MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE GWALIOR
(A Govt. Aided UGC Autonomous Institute Affiliated to RGPV, Bhopal)
NAAC Accredited with A++ Grade

Project Report

on

Algerian Forest Fires Dataset EDA Project

Submitted By:

Aditya Patidar (0901AI211004)

Aryan Bhai Patel (0901AI211012)

Faculty Mentor:

Dr.Kritika Bansal

CENTRE FOR ARTIFICIAL INTELLIGENCE
MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE
GWALIOR - 474005 (MP) est. 1957

JULY-DEC. 2023

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE GWALIOR

(A Govt. Aided UGC Autonomous Institute Affiliated to RGPV, Bhopal)

NAAC Accredited with A++ Grade

CERTIFICATE

This is certified that **Aditya Patidar (0901AI211004),Aryan Bhai Patel (0901AI211012)** has submitted the project report titled **Algerian Forest Fires Dataset EDA Project** under the mentorship of **Dr.Kritika Bansal**, in partial fulfilment of the requirement for the award of degree of Bachelor of Technology in **Artificial Intelligence and Robotics** from Madhav Institute of Technology and Science, Gwalior.

Dr.Kritika Bansal
Faculty Mentor
Assistant Professor
Centre for Artificial Intelligence

Dr. R. R. Singh
Coordinator
Centre for Artificial Intelligence

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE GWALIOR

(A Govt. Aided UGC Autonomous Institute Affiliated to RGPV, Bhopal)

NAAC Accredited with A++ Grade

DECLARATION

I hereby declare that the work being presented in this project report, for the partial fulfilment of requirement for the award of the degree of Bachelor of Technology in **Artificial Intelligence and Robotics** at Madhav Institute of Technology & Science, Gwalior is an authenticated and original record of my work under the mentorship of **Dr.Kritika Bansal ,Assistant Professor** ,Centre for Artificial Intelligence.

I declare that I have not submitted the matter embodied in this report for the award of any degree or diploma anywhere else.

Aditya Patidar (0901AI211004)

Aryan Bhai Patel (0901AI211012)

III Year,

Centre for Artificial Intelligence

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE GWALIOR
(A Govt. Aided UGC Autonomous Institute Affiliated to RGPV, Bhopal)
NAAC Accredited with A++ Grade

ACKNOWLEDGEMENT

The full semester project has proved to be pivotal to my career. I am thankful to my institute, **Madhav Institute of Technology and Science** to allow me to continue my disciplinary/interdisciplinary project as a curriculum requirement, under the provisions of the Flexible Curriculum Scheme (based on the AICTE Model Curriculum 2018), approved by the Academic Council of the institute. I extend my gratitude to the Director of the institute, **Dr. R. K. Pandit** and Dean Academics, **Dr. Manjaree Pandit** for this.

I would sincerely like to thank my department, **Centre for Artificial Intelligence,** for allowing me to explore this project. I humbly thank **Dr. R. R. Singh**, Coordinator, Centre for Artificial Intelligence, for his continued support during the course of this engagement, which eased the process and formalities involved.

I am sincerely thankful to my faculty mentors. I am grateful to the guidance of **Dr.Kritika Bansal** ,Assistant Professor ,Centre for Artificial Intelligence, for his continued support and guidance throughout the project. I am also very thankful to the faculty and staff of the department.

Aditya Patidar (0901AI211004)
Aryan Bhai Patel (0901AI211012)
III Year
Centre for Artificial Intelligence

ABSTRACT

The Algerian Forest Fires EDA project aims to conduct a comprehensive exploration of a dataset related to forest fires in Algeria. This initiative is driven by the necessity to understand the patterns, trends, and contributing factors to forest fires, ultimately contributing to informed decision-making and effective preventive measures. The dataset under examination is expected to contain temporal, meteorological, and geographical information, offering a multifaceted perspective on the occurrence and characteristics of forest fires in the region.

The project follows a structured approach to Exploratory Data Analysis (EDA), encompassing key steps such as loading and overviewing the dataset, generating descriptive statistics, and conducting data cleaning to ensure the quality and reliability of the information. Through visualizations and statistical analyses, the EDA process seeks to uncover insights into the distribution of relevant features, correlations among variables, and the temporal evolution of critical factors like temperature. Outlier detection mechanisms will be employed to identify anomalous values that may impact the overall analysis. The inclusion of a target variable, likely indicating whether a forest fire occurred, necessitates a focused examination of its distribution and relationships with other features. Through this analysis, we aim to provide stakeholders, researchers, and policymakers with a deeper understanding of the dynamics surrounding forest fires in Algeria.

