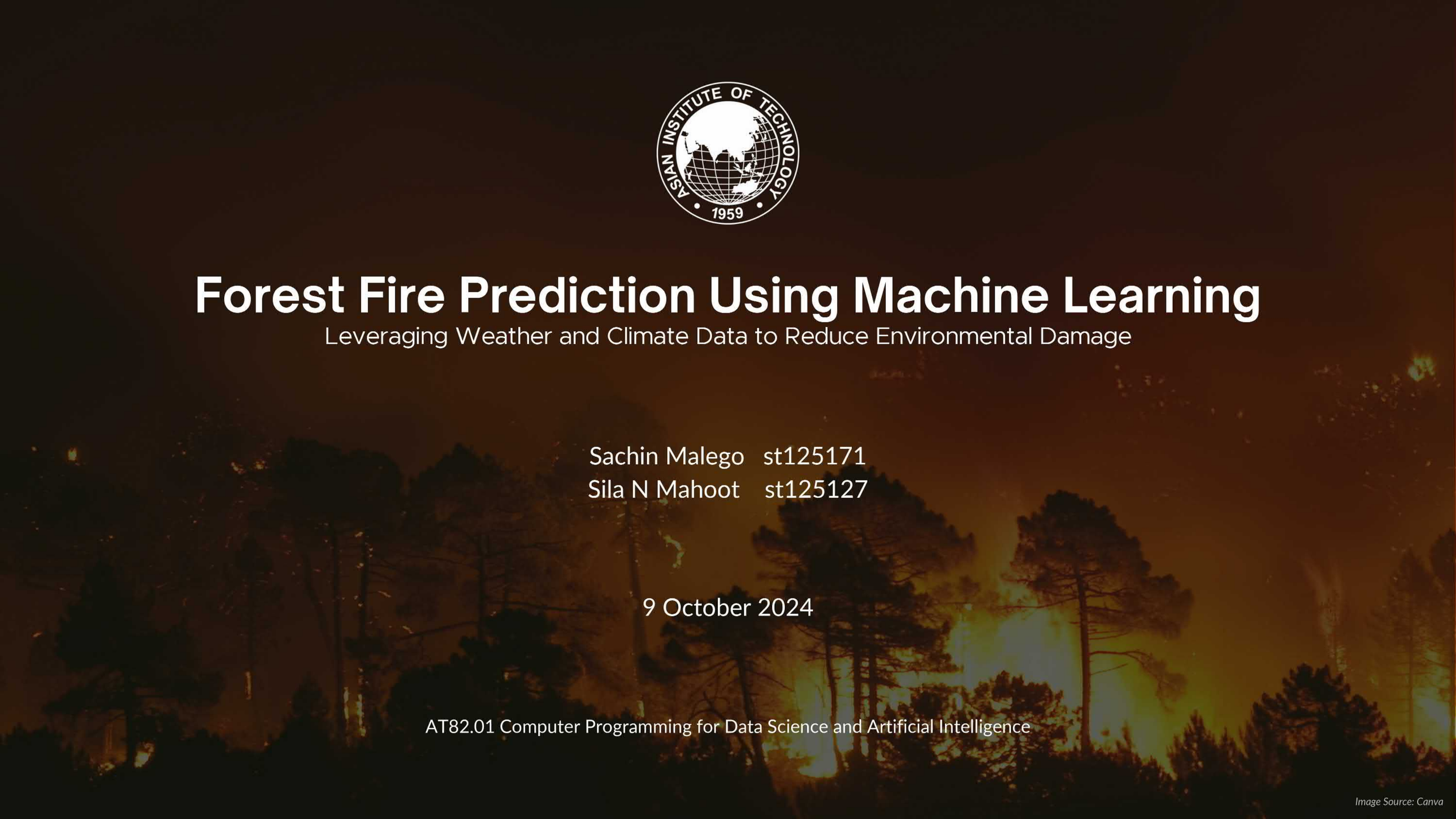


Forest Fire Prediction Using Machine Learning

Leveraging Weather and Climate Data to Reduce Environmental Damage

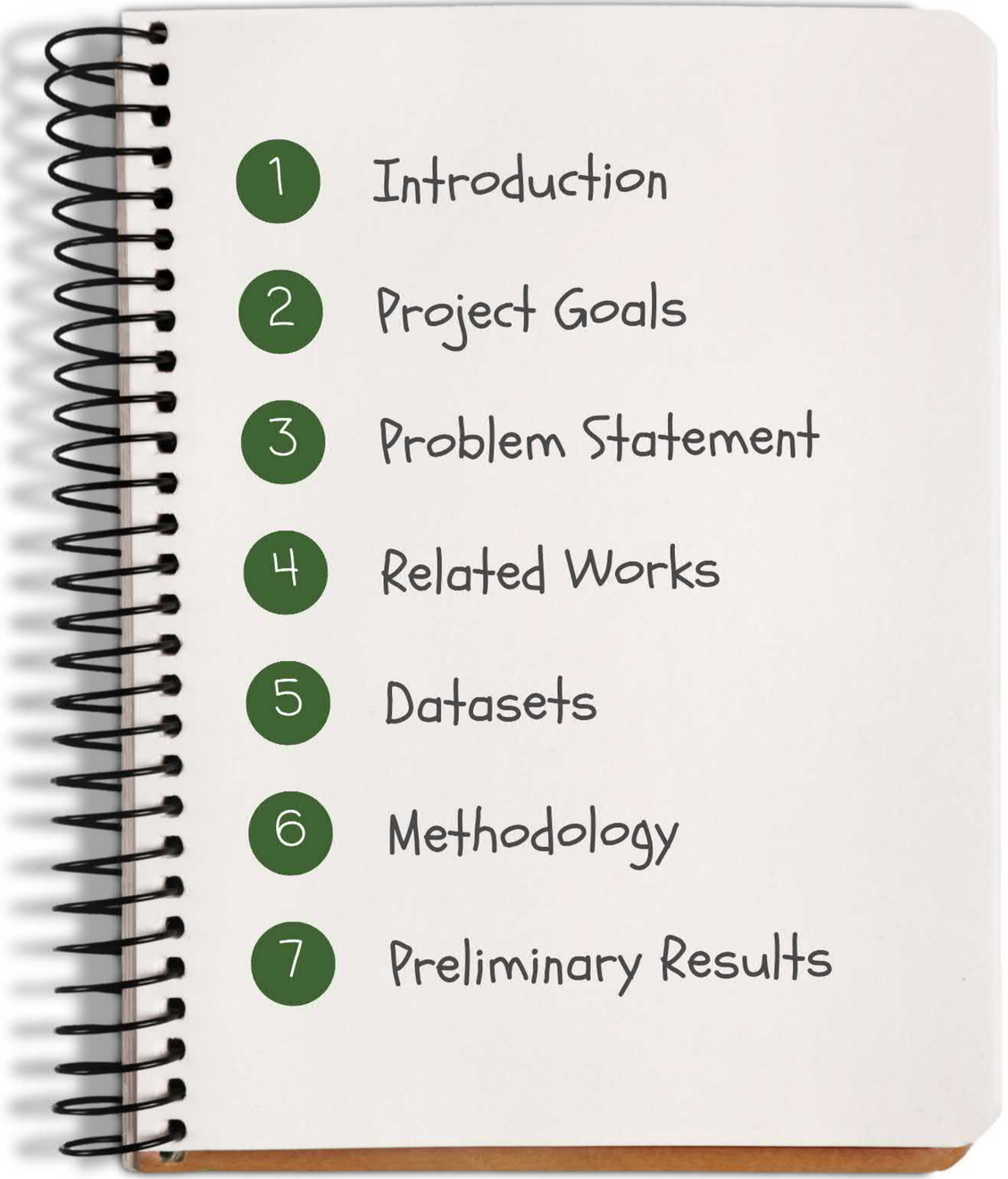
Sachin Malego st125171
Sila N Mahoot st125127

9 October 2024

AT82.01 Computer Programming for Data Science and Artificial Intelligence

Image Source: Canva

Agenda


1 Introduction
2 Project Goals
3 Problem Statement
4 Related Works
5 Datasets
6 Methodology
7 Preliminary Results

Introduction

Why Are Forest Fires a Problem?

Impact on natural habitats and biodiversity.

Threats to human lives and properties.

Contribution to air pollution and climate change.

Project Goals

Predict and Prevent Forest Fires

AIT Asian Institute of Technology

1

Develop a machine learning model to predict forest fires

2

Provide an early warning system to help manage resources

3

Reduce the impact of fires on people and nature

Problem Statements

Challenges in Fire Prediction

- Difficulty in accurately predicting fires.
- Current systems lack precision for early warnings.
- Need for better environmental data handling.

Understanding El Niño

What is El Niño?

- Periodic warming of the Pacific Ocean affects weather worldwide.
- Causes hotter, drier conditions that increase fire risk.

