# Forest Fire Prediction Using Machine Learning

Leveraging Weather and Climate Data to Reduce Environmental Damage

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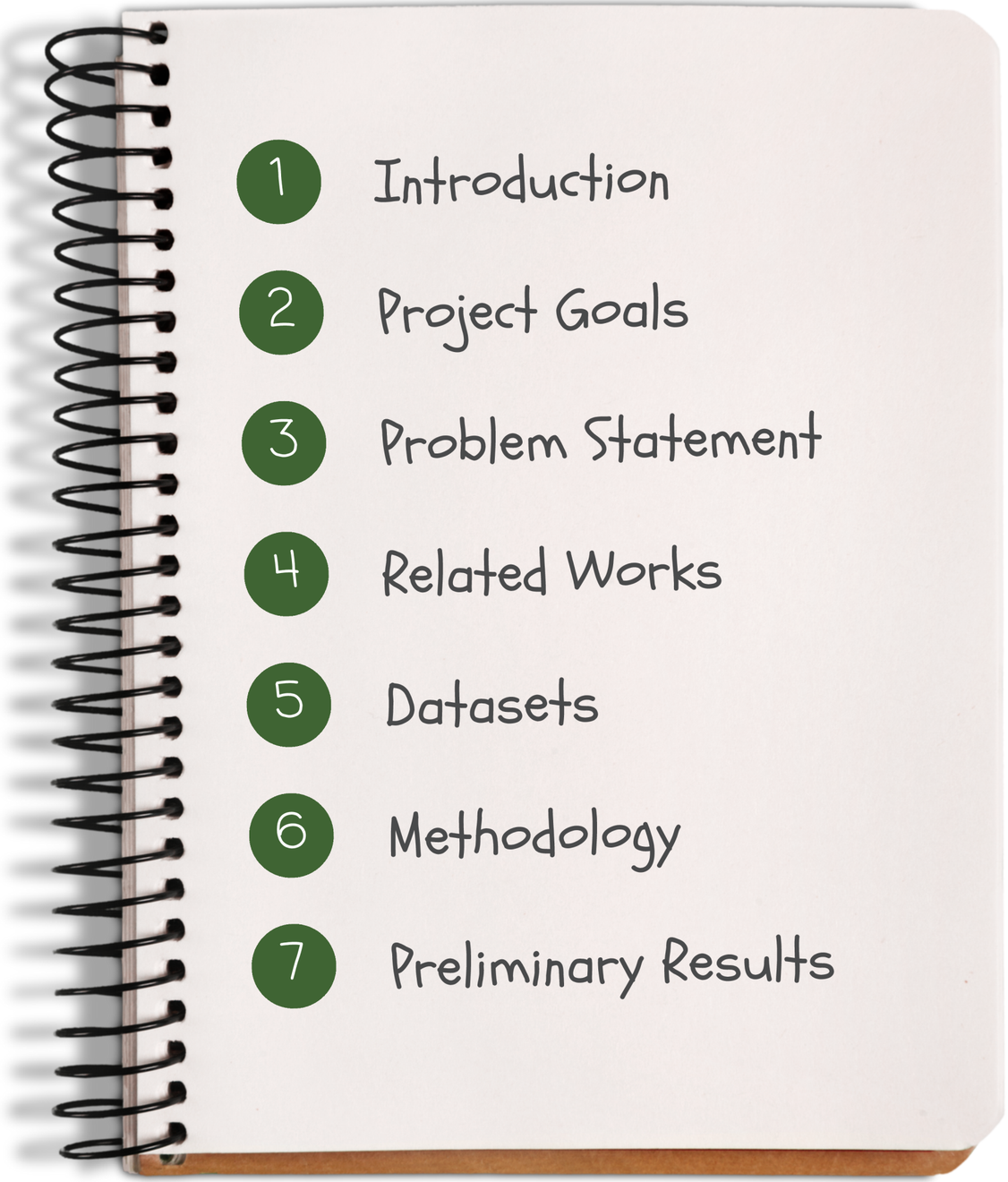
AT82.01 Computer Programming for Data Science and Artificial Intelligence