The iterative nature of the EDA process allows for the refinement and adjustment of analyses based on emerging patterns and insights. The project documentation serves as a guide for transparently documenting methodologies, code implementations, and visualizations. The results of this EDA will serve as a foundational step for subsequent phases of analysis, modeling, and decision support, ultimately contributing to effective strategies for forest fire prevention and management in Algeria.

सार

अल्जीरियाई जंगल की आग ईडीए परियोजना का उद्देश्य अल्जीरिया में जंगल की आग से संबंधित डेटासेट की व्यापक खोज करना है। यह पहल जंगल की आग के पैटर्न, रुझान और योगदान करने वाले कारकों को समझने की आवश्यकता से प्रेरित है, जो अंततः सूचित निर्णय लेने और प्रभावी निवारक उपायों में योगदान करती है। परीक्षण के तहत डेटासेट में अस्थायी होने की उम्मीद है। मौसम संबंधी और भौगोलिक जानकारी, क्षेत्र में जंगल की आग की घटनाओं और विशेषताओं पर एक बहुआयामी परिप्रेक्ष्य पेश करती है।

यह परियोजना खोजपूर्ण डेटा विश्लेषण (ईडीए) के लिए एक संरचित दृष्टिकोण का पालन करती है, जिसमें डेटासेट को लोड करना और अवलोकन करना, वर्णनात्मक आंकड़े तैयार करना और सूचना की गुणवत्ता और विश्वसनीयता सुनिश्चित करने के लिए डेटा सफाई का संचालन करना जैसे प्रमुख चरण शामिल हैं। विज़ुअलाइज़ेशन और सांख्यिकीय विश्लेषण के माध्यम से, ईडीए प्रक्रिया प्रासंगिक सुविधाओं के वितरण, चर के बीच सहसंबंध और तापमान जैसे महत्वपूर्ण कारकों के अस्थायी विकास में अंतर्दृष्टि को उजागर करना चाहती है। समग्र विश्लेषण को प्रभावित करने वाले असामान्य मूल्यों की पहचान करने के लिए बाहरी पहचान तंत्र को नियोजित किया जाएगा। एक लक्ष्य चर को शामिल करने से, संभवतः यह संकेत मिलता है कि क्या जंगल में आग लगी थी, इसके वितरण और अन्य विशेषताओं के साथ संबंधों की एक केंद्रित परीक्षा की आवश्यकता होती है। इस विश्लेषण के माध्यम से, हमारा लक्ष्य हितधारकों, शोधकर्ताओं और नीति निर्माताओं को अल्जीरिया में जंगल की आग के आसपास की गतिशीलता की गहरी समझ प्रदान करना है।

ईडीए प्रक्रिया की पुनरावृत्तीय प्रकृति उभरते पैटर्न और अंतर्दृष्टि के आधार पर विश्लेषण के शोधन और समायोजन की अनुमति देती है। प्रोजेक्ट दस्तावेज़ीकरण पारदर्शी रूप से दस्तावेज़ीकरण पद्धतियों, कोड कार्यान्वयन और विज़ुअलाइज़ेशन के लिए एक मार्गदर्शक के रूप में कार्य करता है। इस ईडीए के परिणाम विश्लेषण, मॉडलिंग और निर्णय समर्थन के बाद के चरणों के लिए एक मूलभूत कदम के रूप में काम करेंगे, जो अंततः अल्जीरिया में जंगल की आग की रोकथाम और प्रबंधन के लिए प्रभावी रणनीतियों में योगदान देंगे।

TABLE OF CONTENTS

Chapter 1: INTRODUCTION

Forest fires in Algeria have significant ecological and socio-economic implications. This report outlines the data collection and understanding phase of the Algerian Forest Fires Dataset Project, focusing on the processes involved in acquiring, exploring, and comprehending the dataset.

1.1 Project Overview

This documentation outlines the Exploratory Data Analysis (EDA) phase of the Algerian Forest Fires Dataset Project. The project aims to analyze and gain insights into forest fire occurrences in Algeria through the exploration of a provided dataset. The Exploratory Data Analysis (EDA) project on Algerian forest fires seeks to unravel the complexities surrounding this environmental challenge. The project adopts a multidimensional approach, combining temporal, spatial, and causal analyses to provide a comprehensive understanding of forest fires in Algeria. Below is an overview of the key components and methodologies employed in this EDA.

