IMPACT OF ETHER ON VULNERABLE GROUPS

MINI PROJECT REPORT

SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS TO

RGUKT- SRIKAKULAM

FOR THE AWARD OF THE DEGREE OF

BACHELOR OF TECHNOLOGY IN

COMPUTER SCIENCE AND ENGINEERING

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RAJIV GANDHI UNIVERSITY OF KNOWLEDGE TECHNOLOGIES

CERTIFICATE OF COMPLETION

This is to certify that the thesis work titled “Impact of ether on vulnerable groups” was successfully completed by M.Ramani priya (S191113), P.Mohitha (S191119), K.Anusha (S190934) ,S.Bhanu(S191130),G.Asha(S190261) In fulfilment of the requirements for the Mini Project in Computer Science and Engineering of Rajiv Gandhi University of Knowledge Technologies under my guidance and output of the work carried out is satisfactory.

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BONAFIDE CERTIFICATE

Certified that this project work titled“Impact of ether on vulnerable groups” was bonafied work by M.Ramani priya (S191113), P.Mohitha (S191119), K.Anusha (S190934) ,S.Bhanu(S191130),G.Asha(S190261) who carried out the work under my supervision, and submitted in partial fulfillment of the requirements for the award of the degree, BACHELOR OF TECHNOLOGY, during the year 2023-2024.

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RGUKT, SRIKAKULAM.

Date**: 8-07-2024**

ABSTRACT

Air quality index (AQI) measures how clean or polluted the air is based on levels of pollutants like carbon monoxide(CO),nitrogen dioxide(NO2),ozone(O3) and fine particulate matter(PM2.5).This study focuses on figuring out which groups of people are most effected by different AQI levels.It specifically looks at vulnerable groups such as people with breathing problems,heart conditions,older adults and children and how their health influenced by various AQI thresholds.Using advanced machine learning techniques,the study analysis past data and models to predict and classify how AQI values impact these groups.By looking at patterns in pollutant levels and health outcomes,the research aims to offer insights that can guide public health actions and policies. This work aims to rise awareness and promote effects that protect vulnerable communities from the harmful effects of air pollution,aiming for a healthier environment for everyone.

Keywords: Air Quality Index(AQI),vulnerable population,machine learning models,air quality,predictive model,supervised learning,public health impact,model training and testing.

ACKNOWLEDGEMENT

The satisfaction that accompanies the successful completion of any task would be incomplete without the mention of people whose perpetual cooperation made it viable, whose constant guidance and encouragement crown all efforts with success. We would like to express our profound gratitude and deep regards to our guide **Mrs.Ch.Lakshmi Bala madam** for her exemplary guidance, inspiration, monitoring, and constant encouragement with constructive suggestions throughout the course of this project. We are extremely grateful for the confidence bestowed in us and for entrusting our project entitled "**Impact of ether on vulnerable groups**". At this juncture, we feel honoured in expressing our sincere thanks to her for providing valuable insights leading to the successful completion of our project.

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1. INTRODUCTION

The Air Quality Index(AQI0 provides a critical evolution of outdoor air quality by measuring the levels of pollutants like carbon monoxide(CO),nitrogen dioxide(NO2),Ozone(O3) and Fine particulate matter(PM2.5).This project aims to classify diverse demographic groups based on their susceptibility to AQI values and predict the associated health impacts.By analysing specific AQI thresholds linked to respiratory conditions heart diseases and other health risks,the study seeks to identify those most vulnerable to air pollution.The insights gained will inform targeted strategies and policies aimed at protecting public health from the adverse effects of environmental pollution.

1.1 Purpose

The main purpose of this project is to analyse how different levels of air pollution,measured by the Air Quality Index(AQI) effects various demographic groups.By focusing on vulnerable populations such as those with respiratory vconditions and heart diseases,the study aims to identify who is most at risk from different AQI thresholds.The research seeks to inform strategies and policies aimed at protecting public health from the adverse effects of environmental pollution.

1.2 Existing System

The current air quality monitoring system uses the K-Nearest neighbors Algorithm to figure out the air quality status like whether it is good,moderate or unhealthy based on the Air Quality Index(AQI).The system gathers data from sensors that measure pollutants like PM2.5,Ozone,Nitrogen Dioxide and Carbon Monoxide.This data is used to calculate the AQI value.The KNN algorithm , a type of machine learning,is trained with past data that has already been categorized into different air quality levels.When new data comes in the algorithm compares it to the closest matches in the existing data to determine the current air quality status.This system helps by providing up-to-data about the air quality,which can alert people and help them take precautions if the air quality is bad.

1.3 Proposed System

In our proposed system,not only determines the air quality status as good,moderate or unhealthy but also specifies the vulnerable groups most likely to be impacted within different AQI ranges.For AQI values of 0-50,the system identifies the people with Asthma,Chronic bronchitis,Other respiratory conditions,pregnant women and children are most at risk.for AQI values between 51-100,individuals with or other cardio vascular conditions ,as well as outdoor workers who spent significant time outdoors are most highlighted.In the AQI range of 101-150,the system focuses n older adults and those expressing hyper tension,chest pain,palpitations are shortness of breath.When AQI values reach 151-200 it indicates higher risks for those which chronic obstructive pulmonary disease (COPD),throat irritaton and other respiratory diseases.Finally,for AQI values above 200,the system alerts the people with asthma,COPD and bronchitis are severely effected.This enhancement allows the system to provide more detailed and actionable health advisors,helping specific vulnerable groups take necessary precautions during periods of poor air quality.