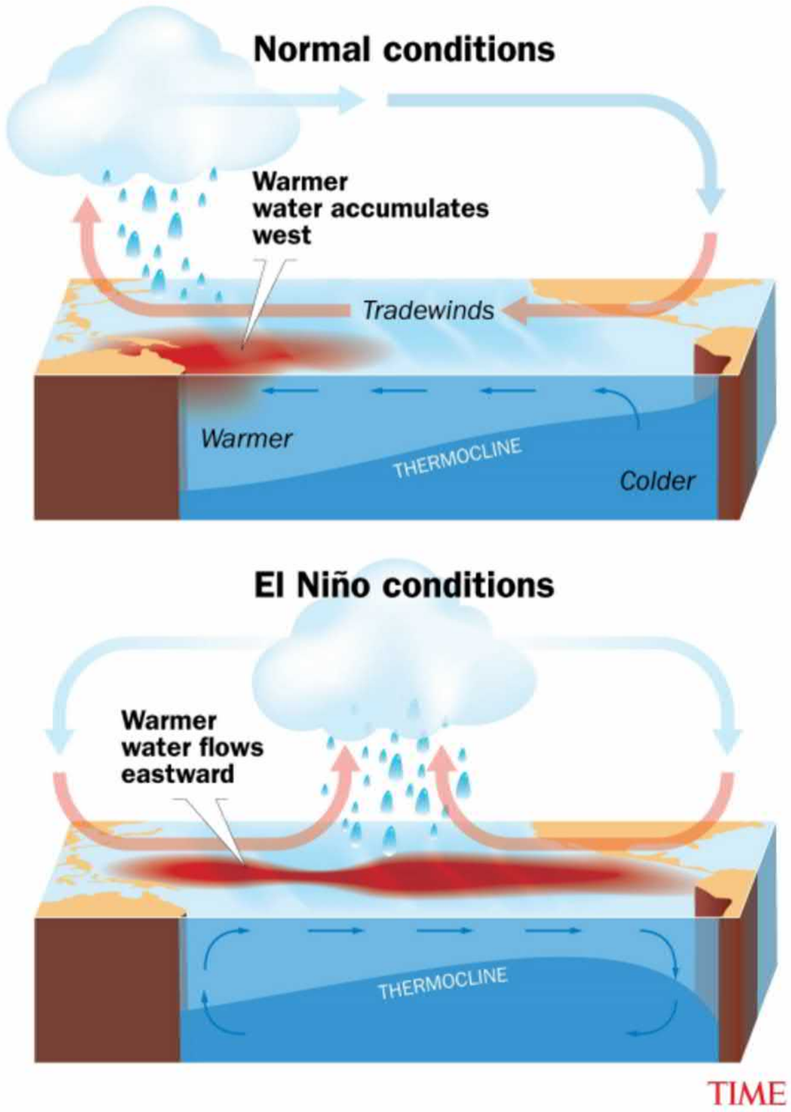


Image Source: Understanding El Niño: A Climate Phenomenon with Global Implications @ LinkedIn

Related Works

- Previous studies used machine learning and satellite data.
- Our model includes climate data like El Niño for improved accuracy.

Toward a More Resilient Thailand Developing a Machine Learning-Powered Forest Fire Warning System

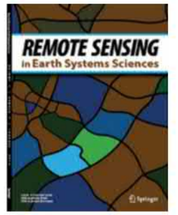
doi.org/10.1016/j.heliyon.2024.e34021

Developed a machine learning-powered forest fire warning system using satellite data and gas measurements. The XGBoost model achieved 99.6% accuracy.

Trending and Emerging Prospects of Physics-based and ML-based Wildfire Spread Models

doi.org/10.1007/s11676-024-01783-x

Reviewed advanced predictive models, highlighting both physics-based and machine learning methods. Suggested that combining different approaches could improve model reliability.



Enhancing Forest Fire Detection and Prevention Through Satellite Data and Machine Learning Algorithms for Early Warning Systems

doi.org/10.1007/s41976-024-00140-0

Combined random forest, SVM, and CNN models with satellite images for fire detection. Achieved 98% accuracy and focused primarily on satellite data, while our project also incorporates weather and climate data.