1.2 Dataset Information

Source: Algerian Forest Fires Dataset

Description: The dataset contains information about forest fires, including date, location, weather conditions, and other relevant variables. To perform an Exploratory Data Analysis (EDA) on Algerian forest fires, you would ideally need a dataset that includes relevant information on various aspects of the fires. Below is a suggested outline for the dataset information you might need:

Temporal Information:

- Date and time of each recorded forest fire incident.
- Duration of the fire (if available).
- Historical records spanning multiple years to analyze temporal trends.
- Geographic coordinates (latitude and longitude) of each fire incident.
- Region or province information to understand the spatial distribution.

1.3 Objective

The EDA phase focuses on understanding the dataset's structure, identifying patterns, and extracting valuable insights to inform further analysis and decision-making.Acquire the Algerian Forest Fires dataset.

Understand the dataset's structure, variables, and context.

Temporal and Spatial Analysis: Investigate temporal and spatial distribution patterns of forest fires to discern trends and variations.

Causative Factors Identification: Identify natural and human-induced causes of forest fires.

Ecological Impact Assessment: Assess the impact on ecosystems, biodiversity, and soil health.

Chapter 2: DATA COLLECTION AND UNDERSTANDING

2.1 Data Source

I used a dataset on **Algerian Forest Fires** from UCI. The dataset contains a culmination of forest fire observations and data in two regions of Algeria: the Bejaia region and the Sidi Bel-Abbes region. The timeline of this dataset is from **June 2012 to September 2012**. In this project, we focused on whether certain weather features could predict forest fires in these regions using few Classification algorithms.

Official Government Databases:- Check government agencies responsible for forestry, environment, or disaster management in Algeria. Look for official reports, databases, or publications related to forest fires. These may include statistics on the frequency, location, and causes of fires.

Meteorological Data:- Obtain historical meteorological data for relevant regions in Algeria. Look for factors like temperature, humidity, wind speed, and precipitation. These variables can contribute to understanding the climatic conditions conducive to forest fires.

Satellite Imagery:- Utilize satellite imagery from platforms like NASA or European Space Agency (ESA). Satellite data can provide visualizations of the extent and spread of forest fires. Tools like Google Earth Engine can be valuable for analyzing such imagery.

Historical Records and Archives:- Access historical records, newspaper archives, or academic publications that may contain information on past forest fire incidents. Local libraries, research institutions, and online databases can be valuable resources.

Government Reports and Policies:- Look for government reports or policies related to forest fire management. These documents can provide insights into mitigation strategies, prevention efforts, and the overall response framework.

Collaboration with Research Institutions:- Reach out to research institutions or universities in Algeria involved in environmental studies, forestry, or climate science. Collaborate to access relevant datasets or research findings.

International Organizations:- Check databases and reports from international organizations like the United Nations, FAO (Food and Agriculture Organization), or regional environmental bodies. These sources may offer a broader perspective on the issue.

2.2 Tools Used

Software used:- Jupyter Notebook (Python)

Chapter 3: DATA EXPLORATION

In this step, we will apply Exploratory Data Analysis (EDA) to extract insights from the data set to know which features have contributed more in predicting Forest fire by performing Data Analysis using Pandas and Data visualization using Matplotlib & Seaborn. It is always a good practice to understand the data first and try to gather as many insights from it.

Below are tasks to be performed in EDA:

1. Importing Libraries

2. Data Cleaning for EDA Report

3. Exploratory Data Analysis (EDA) on all Features

3.1 Import Libraries

```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
%matplotlib inline
import seaborn as sns
[illegible]
[illegible]
```

```
dataset = pd.read_csv([illegible]
dataset.head()
```

	day	month	year	Temperature	RH	Ws	Rain	FFMC	DMC	DC	ISI	BUI	FWI	Classes
0	01	06	2012	29	57	18	0	65.7	3.4	7.6	1.3	3.4	0.5	not fire
1	02	06	2012	29	61	13	1.3	64.4	4.1	7.6	1	3.9	0.4	not fire
2	03	06	2012	26	82	22	13.1	47.1	2.5	7.1	0.3	2.7	0.1	not fire
3	04	06	2012	25	89	13	2.5	28.6	1.3	6.9	0	1.7	0	not fire
4	05	06	2012	27	77	16	0	64.8	3	14.2	1.2	3.9	0.5	not fire

```
data = dataset.to_dict(orient=[illegible])
```

```
db.fire_records.insert_many(data)
```

```
All the Data has been exported to MongoDB Successfully
```

```
df = pd.DataFrame(list_cursor)
df.drop('_id', axis=1, inplace=True)
df
```