1.4 Scope

The scope of the project includes the following functionalities:

- Identifying Vulnerable groups susceptability to different AQI values.
- Analysing the health impacts of pollutants like carbon monoxide(CO),nitrogen dioxide(NO2),Ozone(O3) and fine particulate matter(PM2.5) on these groups.
- Developing recommendations for public health and policies based on the findings.

1.3 Definitions, Acronyms, and Abbreviations

AQI : Air Quality Index
CO :Carbon Monoxide
NO2 :Nitrogen dioxide
O3 :Ozone

1.5 Overview

Air pollution can seriously effect vulnerable people like children,the elders and those with health problems.It can cause breathing issues,heart and lung diseases and reduce overall quality of life.

2. OVERALL DESCRIPTION

2.1 Product Perspective

The Project focuses on conducting research and analysis rather than developing a physical product.It involves gathering and analysing data to generate insights into the relationship between air pollution levels and health outcomes for vulnerable populations.

2.2 Product Functions

The primary functions of this project as follows :

- **Data collection:**Gathering real time or historical data on AQI levels and pollutant concentrations from reliable sources.Ensure that dataset includes information on AQI levels categorized into ranges(ex:good,moderate,unhealthy etc.).
- **Data processing and analysis**:

  - Pre process the data by removing irrelevant columns like “Good”,”Bad” indicators

  - Add a new column that categorizes AQI ranges into specific health impact categories.

  - Impact algorithms to correlate AQI levels and pollutant concentrations with health outcomes specific to vulnerable groups.

Reporting: Generating comprehensive reports and visualizations summarizing the findings of the research ,including recommendations for public health and policies based on the observed data.

2.3 User Classes and Characteristics

The primary users of the project include researchers, public health officials,policy makers and stake holders involved in environmental health and public policy these users will utilize the research findings to make informed decisions regarding air quality and protection of vulnerable populations.

2.4 Operating Environment

We need Python 3.6 or above versions to execute.For running the machine learning model, you require

- Jupyter Notebook
- Libraries and packages flask, numpy, pandas, Scikit-learn.

The developers operating environment is,

i. Jupyter Notebook for code implementation

2.5 Technologies Used

Frontend	:	JavaScript,HTML/CSS.
Backend	:	Python
Framework	:	Flask

2.6 Requirements

- **Software Requirements:**

  i. Python 3.6

  ii. Jupyter Notebook

  iii. Libraries and Packages flask, numpy, pandas, Scikit-learn.

  iv. Linux (Ubuntu 20.04 version) OS

- **Hardware Requirements:**

  i. AMD Ryzen 3 3250u with radeon graphics Processor

  ii. 5.7 GB RAM

  iii.Minimum 500MB Storage

  iv.Screen resolution of at least 1366x768(16:9)2

3. SYSTEM OVERVIEW

This section provides an overview of the system, outlining its purpose, architecture, components, and functionalities.

3.1 System Purpose

The purpose of the proposed system is to monitor and analyze air quality index(AQI) levels and provide detailed information on the potential impact on various vulnerable groups.By leveraging machine learning algorithms,the system aims to predict which individuals are most likely to be affected under different AQI ranges,thus offering tailored health advisories and enabling specific vulnerable groups to take necessary precautions during periods of poor air quality.

3.2 System Architecture

The system follows a client-server architecture, consisting of three main components:

Data collection layer:

- **Sensors and data sources:**Collect real-time AQI data from multiple sources such as air quality monitoring stations,satellite data and public APIs.

- **Health Data Sources**:Gather health data relevant to vulnerable groups from hospitals,clinics and health organizations.

Data Processing layer:

- **Preprocessing Module**:Cleans and normalizes the collected data to ensure consistency and accuracy.

- **Data integration module**:Merges AQI data with health data to create comprehensive datasets for analysis.

Machine Learning layer:

- **Model Training:**Develop and train machine learning models using historical AQI and health data to predict the impact on vulnerable groups.

- **Model evaluation**:Validate the models using test datasets to ensure accuracy and reliability.

Prediction and Analysis layer:

- **AQI Analysis:**Classifies AQI levels into categories(Good,Moderate,Unhealthy,etc.).

- **Impact Prediction:**Predicts the health impact on vulnerable groups based on AQI levels.

User Interface layer:

- **Dashboard**:Provides a visual representation of real-time AQI data and health impact predictions.

- **Alerts and Notifications:**Sends alerts and health advisories to vulnerable groups through various channels such as mobile apps,SMS and email.Validate the models using test datasets to ensure accuracy and reliability.

3.3 System Functionality

The system provides the following key functionalities:

Real-Time Monitoring: Continuously monitors AQI levels from various sources and updates the data in real-time.

Health Impact Prediction: Uses trained machine learning models to predict the health impact on vulnerable groups based on current AQI levels.

Detailed Health Advisories: Provides specific health advisories for different AQI ranges:

AQI 0-50 (Good) : Identifies People with asthma,chronic bronchitis,other respiratory conditions,pregnant women, and children as most at risk.
AQI 51-100 (Moderate) : Highlights individuals with cardiovascular conditions and outdoor workers as more likely to be affected.
AQI 101-150 (Unhealthy for sensitive groups) : Focuses on older adults and those with hypertension,chest pain,palpitations or shortness of breath.
AQI 151-200 (Unhealthy) : Indicates higher risks for individuals with chronic obstructive pulmonary disease (COPD),throat irritation and other respiratory diseases.
AQI 201+ (Very Unhealthy) : Alerts people with asthma,COPD and bronchitis about severe effects.

