook: Usage of Jupyter Notebook is a must that is provided by the Anaconda software to provide Computational support to the project for performing all the phases of the project easily.

- **Hardware Requirements:**

CPU: 2 x 64-bit 2.8 GHz 8.00 GT/s CPUs

RAM: 32 GB (or 16 GB of 1600 MHz DDR3 RAM)

Storage: 300 GB. (600 GB for air-gapped deployments.) Additional space recommended if the repository will be used to store packages built by the customer.

With an empty repository, a base install requires 2 GB.

Internet access to download the files from Anaconda.org or a USB drive containing all of the files you need with alternate instructions for air gapped installations.

TOOLS USED

- **Python**, a high-level programming language.
- **NumPy**, a library used for scientific calculations in Python programming language.
- **Pandas**, a library used for data analysis in Python programming language.
- **Matplotlib**, a library used for data visualization in Python programming language.
- **Seaborn**, a library used for data visualization in Python programming language.
- **Tableau**, a data visualization tool used for interactive data Visualization and building dashboards.
- **Scikit-Learn**, a library used for building Machine Learning models in Python programming language.
- **Jupyter Notebook** for providing the computational support to the project.
- **Anaconda** software for supporting the whole project.

ADVANTAGES

1. It can help to understand the relationship between the wildfires and climate change.
2. By doing the analysis, the project helps to use the wildfire related parameters to predict the burned area after the incident.
3. This project helps to understand the urgency of situation.
4. It will help the designated authorities to deploy the forces accordingly as per the damaged area predicted by the project.
5. Also, it helps to understand the accuracies of different Machine Learning models on the related datasets to magnify the connection between climate change and wildfires.
6. This project will also try to understand the role of global warming in causing climate change.
7. Moreover, the linkage of Green House Emissions and its complications with the increased effects of climate change will be helpful to understand.
8. Finally, this project can be useful in fight against climate change as the recent patterns of wildfires are mostly linked with the climate change and it's currently one of the biggest problems that our world is facing right now.

APPLICATIONS

1. It can be used to access the effects of climate change over increased wildfires.
2. It can be used to help authorities combating the wildfires via the prediction of burned area.
3. This project would be beneficial to understand other famous datasets related to the wildfires for the sake of combatting and analysing the climate change and preparing the task forces with the insights being found out from the dataset.
4. Moreover, the insights from the dataset can be used to intervene between the other incidents that occur due to climate change to understand this serious problem.
5. This project can also be used to study the climatic patterns with respect to human ignited factors that are contributing to Climate change.

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