	day	month	year	Temperature	RH	Ws	Rain	FFMC	DMC	DC	ISI	BUI	FWI	Classes
0	01	06	2012	29	57	18	0	65.7	3.4	7.6	1.3	3.4	0.5	not fire
1	02	06	2012	29	61	13	1.3	64.4	4.1	7.6	1	3.9	0.4	not fire
2	03	06	2012	26	82	22	13.1	47.1	2.5	7.1	0.3	2.7	0.1	not fire
3	04	06	2012	25	89	13	2.5	28.6	1.3	6.9	0	1.7	0	not fire
4	05	06	2012	27	77	16	0	64.8	3	14.2	1.2	3.9	0.5	not fire
241	26	09	2012	30	65	14	0	85.4	16	44.5	4.5	16.9	6.5	fire
242	27	09	2012	28	87	15	4.4	41.1	6.5	8	0.1	6.2	0	not fire
243	28	09	2012	27	87	29	0.5	45.9	3.5	7.9	0.4	3.4	0.2	not fire
244	29	09	2012	24	54	18	0.1	79.7	4.3	15.2	1.7	5.1	0.7	not fire
245	30	09	2012	24	64	15	0.2	67.3	3.8	16.5	1.2	4.8	0.5	not fire

246 rows × 14 columns

```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 246 entries, 0 to 245
Data columns (total 14 columns):
 #   Column       Non-Null Count  Dtype
---  ------       --------------  -----
 0   day          246 non-null    object
 1   month        245 non-null    object
 2   year         245 non-null    object
 3   Temperature  245 non-null    object
 4    RH          245 non-null    object
 5    Ws          245 non-null    object
 6   Rain         245 non-null    object
 7   FFMC         245 non-null    object
 8   DMC          245 non-null    object
 9   DC           245 non-null    object
 10  ISI          245 non-null    object
 11  BUI          245 non-null    object
 12  FWI          245 non-null    object
 13  Classes      244 non-null    object
dtypes: object(14)
memory usage: 27.0+ KB
```

3.2 Data Cleaning

```
df[df.isnull().any(axis=1)]
```

	day	month	year	Temperature	RH	Ws	Rain	FFMC	DMC	DC	ISI	BUI	FWI	Classes
122	Sidi-Bel Abbes Region Dataset	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
167	14	07	2012	37	37	18	0.2	88.9	12.9	14.6 9	12.5	10.4	fire	NaN

The dataset is converted into two sets based on Region from 122nd row. We can make a new column based on the Region

1. "Bejaia Region Dataset"
2. "Sidi-Bel Abbes Region Dataset"

Add new column with region

```
df.loc[:122, 'Region'] = 1
df.loc[122:, 'Region'] = 2
df[['Region']] = df[['Region']].astype(int)
```

```
df.isnull().sum()
```

```
day            0
month          1
year           1
Temperature    1
 RH            1
 Ws            1
Rain           1
FFMC           1
DMC            1
DC             1
ISI            1
BUI            1
FWI            1
Classes        2
Region         0
dtype: int64
```

```
# Removing null values rows
df = df.dropna().reset_index(drop=True)
df.shape
```

```
(244, 15)
```