User Alerts and Notifications:Sends timely alerts and notifications to users,advising them on necessary precautions during periods of poor air quality.

Historical Data Analysis:Analyzes historical AQI and health data to identify trends and patterns,which can help in improving prediction accuracy and health advisories.

By integrating real-time AQI monitoring with advanced machine learning algorithms,the proposed system aims to enhance public health safety by providing detailed and actionable information to vulnerable groups,thus enabling them to take necessary precautions during periods of poor air quality.

4. Requirement Specification:

This section outlines the specific functionalities and behaviors that the system should exhibit. The functional requirements are categorized based on the main features and functionalities of the system.

4.1 Functional Requirements

4.1.1 Data collection

1. The system shall collect real-time or historical data on AQI levels from reliable sources.
2. The system shall gather data on pollutant concentrations (CO,NO2,O3,PM2.5) corresponding to AQI levels.

4.1.2 Data Analysis

1. The system shall analyze the collected data to identify correlations between AQI levels,pollutant concentrations,and health outcomes for vulnerable groups.
2. The system shall generate statistical reports and visualizations to present the findings of the analysis.

4.1.3 Reporting

1. The system shall produce comprehensive reports summarizing the impact of air quality on vulnerable populations.
2. Reports shall include recommendations for public health interventions and policies based on the research findings.

5. NON-FUNCTIONAL REQUIREMENTS

Non-functional requirements specify the qualities or attributes that the system should possess.They focus on how the system should perform rather than what it should do.

Performance: The system shall be capable of processing and analyzing large datasets efficiently.

Reliability: The system shall operate reliably with minimal downtime during data collection and analysis phases.

Security: Data transmission and storage shall adhere to best practices for security and privacy protection.

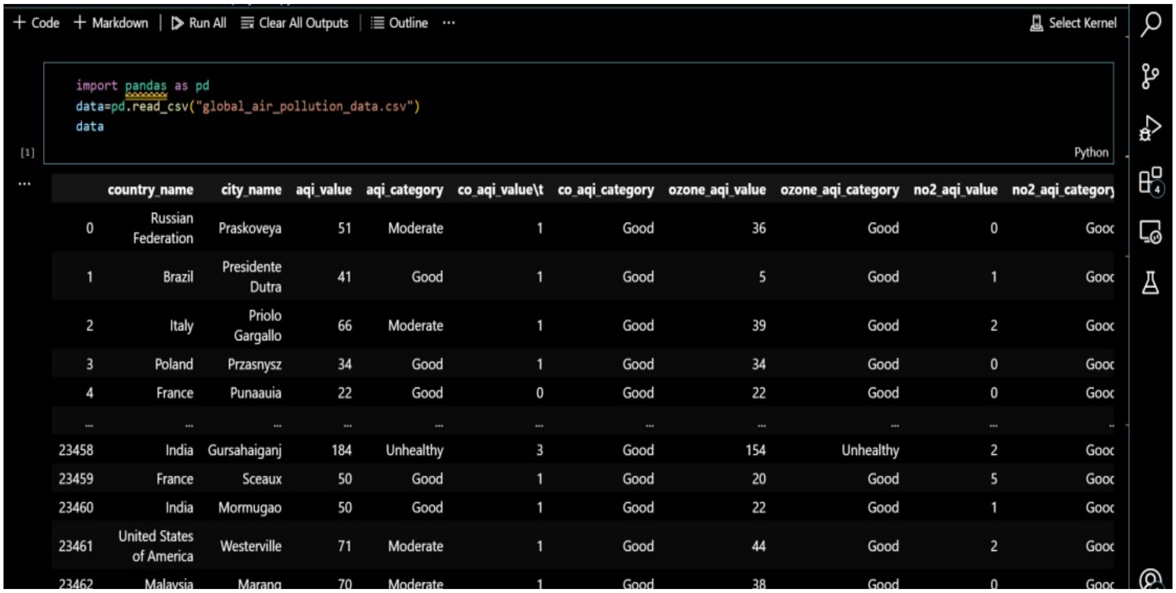
Usability: The user interface shall be intuitive and user-friendly for researchers and stake holders.

6. IMPLEMENTATION:

Steps to Build the Model

1. Uploading the dataset
2. Preprocessing
3. Updating the dataset
4. Attribute type conversion
5. Visualization
6. Train and test the model
7. Final accuracy
8. Frontend
9. Combining Frontend and Backend
10.Output

6.1 Uploading the dataset

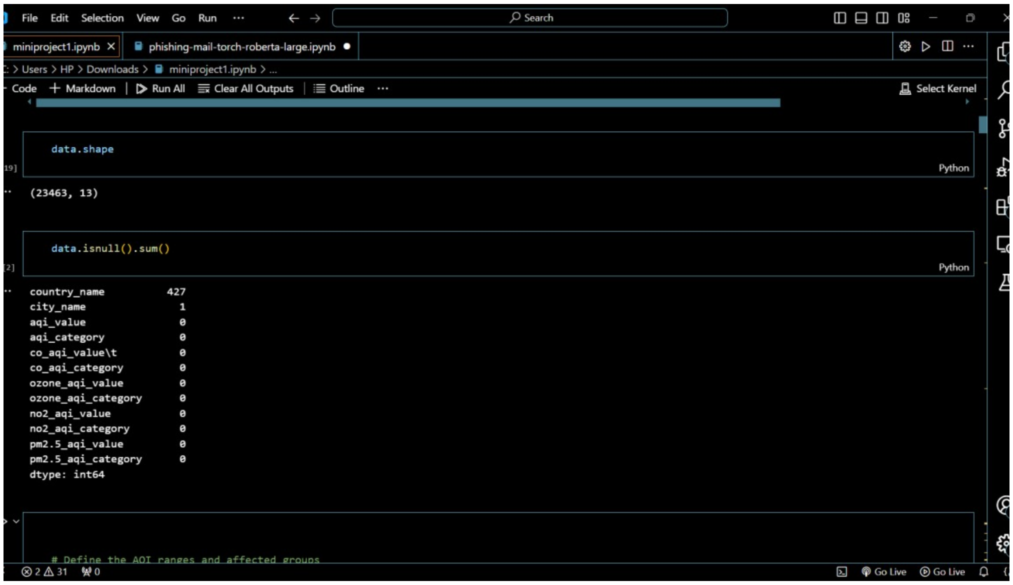


```
import pandas as pd
data=pd.read_csv("global_air_pollution_data.csv")
data
```