*Image Source: Canva*

# Agenda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# 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.

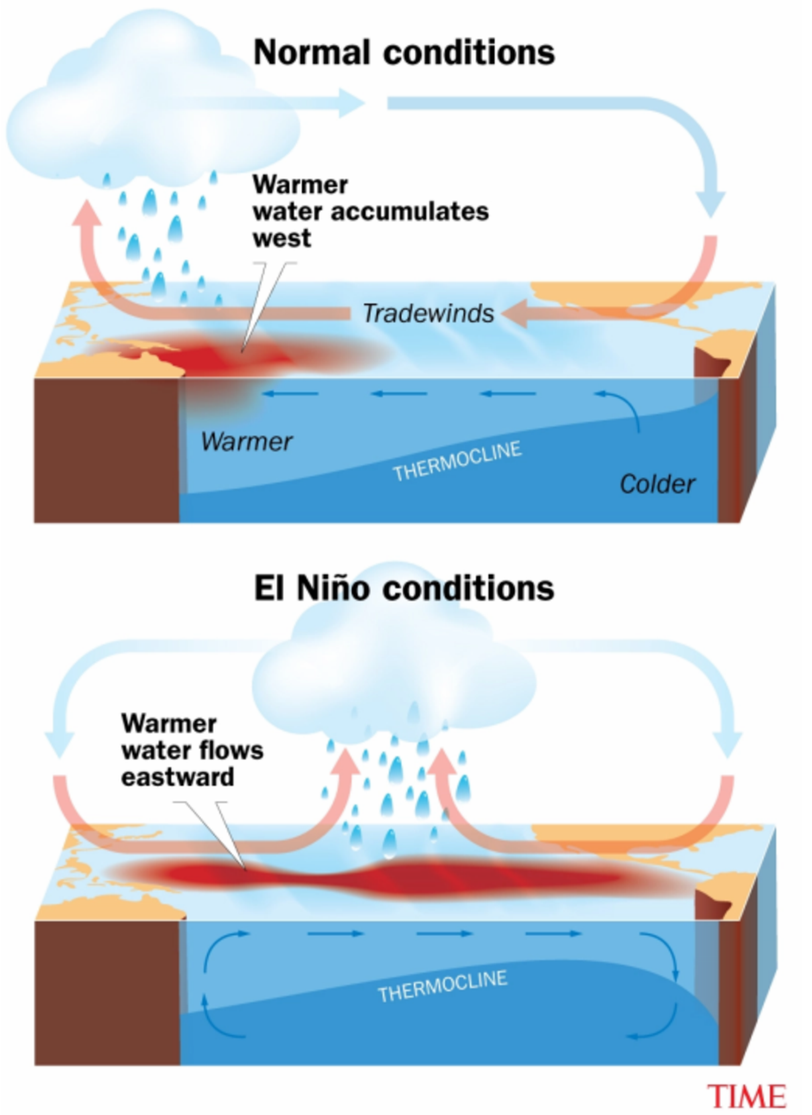



*Image Source: Understanding El Niño: A Climate Phenomenon with Global Implications @ LinkedIn*