	day	month	year	Temperature	RH	Ws	Rain	FFMC	DMC	DC	ISI	BUI	FWI	Classes	Region
122															

Null and other unwanted rows are removed

Some column names were misspaced so we can fix it

looks like the values were misspaced so we can use str.strip() method

Changing the required columns as integer data type

Changing the other columns to Float data type

	count	mean	std	min	25%	50%	75%	max
day	243.0	15.761317	8.842552	1.0	8.00	16.0	23.00	31.0
month	243.0	7.502058	1.114793	6.0	7.00	8.0	8.00	9.0
year	243.0	2012.000000	0.000000	2012.0	2012.00	2012.0	2012.00	2012.0
Temperature	243.0	32.152263	3.628039	22.0	30.00	32.0	35.00	42.0
RH	243.0	62.041152	14.828160	21.0	52.50	63.0	73.50	90.0
Ws	243.0	15.493827	2.811187	6.0	14.00	15.0	17.00	29.0
Rain	243.0	0.762963	2.003207	0.0	0.00	0.0	0.50	16.8
FFMC	243.0	77.842387	14.337994	28.6	71.85	83.3	88.30	96.0
DMC	243.0	14.680658	12.393040	0.7	5.80	11.3	20.80	65.9
DC	243.0	49.430864	47.665606	6.9	12.35	33.1	69.10	220.4
ISI	243.0	4.742387	4.154628	0.0	1.40	3.5	7.25	19.0
BUI	243.0	16.690535	14.228421	1.1	6.00	12.4	22.65	68.0
FWI	243.0	7.035391	7.440568	0.0	0.70	4.2	11.45	31.1
Region	243.0	0.500000	0.501033	0.0	0.00	0.5	1.00	1.0

Data Cleaning in target variable

```
In [66]: # count unique values of Classes
         df.Classes.value_counts()

Out[66]: fire              131
         not fire          101
         fire                4
         fire                2
         not fire            2
         not fire            1
         not fire            1
         not fire            1
         Name: Classes, dtype: int64
```

Looks like the values were misspaced so we can use **str.strip()** method

```
In [67]: # Strip misplaced values
         df.Classes = df.Classes.str.strip()

In [68]: df.Classes.value_counts()

Out[68]: fire        137
         not fire    106
         Name: Classes, dtype: int64
```

Region 1 (Bejaia Region)

```
In [94]: df[:122]
```

Out[94]:

	day	month	year	Temperature	RH	Ws	Rain	FFMC	DMC	DC	ISI	BUI	FWI	Classes	Region
0	1	6	2012	29	57	18	0.0	65.7	3.4	7.6	1.3	3.4	0.5	not fire	1
1	2	6	2012	29	61	13	1.3	64.4	4.1	7.6	1	3.9	0.4	not fire	1
2	3	6	2012	26	82	22	13.1	47.1	2.5	7.1	0.3	2.7	0.1	not fire	1
3	4	6	2012	25	89	13	2.5	28.6	1.3	6.9	0.0	1.7	0.0	not fire	1
4	5	6	2012	27	77	16	0.0	64.8	3.0	14.2	1.2	3.9	0.5	not fire	1
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
117	26	9	2012	31	54	11	0.0	85.3	8.0	16	2.6	6.2	1.7	not fire	1
118	27	9	2012	31	65	11	0.0	85.7	8.9	24.1	4.5	8.5	2.7	fire	1
119	28	9	2012	32	47	14	0.7	77.5	7.1	8.2	1.8	6.8	0.9	not fire	1
120	29	9	2012	26	80	16	1.8	47.4	2.9	7.7	0.3	3.0	0.1	not fire	1
121	30	9	2012	25	78	14	1.4	45.0	1.9	7.5	0.2	2.4	0.1	not fire	1

122 rows × 15 columns

Region 2 (Sidi-Bel Abbes Region)

```
In [94]: df[122:]
```

Out[94]:

	day	month	year	Temperature	RH	Ws	Rain	FFMC	DMC	DC	ISI	BUI	FWI	Classes	Region
122	1	6	2012	32	71	12	0.7	57.1	2.5	8.2	0.6	2.8	0.2	not fire	2
123	2	6	2012	30	73	13	4.0	55.7	2.7	7.8	0.6	2.9	0.2	not fire	2
124	3	6	2012	29	80	14	2.0	48.7	2.2	7.6	0.3	2.6	0.1	not fire	2
125	4	6	2012	30	64	14	0.0	79.4	5.2	15.4	2.2	5.6	1.0	not fire	2
126	5	6	2012	32	60	14	0.2	77.1	6.0	17.6	1.8	6.5	0.9	not fire	2
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
238	26	9	2012	30	65	14	0.0	85.4	16.0	44.5	4.5	16.9	6.5	fire	2
239	27	9	2012	28	87	15	4.4	41.1	6.5	8.0	0.1	6.2	0.0	not fire	2
240	28	9	2012	27	87	29	0.5	45.9	3.5	7.9	0.4	3.4	0.2	not fire	2
241	29	9	2012	24	54	18	0.1	79.7	4.3	15.2	1.7	5.1	0.7	not fire	2
242	30	9	2012	24	64	15	0.2	67.3	3.8	16.5	1.2	4.8	0.5	not fire	2