[1]

	country_name	city_name	aqi_value	aqi_category	co_aqi_value\t	co_aqi_category	ozone_aqi_value	ozone_aqi_category	no2_aqi_value	no2_aqi_categor
0	Russian Federation	Praskoveya	51	Moderate	1	Good	36	Good	0	Gooc
1	Brazil	Presidente Dutra	41	Good	1	Good	5	Good	1	Gooc
2	Italy	Priolo Gargallo	66	Moderate	1	Good	39	Good	2	Gooc
3	Poland	Przasnysz	34	Good	1	Good	34	Good	0	Gooc
4	France	Punaauia	22	Good	0	Good	22	Good	0	Gooc
...	...	...	...	...	...	...	...	...	...	..
23458	India	Gursahaiganj	184	Unhealthy	3	Good	154	Unhealthy	2	Gooc
23459	France	Sceaux	50	Good	1	Good	20	Good	5	Gooc
23460	India	Mormugao	50	Good	1	Good	22	Good	1	Gooc
23461	United States of America	Westerville	71	Moderate	1	Good	44	Good	2	Gooc
23462	Malaysia	Marang	70	Moderate	1	Good	38	Good	0	Gooc

6.2 Preprocessing the dataset


File Edit Selection View Go Run ···
Search
miniproject1.ipynb
phishing-mail-torch-roberta-large.ipynb
Users > HP > Downloads > miniproject1.ipynb > ...
Code + Markdown | Run All Clear All Outputs | Outline ···
Select Kernel
Python
Go Live
Go Live

```
data.shape
```

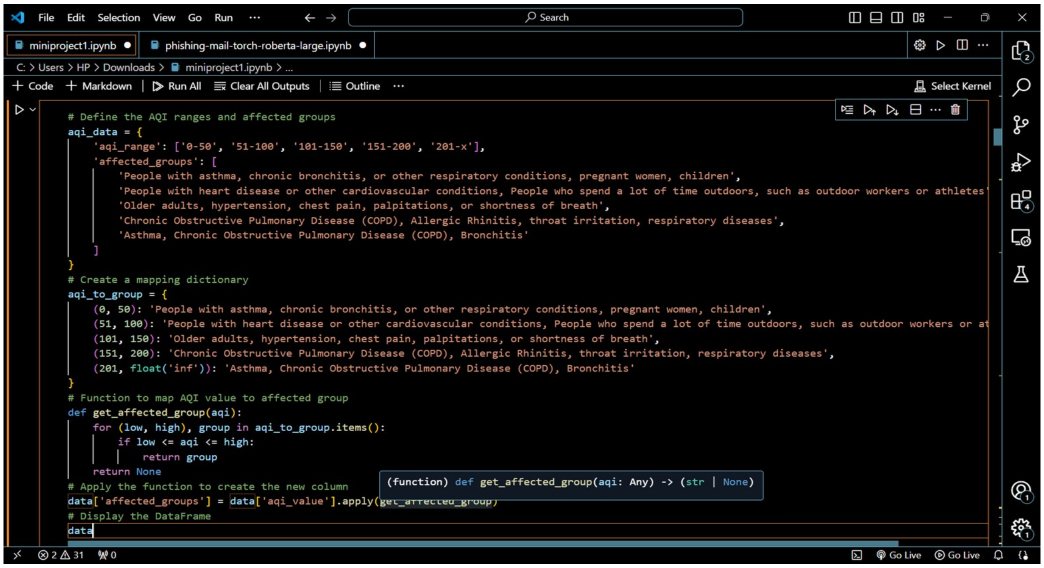
```
(23463, 13)
```

```
data.isnull().sum()
```