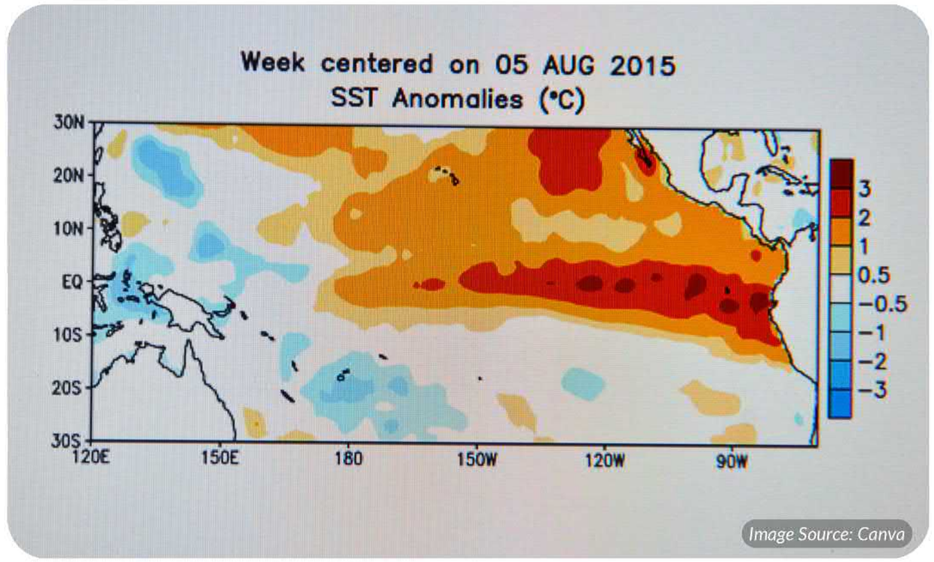
Datasets

Data Sources Used

Forest Fire Occurrences
in Algeria and Portugal

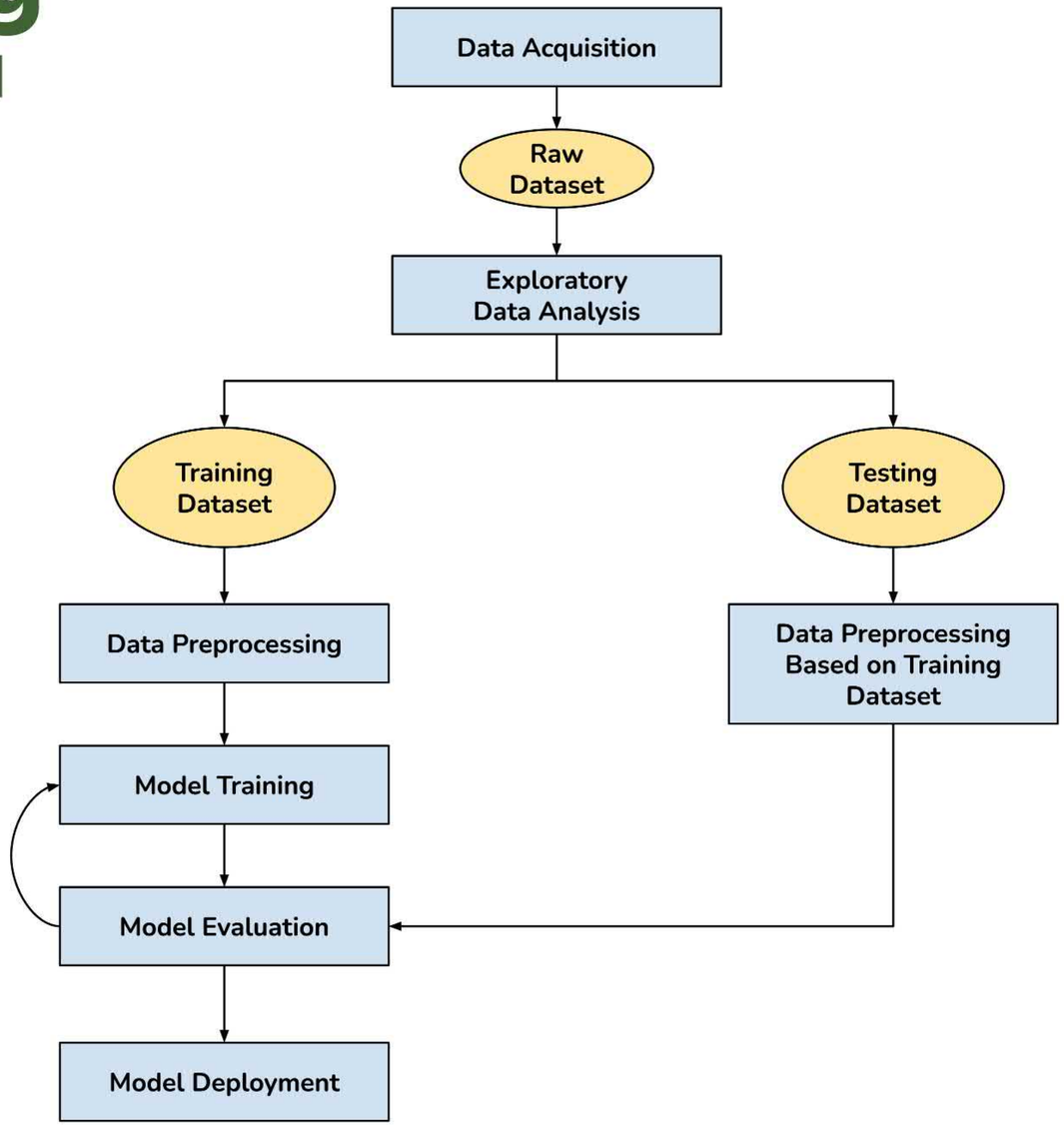
Historical Weather Data
from Meteostat & Weather Underground