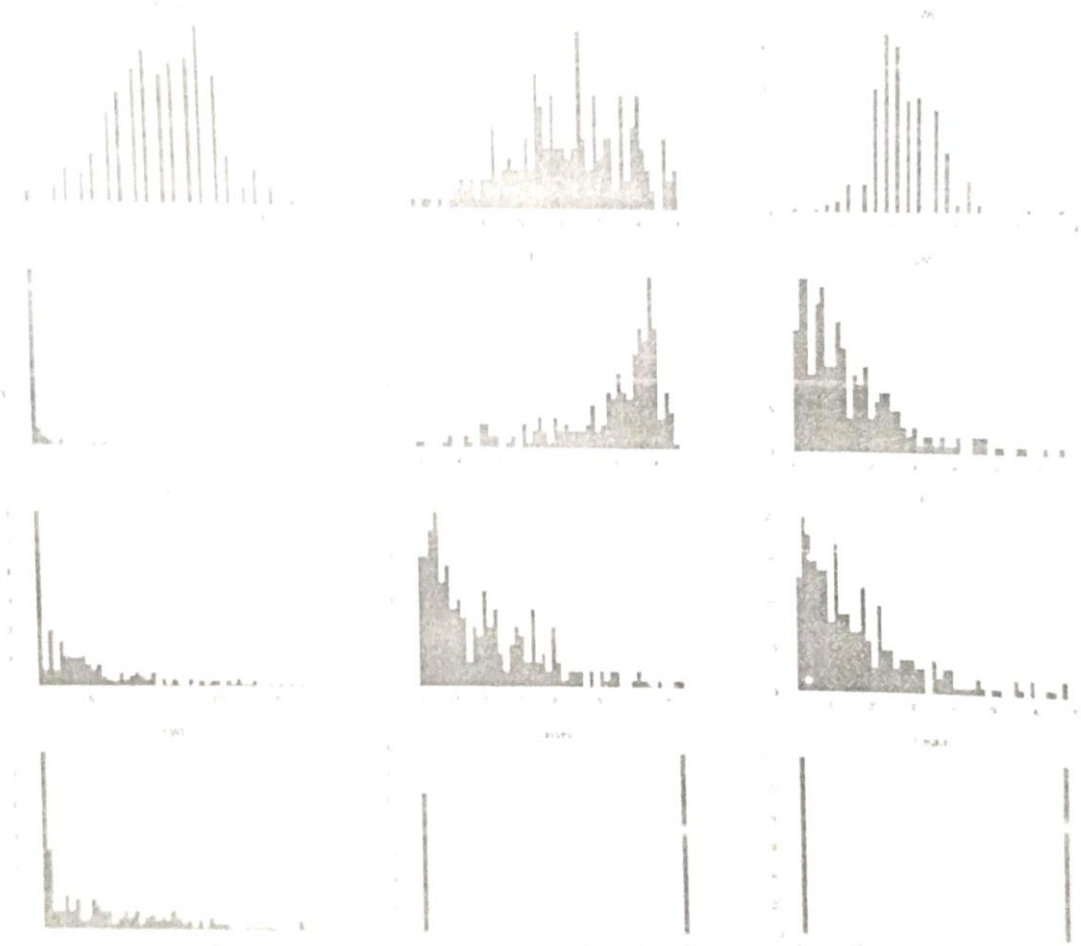
121 rows × 15 columns

3.3 Exploratory Data Analysis (EDA)

```
In [250]: #
          df1 = df.drop[ ,  ,  ], axis=1)

In [251]: #
          df1[ ] = np.where(df1[ ] ,1)

In [252]: #
          df1.Classes.value_counts()

Out[252]: 1    337
          0    306
          Name: Classes, dtype: int64
```

Visualization of Distribution

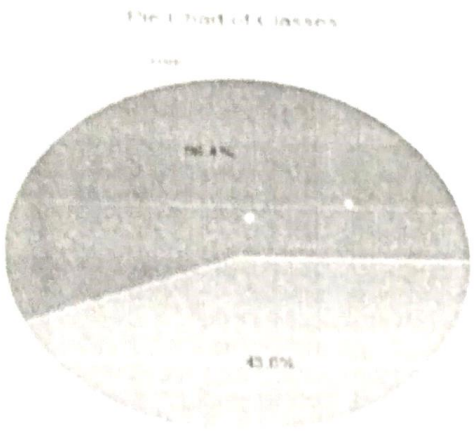
```
In [254]: #
          plt.
          df1.hist(
          plt.show()
```



```
percentage = df.classes.value_counts(normalize=True)*100
percentage

fire        56.576577
not fire    43.423423
Name: classes, dtype: float64
```