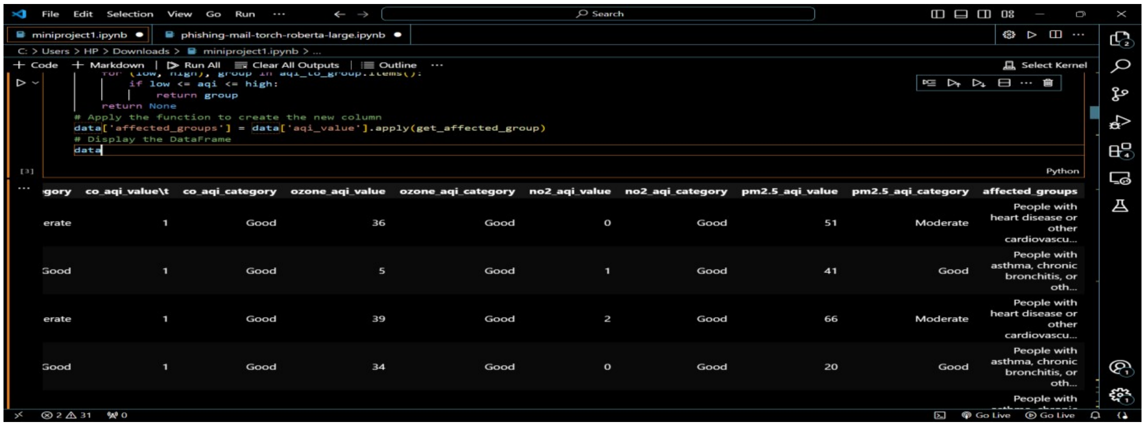
```
country_name         427
city_name              1
aqi_value              0
aqi_category           0
co_aqi_value\t         0
co_aqi_category        0
ozone_aqi_value        0
ozone_aqi_category     0
no2_aqi_value          0
no2_aqi_category       0
pm2.5_aqi_value        0
pm2.5_aqi_category     0
dtype: int64
```

```
# Define the AQI ranges and affected groups
```

6.3 Updating dataset:


File Edit Selection View Go Run ···
Search
miniproject1.ipynb
phishing-mail-torch-roberta-large.ipynb
C: > Users > HP > Downloads > miniproject1.ipynb > ...
+ Code + Markdown | Run All Clear All Outputs | Outline ···
Select Kernel
(function) def get_affected_group(aqi: Any) -> (str | None)
Go Live
Go Live

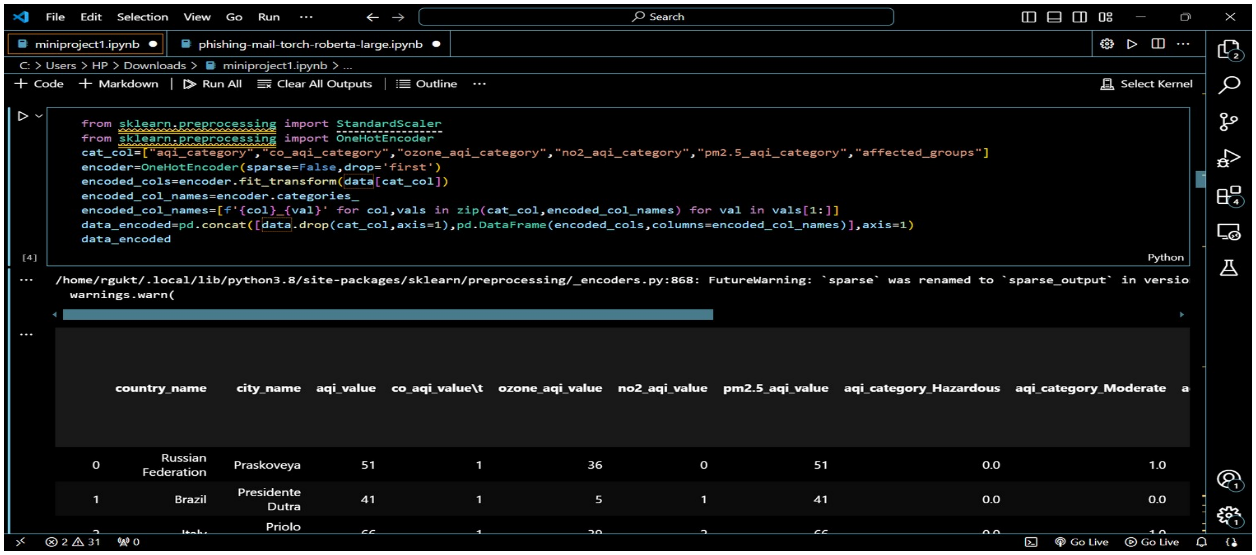
```
# Define the AQI ranges and affected groups
aqi_data = {
    'aqi_range': ['0-50', '51-100', '101-150', '151-200', '201-x'],
    'affected_groups': [
        'People with asthma, chronic bronchitis, or other respiratory conditions, pregnant women, children',
        'People with heart disease or other cardiovascular conditions, People who spend a lot of time outdoors, such as outdoor workers or athletes'
        'Older adults, hypertension, chest pain, palpitations, or shortness of breath',
        'Chronic Obstructive Pulmonary Disease (COPD), Allergic Rhinitis, throat irritation, respiratory diseases',
        'Asthma, Chronic Obstructive Pulmonary Disease (COPD), Bronchitis'
    ]
}
# Create a mapping dictionary
aqi_to_group = {
    (0, 50): 'People with asthma, chronic bronchitis, or other respiratory conditions, pregnant women, children',
    (51, 100): 'People with heart disease or other cardiovascular conditions, People who spend a lot of time outdoors, such as outdoor workers or at
    (101, 150): 'Older adults, hypertension, chest pain, palpitations, or shortness of breath',
    (151, 200): 'Chronic Obstructive Pulmonary Disease (COPD), Allergic Rhinitis, throat irritation, respiratory diseases',
    (201, float('inf')): 'Asthma, Chronic Obstructive Pulmonary Disease (COPD), Bronchitis'
}
# Function to map AQI value to affected group
def get_affected_group(aqi):
    for (low, high), group in aqi_to_group.items():
        if low <= aqi <= high:
            return group
    return None
# Apply the function to create the new column
data['affected_groups'] = data['aqi_value'].apply(get_affected_group)
# Display the DataFrame
data
```



```
    for (low, high), group in aqi_to_group.items():
        if low <= aqi <= high:
            return group
    return None
# Apply the function to create the new column
data['affected_groups'] = data['aqi_value'].apply(get_affected_group)
# Display the DataFrame
data
```

gory	co_aqi_value\t	co_aqi_category	ozone_aqi_value	ozone_aqi_category	no2_aqi_value	no2_aqi_category	pm2.5_aqi_value	pm2.5_aqi_category	affected_groups
erate	1	Good	36	Good	0	Good	51	Moderate	People with heart disease or other cardiovascu...
Good	1	Good	5	Good	1	Good	41	Good	People with asthma, chronic bronchitis, or oth...
erate	1	Good	39	Good	2	Good	66	Moderate	People with heart disease or other cardiovascu...
Good	1	Good	34	Good	0	Good	20	Good	People with asthma, chronic bronchitis, or oth...
									People with