# 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**

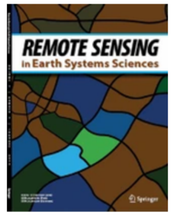
doi.org/10.1016/j.heliyon.2024.e34021

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

Image Source: Canva

### Sea Surface Temperature
from Climate Prediction Center

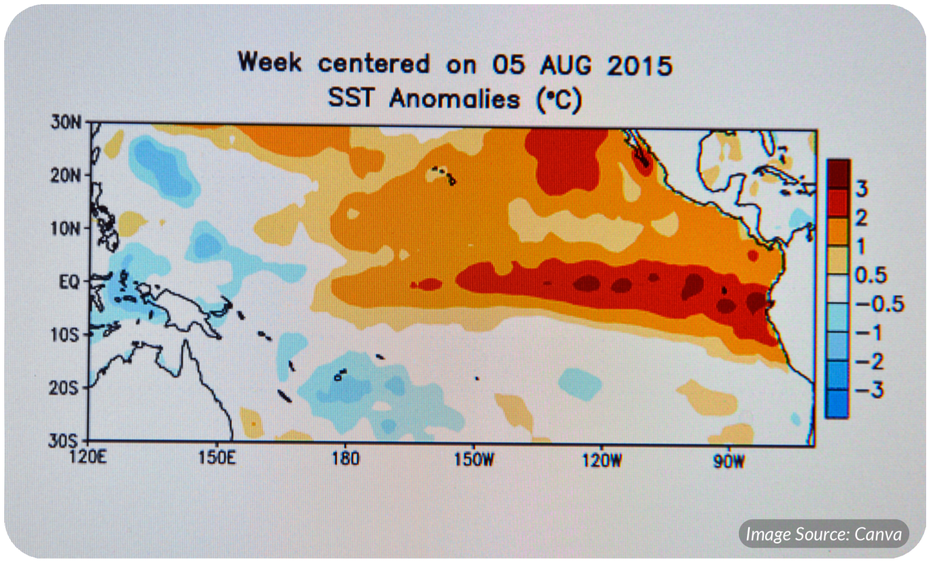
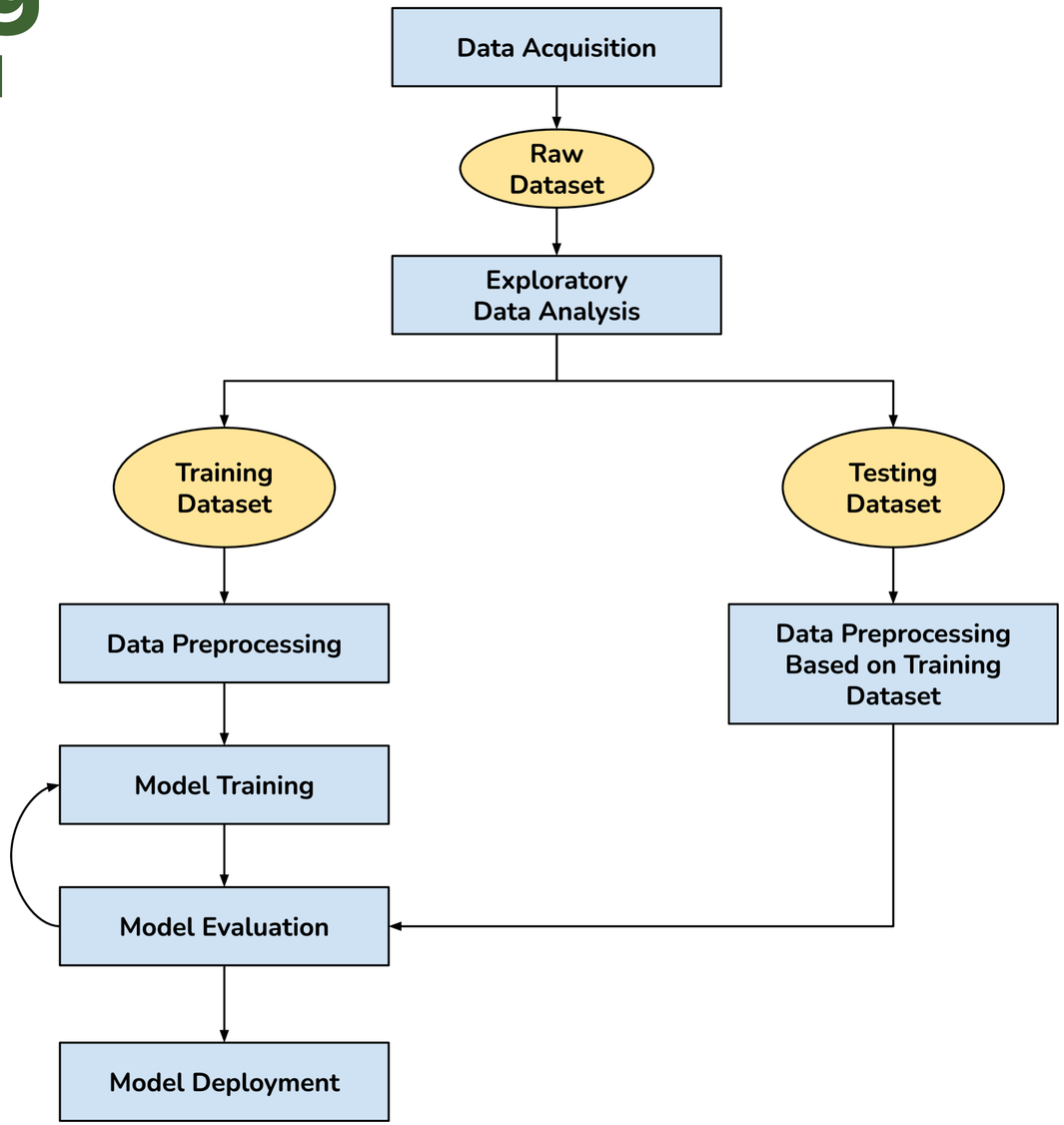