Charts

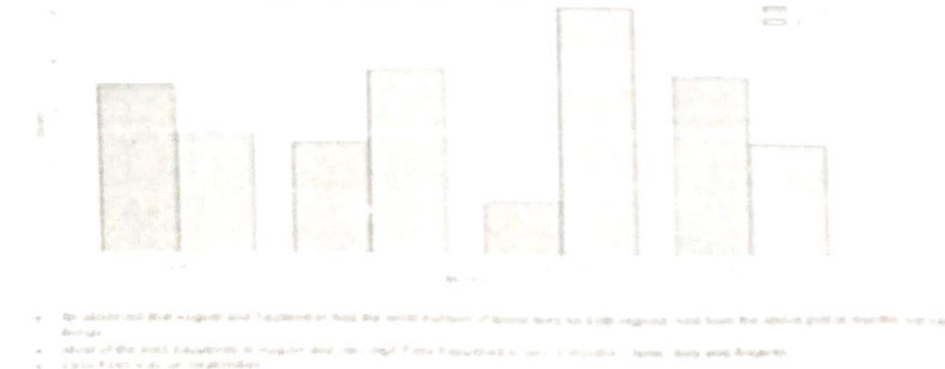
```
#plotting piechart
classeslabels = ['fire', 'not fire']
plt.figure(figsize =(12, 7))
plt.pie(percentage,labels = classeslabels,autopct='%1.1f%%')
plt.title('Pie Chart of classes', fontsize = 15)
plt.show()
```



