*Style Guidelines for Final Year Project Reports*

Forest Fire Prediction and Analysis Using Environmental Data

Session 2022-2026

A project submitted in partial fulfilment of the requirements

for the completion of **Data Analysis and Visualization** course



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# INTRODUCTION

Forest fires are a significant environmental issue, causing immense damage to ecosystems, wildlife, and human property. Accurate prediction and analysis of forest fire conditions can aid in preventive measures and timely responses. This project revolves around the analysis of forest fire data to understand the contributing factors and develop insights that can assist in fire risk assessment. The dataset includes various meteorological and environmental attributes that influence fire occurrences.

# PROBLEM STATEMENT

Forest fires are often unpredictable and can escalate quickly due to factors like temperature, wind, and humidity. Lack of timely predictions can result in disastrous consequences. The problem lies in identifying the conditions under which forest fires are likely to occur. There is a need for a system that can analyze these conditions effectively to support decision-makers in forest management and emergency response**.**

# PROJECT RATIONALE

The importance of this project lies in its potential to minimize the damage caused by forest fires. By analyzing historical data and identifying patterns, we can improve prediction accuracy, enabling proactive actions. This project will help environmental agencies and forest departments by providing a data-driven foundation for understanding fire behavior.

## PROJECT GOALS

* To explore and analyze key factors contributing to forest fires.
* To develop a system that provides insights into fire risk based on environmental variables.
* To assist in the prediction and prevention of forest fires.

## PROJECT OBJECTIVES

* Collect and preprocess forest fire data.
* Perform statistical and visual analysis of environmental factors.
* Develop models (e.g., classification or regression) to predict fire-prone conditions.
* Evaluate model performance using appropriate metrics.
* Provide visual dashboards for easier interpretation of results**.**

## PROJECT SCOPE

* Included: Analysis of the provided forest fire dataset, feature extraction, data visualization, and predictive modeling.
* Excluded: Real-time data acquisition, deployment of the system in operational environments, and integration with hardware systems.
* Constraints: Limited to the features available in the dataset; prediction limited to historical patterns.

# SYSTEM FUNCTIONALITIES

* Upload and read forest fire datasets.
* Clean and preprocess data (handling missing values, normalization, etc.).
* Visualize key variables such as temperature, wind, humidity, and fire indices.
* Train and test models to classify or predict fire intensity or occurrence.
* Display results using graphs and performance metrics.
* Provide export reports for stakeholders.

# **TOOLS AND TECHNOLOGIES**

* Python – Core programming language for data processing and analysis.
* Pandas & NumPy – For data manipulation and numerical computations.
* Matplotlib & Seaborn – For data visualization and graphical representation.
* Scikit-learn – For building and evaluating machine learning models.
* Jupyter Notebook – For interactive development and documentation.
* Excel/CSV – For dataset storage and input.