Image Source: Canva

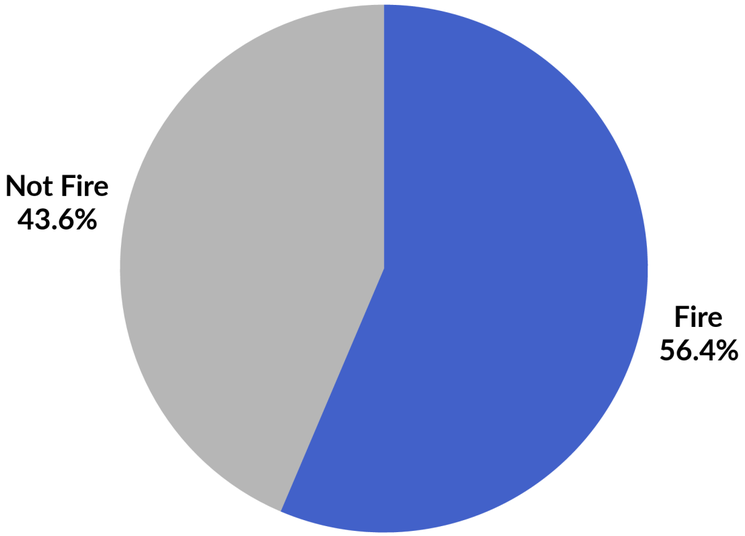
# Methodology

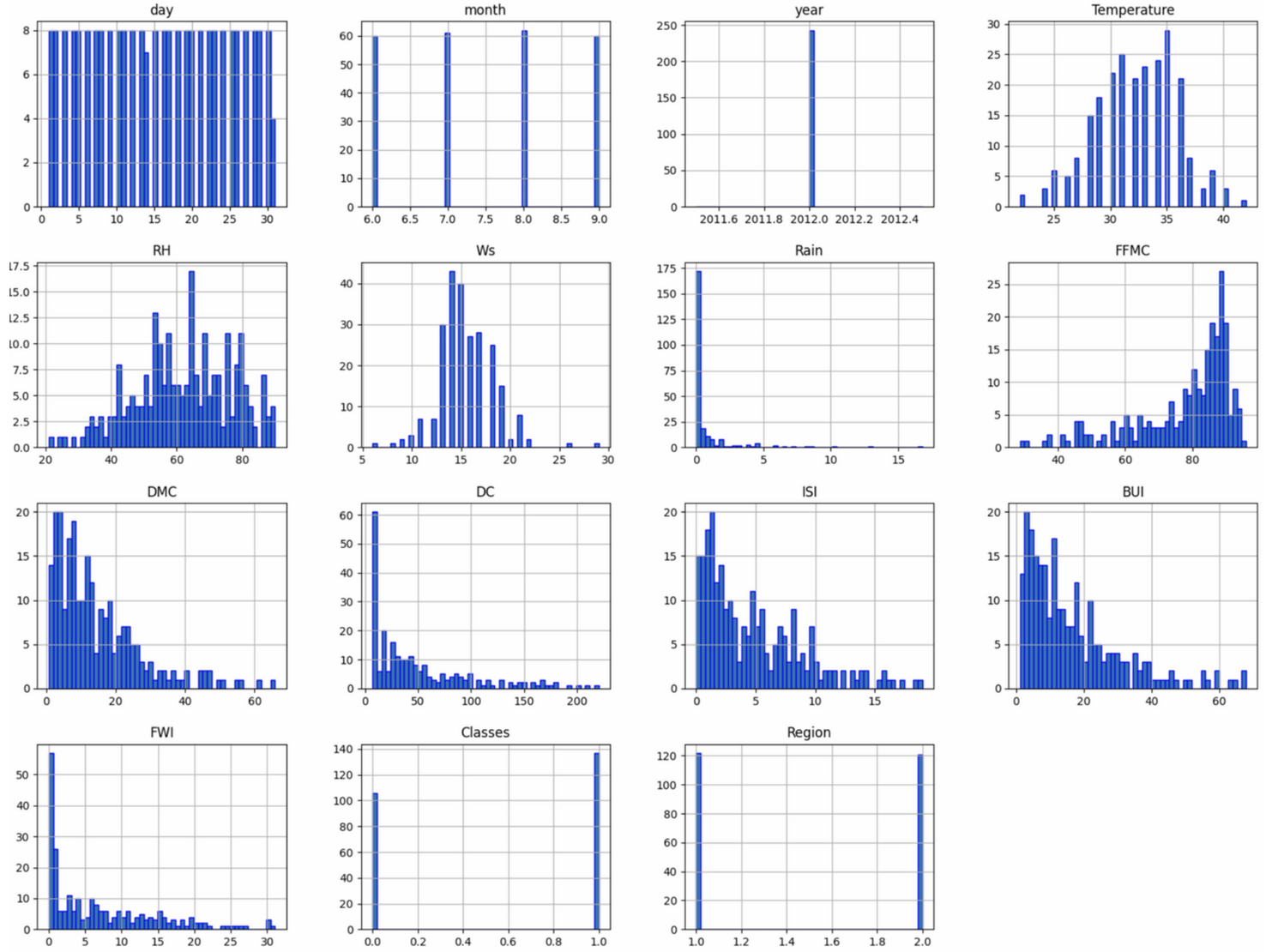
## How We Build Our Model



# Preliminary Results

## Exploring the Data



# Preliminary Results

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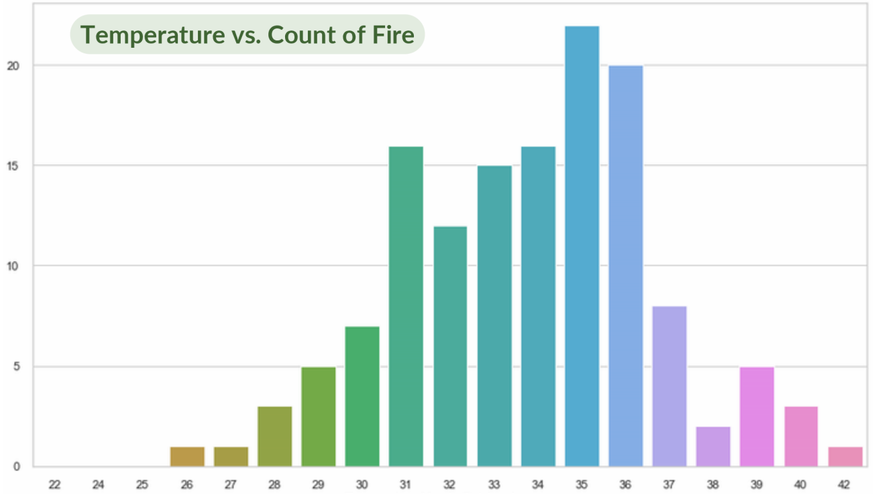