Sea Surface Temperature
from Climate Prediction Center



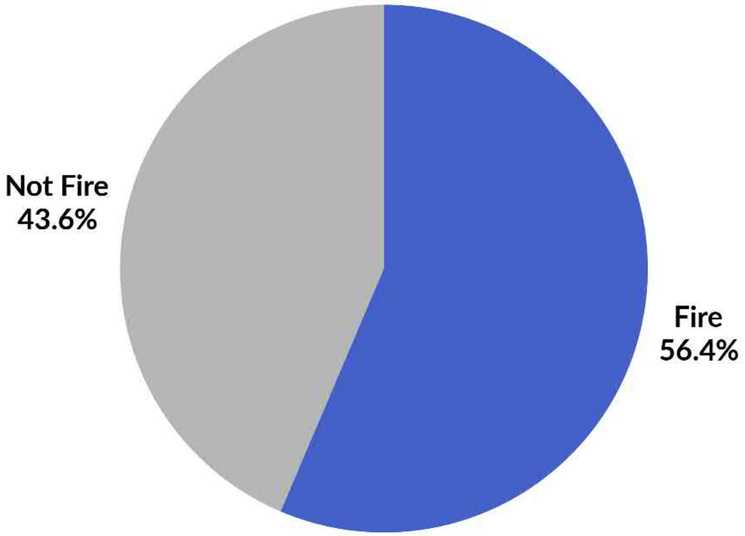
Methodology

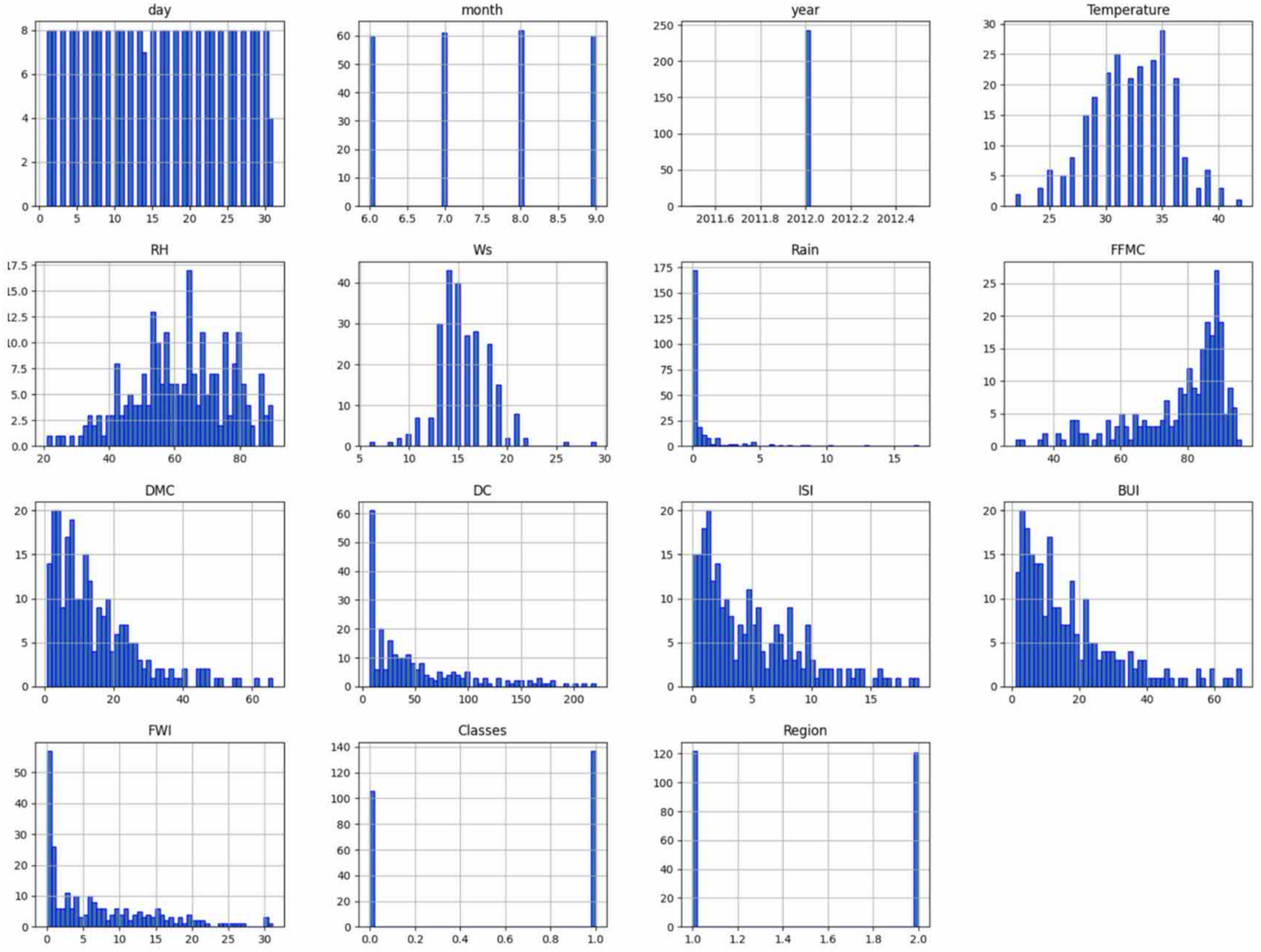