6.4 Attribute type conversion:

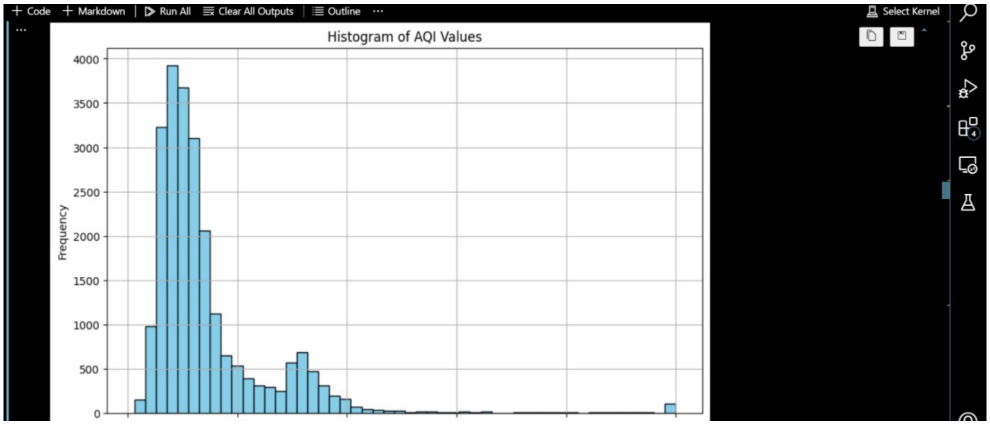


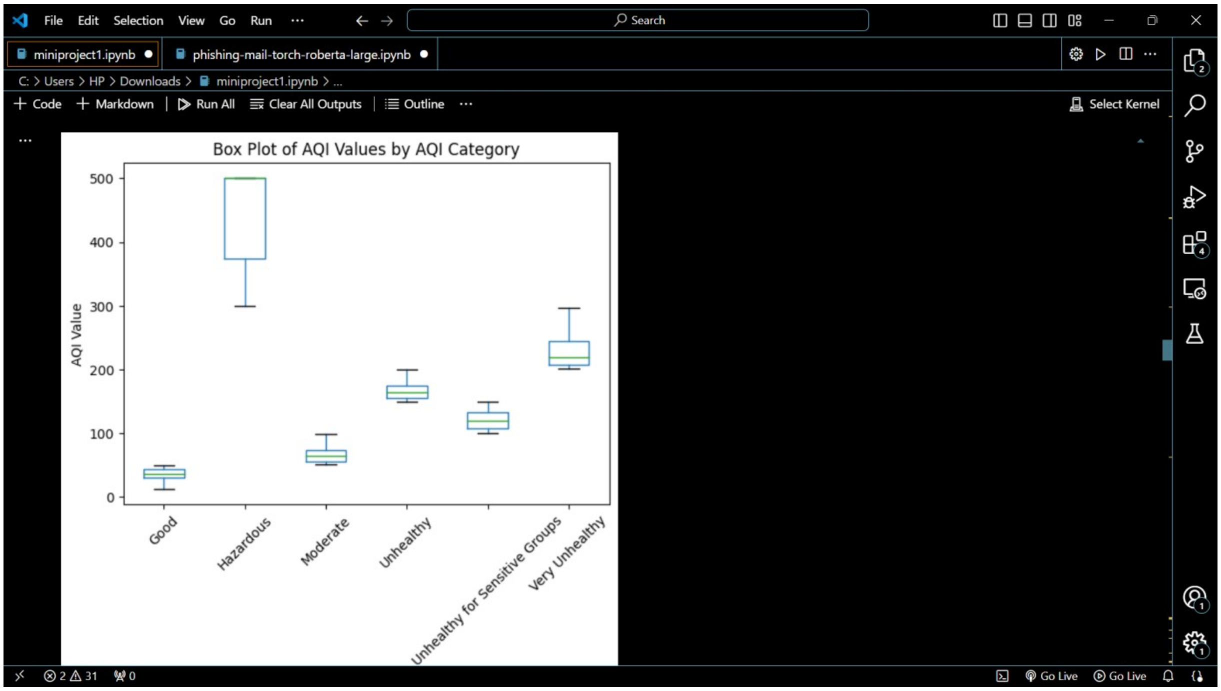
```
from sklearn.preprocessing import StandardScaler
from sklearn.preprocessing import OneHotEncoder
cat_col=["aqi_category","co_aqi_category","ozone_aqi_category","no2_aqi_category","pm2.5_aqi_category","affected_groups"]
encoder=OneHotEncoder(sparse=False,drop='first')
encoded_cols=encoder.fit_transform(data[cat_col])
encoded_col_names=encoder.categories_
encoded_col_names=[f'{col}_{val}' for col,vals in zip(cat_col,encoded_col_names) for val in vals[1:]]
data_encoded=pd.concat([data.drop(cat_col,axis=1),pd.DataFrame(encoded_cols,columns=encoded_col_names)],axis=1)
data_encoded
```