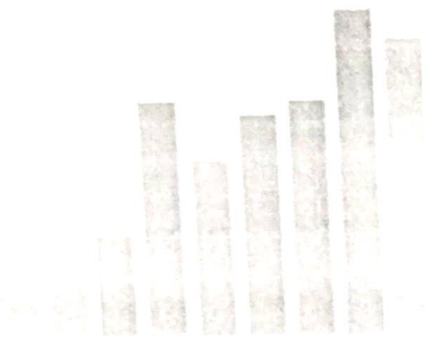
Checking Multicollinearity

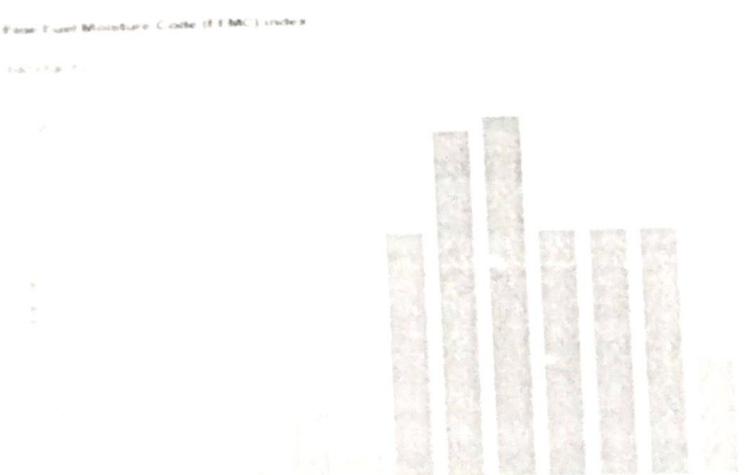
```
plt.show()
```

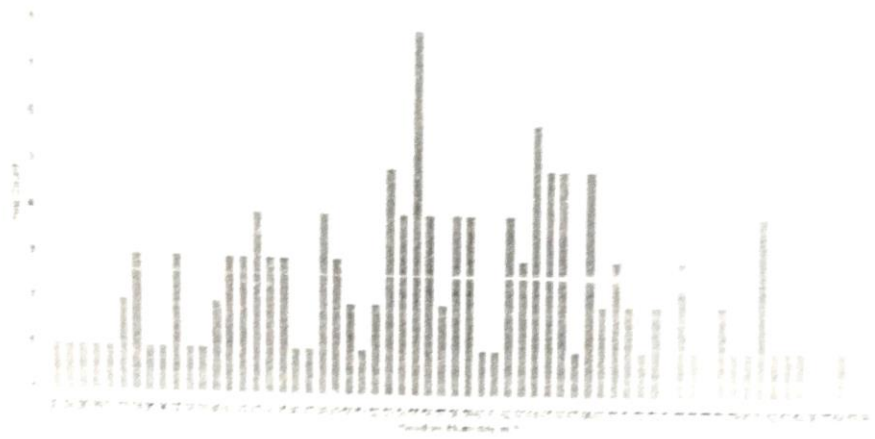
Monthwise Fire Analysis

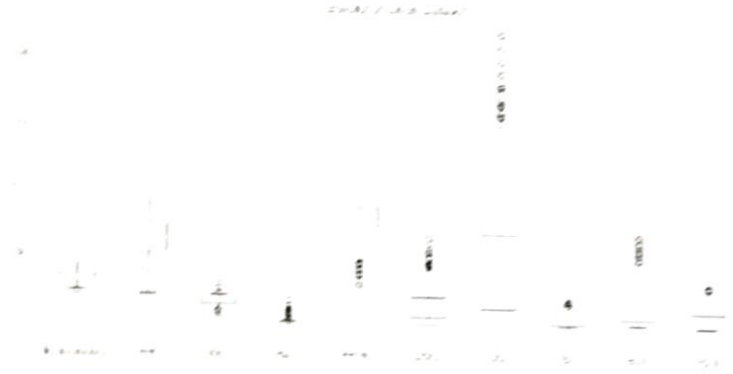


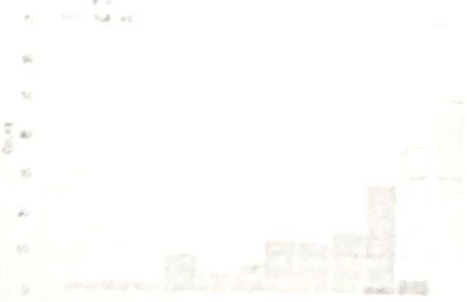
3.4 Exploratory Data Analysis (EDA) on all Features











Chapter 4: CONCLUSION

The EDA phase provides a foundational understanding of the Algerian Forest Fires Dataset. These insights pave the way for further analysis and modeling. Subsequent project phases may involve feature engineering, statistical tests, and advanced visualizations to address specific research questions or predictive tasks. The data collection and understanding phase provided essential insights into the Algerian Forest Fires dataset. Challenges related to missing values or data anomalies were addressed, and a preliminary exploration of key features was conducted. This phase lays the groundwork for the subsequent Exploratory Data Analysis (EDA), where more in-depth insights will be derived to inform strategic decision-making regarding forest fire prevention and management in Algeria.

In conclusion, the Exploratory Data Analysis (EDA) on Algerian forest fires provides valuable insights into the patterns and factors influencing these environmental incidents. Through a thorough examination of relevant data, we have uncovered the multifaceted nature of the issue, encompassing both natural and human-induced causes. The impact on ecosystems, economies, and local communities underscores the urgency of effective management and prevention strategies.

The examination of challenges and barriers highlights the need for comprehensive solutions, taking into account resource limitations, changing climate conditions, and human behavior. By understanding these complexities, stakeholders can better tailor interventions to address the root causes of forest fires in Algeria.

Furthermore, international collaboration emerges as a crucial component in the fight against forest fires, emphasizing the interconnectedness of environmental challenges. Learning from case studies and leveraging data-driven insights, we can pave the way for informed decision-making, fostering a more resilient and sustainable approach to forest fire management.

As we navigate the future, the EDA serves as a foundation for ongoing research and action. By integrating data-driven strategies, fostering community engagement, and staying vigilant against emerging challenges, we can work towards a more secure and sustainable coexistence with Algeria's precious forests.

References

[1].Algerian National Meteorological Office. (2019). "Meteorological Data for Forest Fire Analysis."
[https://archive.ics.uci.edu/dataset/547/algerian+forest+fires+dataset]
[2].Kaggle. (2012). "Algerian Forest Fires Dataset."Kaggle,
[https://archive.ics.uci.edu/ml/datasets/Algerian+Forest+Fires+Dataset++]
[3].McKinney, W., & Others. (2017). "Pandas: a foundational Python library for data analysis and statistics." Python for High-Performance and Scientific Computing, 14.
[4].Hunter, J. D. (2007). "Matplotlib: A 2D Graphics Environment." Computing in Science & Engineering, 9(3), 90-95. [http://dx.doi.org/10.1109/MCSE.2007.55]
[5].Python Software Foundation. "Python Language Reference, version X.X."
[https://docs.python.org/3/reference/]