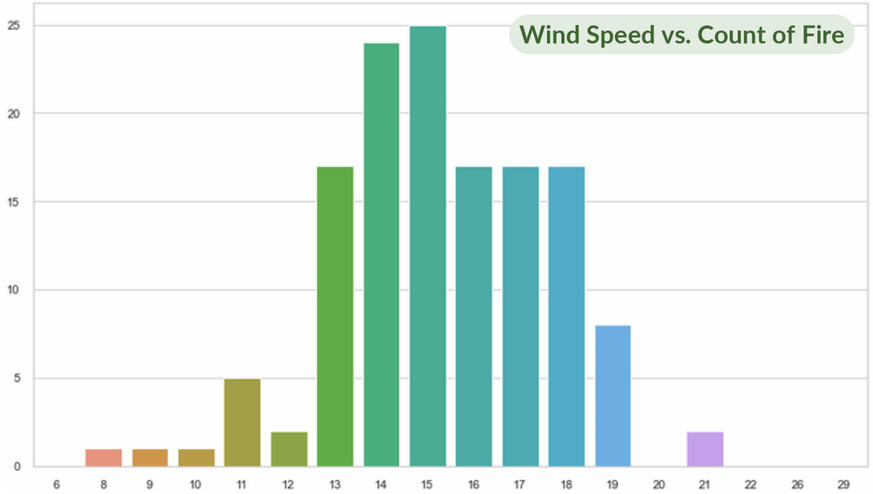


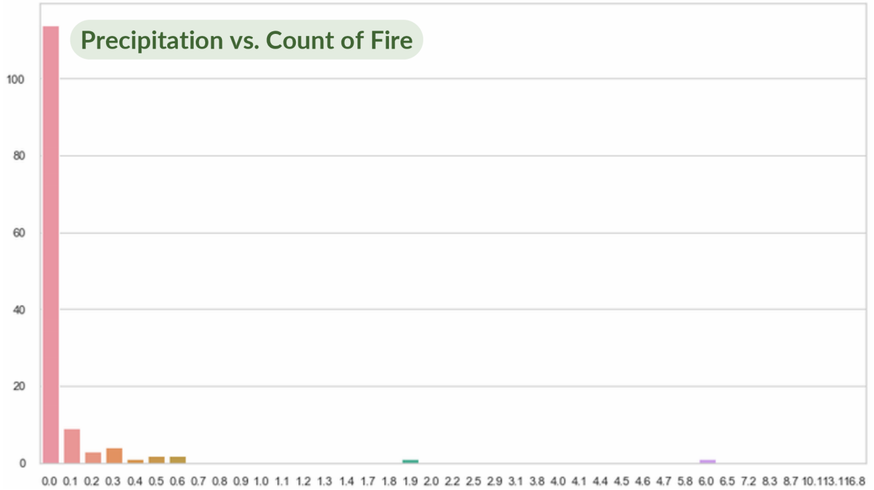


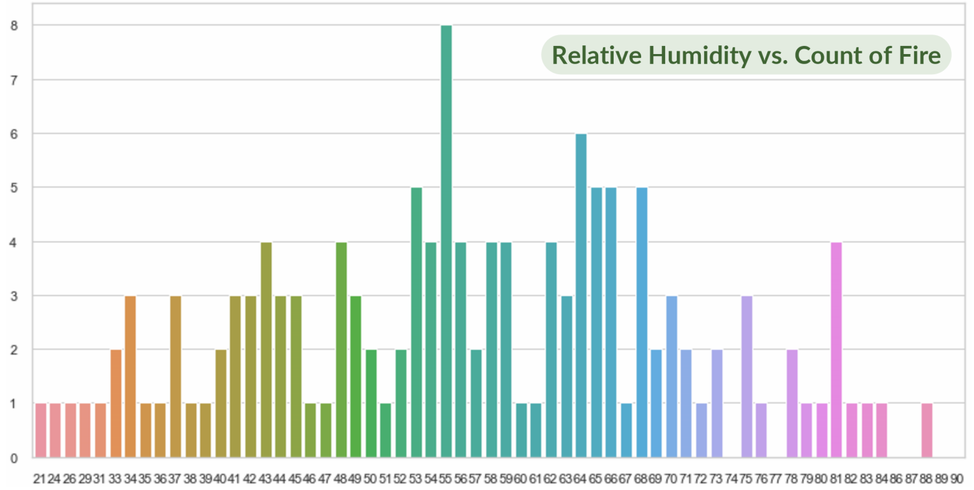