How We Build Our Model



Preliminary Results

Exploring the Data





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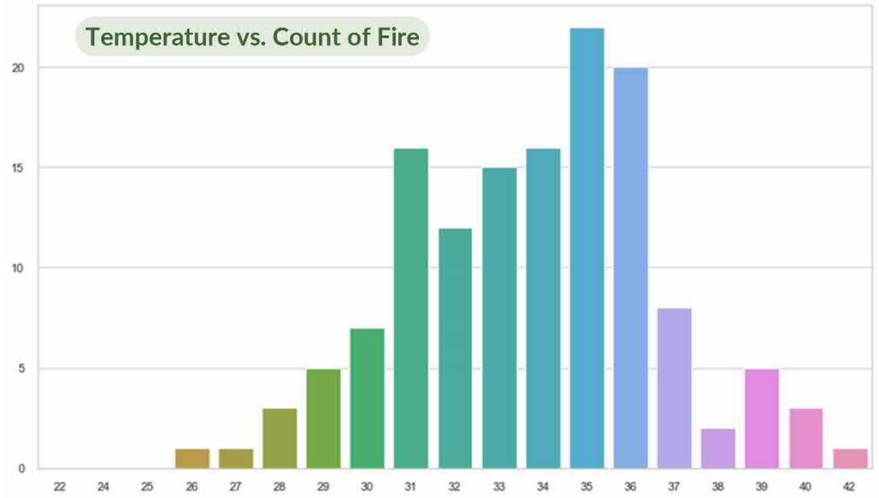
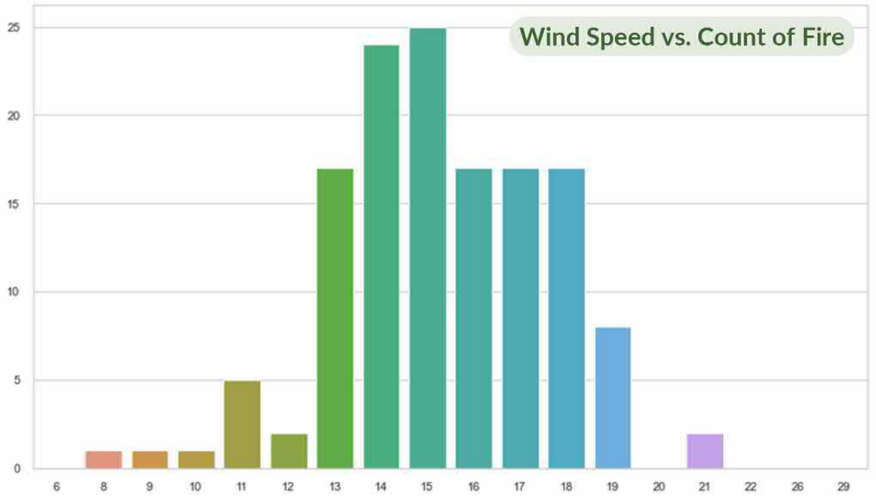
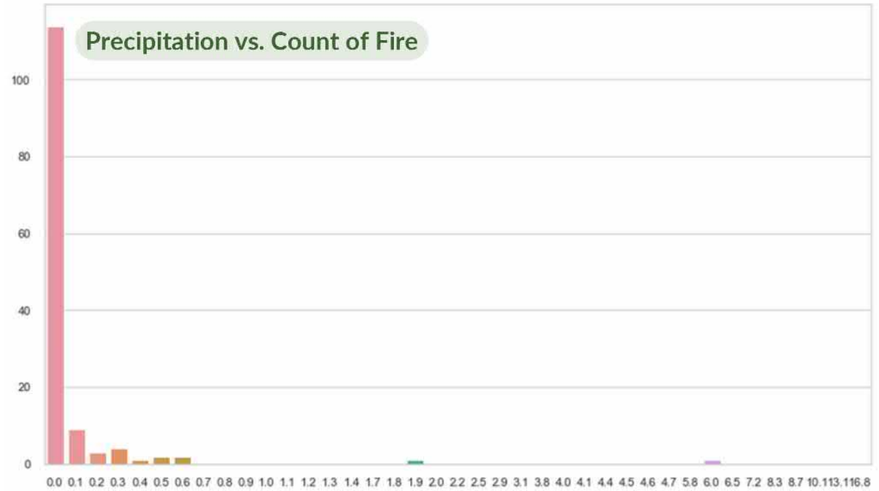
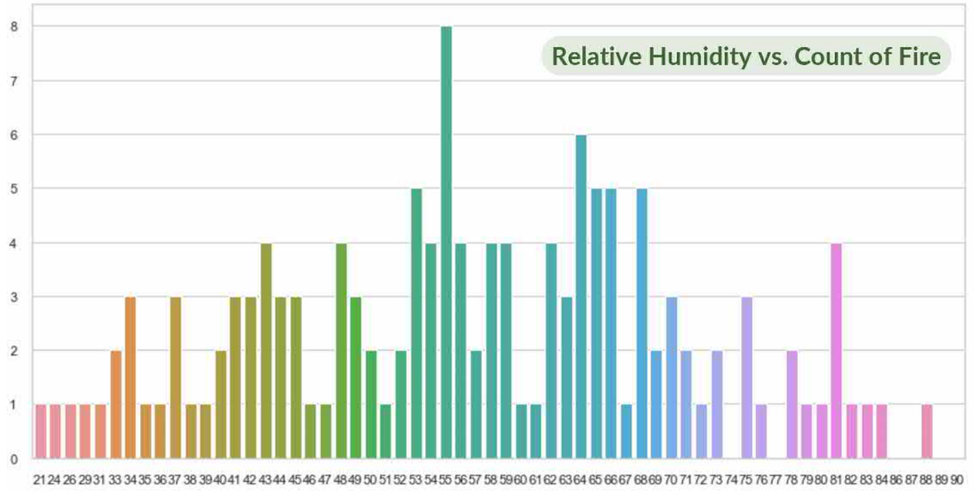