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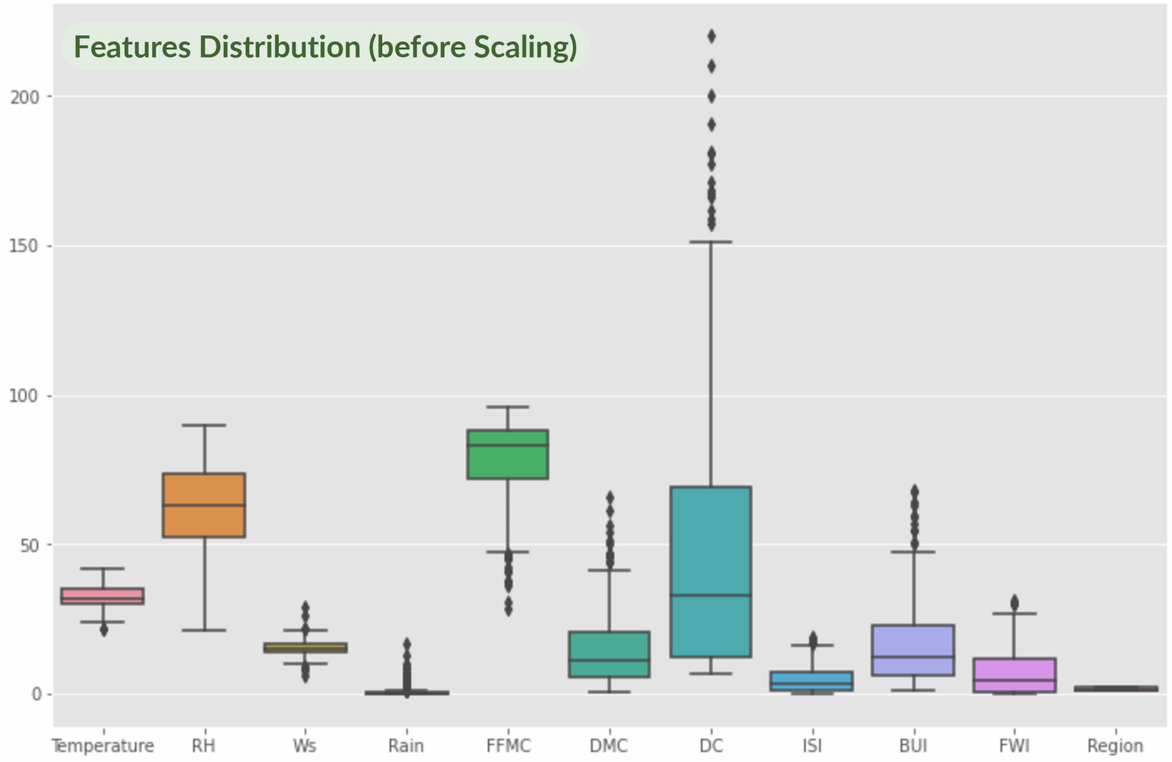


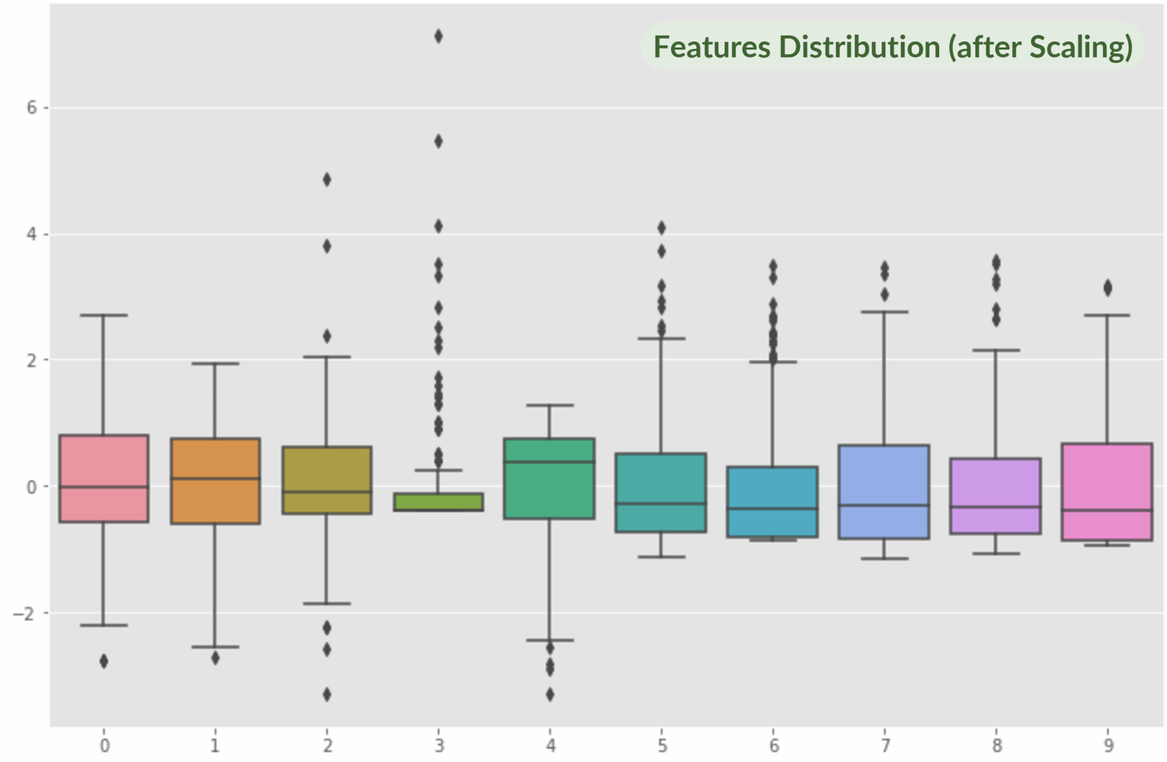

# Thank You!