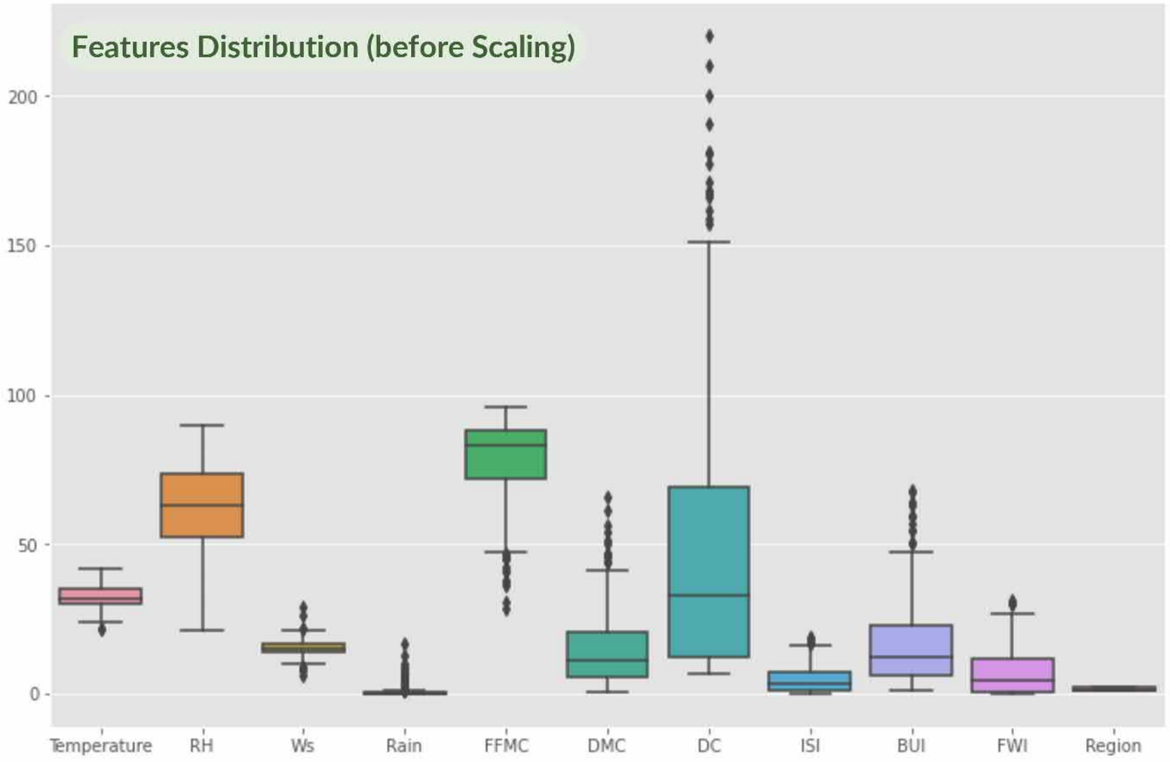


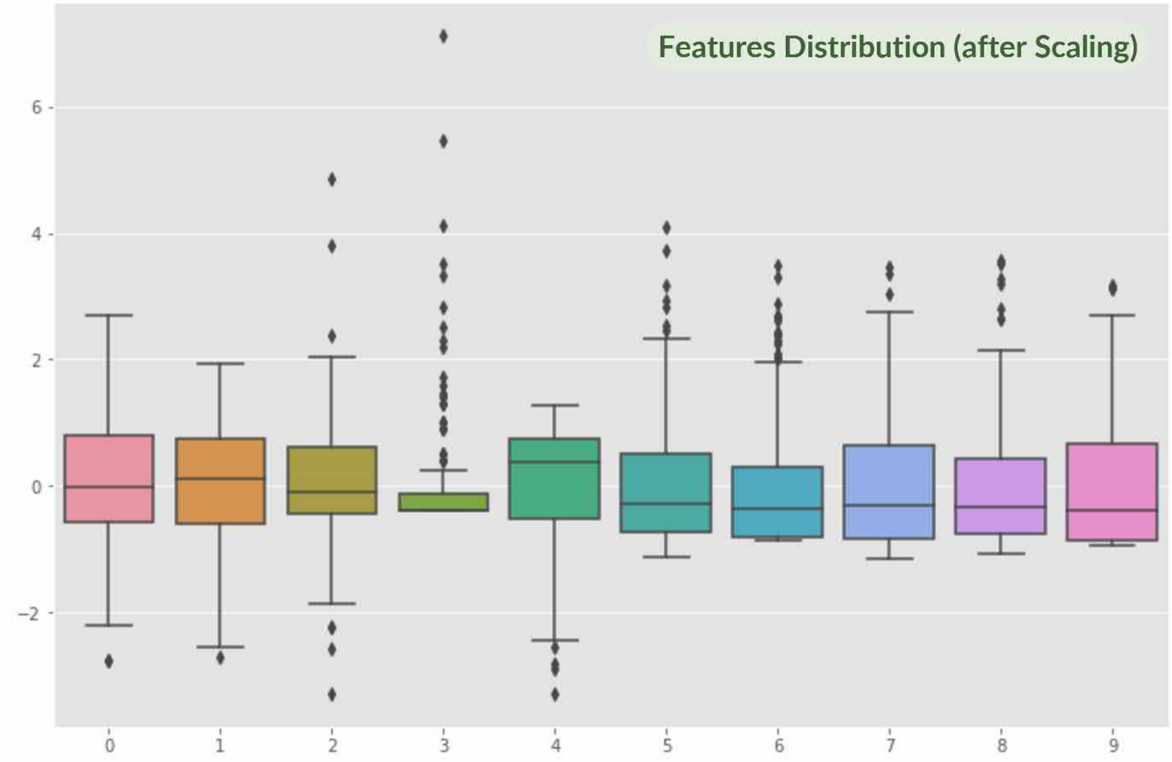




Preliminary Results

Exploring the Data





Thank You!