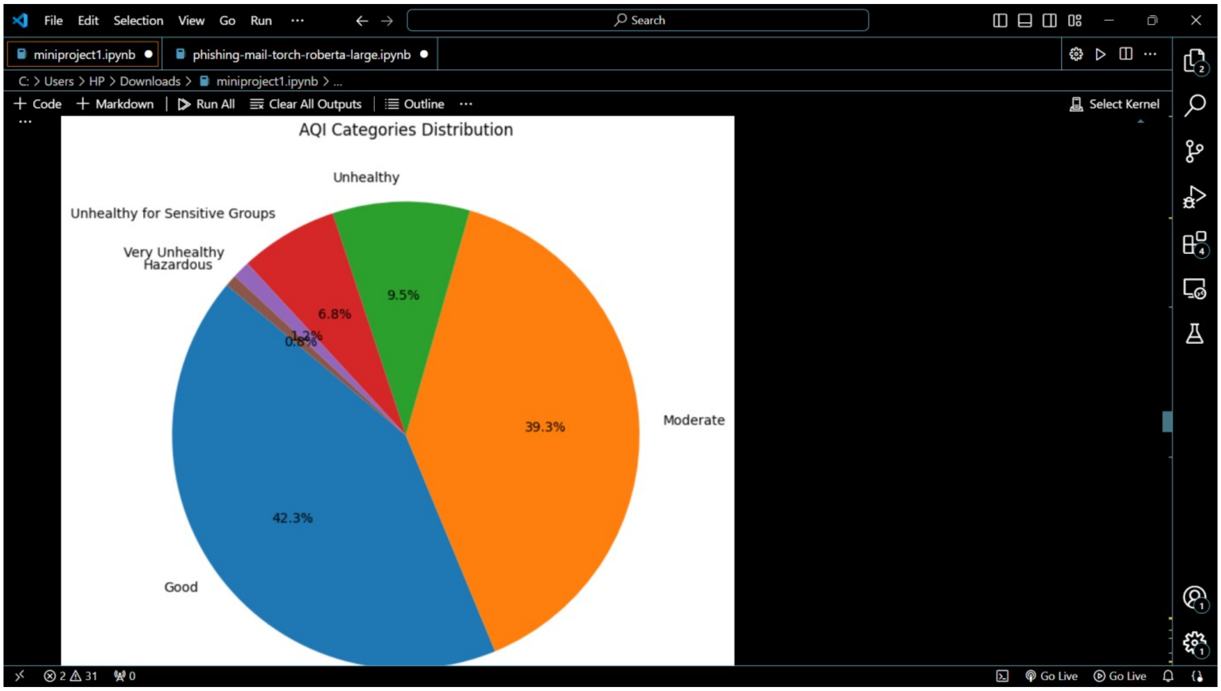
```
/home/rgukt/.local/lib/python3.8/site-packages/sklearn/preprocessing/_encoders.py:868: FutureWarning: `sparse` was renamed to `sparse_output` in versio
  warnings.warn(
```

	country_name	city_name	aqi_value	co_aqi_value\t	ozone_aqi_value	no2_aqi_value	pm2.5_aqi_value	aqi_category_Hazardous	aqi_category_Moderate	a
0	Russian Federation	Praskoveya	51	1	36	0	51	0.0	1.0	
1	Brazil	Presidente Dutra	41	1	5	1	41	0.0	0.0	
		Priolo								

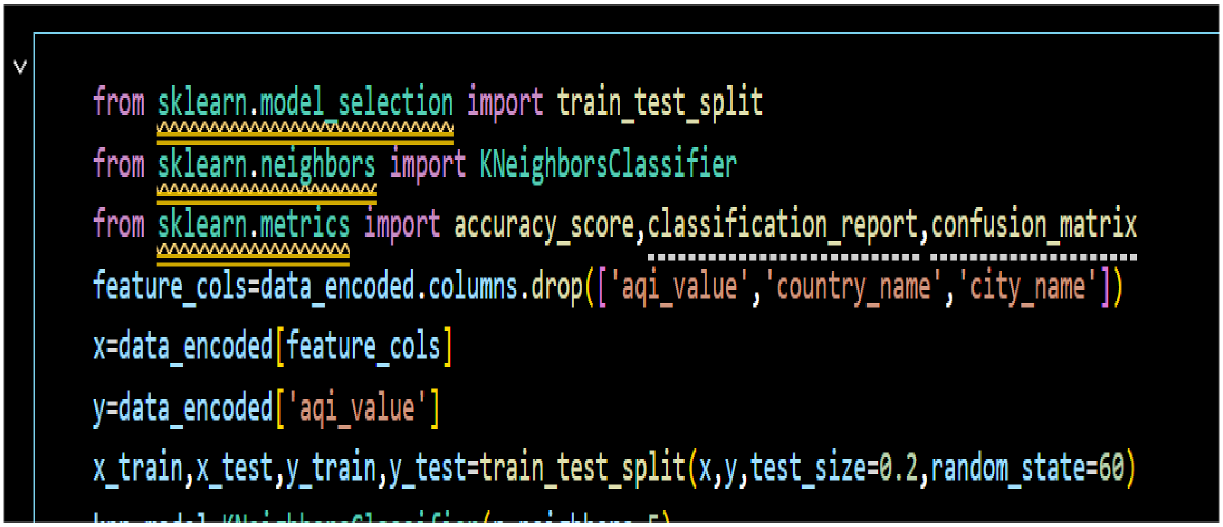
6.5 Visualization:




File
Edit
Selection
View
Go
Run
Search
miniproject1.ipynb
phishing-mail-torch-roberta-large.ipynb
C: > Users > HP > Downloads > miniproject1.ipynb > ...
Code
Markdown
Run All
Clear All Outputs
Outline
Select Kernel
Box Plot of AQI Values by AQI Category
AQI Value
500
400
300
200
100
0
Good
Hazardous
Moderate
Unhealthy
Unhealthy for Sensitive Groups
Very Unhealthy
2
31
0
Go Live
Go Live

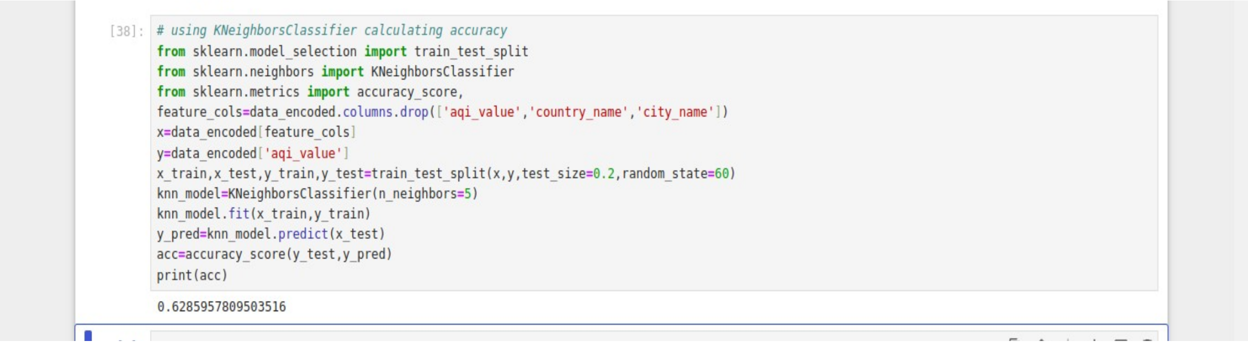

File
Edit
Selection
View
Go
Run
Search
miniproject1.ipynb
phishing-mail-torch-roberta-large.ipynb
C: > Users > HP > Downloads > miniproject1.ipynb > ...
Code
Markdown
Run All
Clear All Outputs
Outline
Select Kernel
AQI Categories Distribution
Unhealthy
Unhealthy for Sensitive Groups
Very Unhealthy
Hazardous
9.5%
6.8%
1.2%
0.8%
39.3%
Moderate
42.3%
Good
2
31
0
Go Live
Go Live

6.6 Train and Test the model :



```
from sklearn.model_selection import train_test_split
from sklearn.neighbors import KNeighborsClassifier
from sklearn.metrics import accuracy_score,classification_report,confusion_matrix
feature_cols=data_encoded.columns.drop(['aqi_value','country_name','city_name'])
x=data_encoded[feature_cols]
y=data_encoded['aqi_value']
x_train,x_test,y_train,y_test=train_test_split(x,y,test_size=0.2,random_state=60)
knn_model=KNeighborsClassifier(n_neighbors=5)
```

6.7 Final Accuracy:



```
[38]: # using KNeighborsClassifier calculating accuracy
      from sklearn.model_selection import train_test_split
      from sklearn.neighbors import KNeighborsClassifier
      from sklearn.metrics import accuracy_score,
      feature_cols=data_encoded.columns.drop(['aqi_value','country_name','city_name'])
      x=data_encoded[feature_cols]
      y=data_encoded['aqi_value']
      x_train,x_test,y_train,y_test=train_test_split(x,y,test_size=0.2,random_state=60)
      knn_model=KNeighborsClassifier(n_neighbors=5)
      knn_model.fit(x_train,y_train)
      y_pred=knn_model.predict(x_test)
      acc=accuracy_score(y_test,y_pred)
      print(acc)

      0.6285957809503516
```

6.8 Front end:

HTML code:

```
<!DOCTYPE html>
<html lang="en">
<head>
  <meta charset="UTF-8">
  <meta name="viewport" content="width=device-width, initial-scale=1.0">
  <title>Impact of Atmosphere on Vulnerable Diseases</title>
<link rel=”stylesheet” href=”styles.css” >
</head>
<body>
  <div class="container">
    <h1>Impact of Atmosphere on Vulnerable Diseases</h1>
  </div>
  <div class="container1">
    <p>Air Quality Index</p>
    <input type="text" placeholder="Enter AQI value" id="aqiInput">
    <button id="submitBtn">Submit</button>
    <div class="result" id="result"></div>
    <div class="result" id="resultImage"></div>
  </div>
  <script src="script.js"></script>
</body>
</html>
```

CSS Code:

```
body {
  font-family: Arial, sans-serif;
  text-align: center;
  padding: 20px;
```

```
   background:linear-gradient(135deg,#153677,#4e085f);
}


.container {
  max-width: 600px;
  margin: 0 auto;
  padding: 20px;
  background-color: white;
  border-radius: 10px;
  box-shadow: 0 0 10px rgba(0, 0, 0, 0.1);
}
form {
  margin: 20px 0;
}
label {
  font-size: 18px;
  margin-right: 10px;
}
input {
  font-size: 18px;
  padding: 5px;
  margin-right: 10px;
}
button {
  font-size: 18px;
  padding: 5px 10px;
}
.result {
  margin-top: 20px;
  font-size: 20px;
  color: #ff0000;
}
```

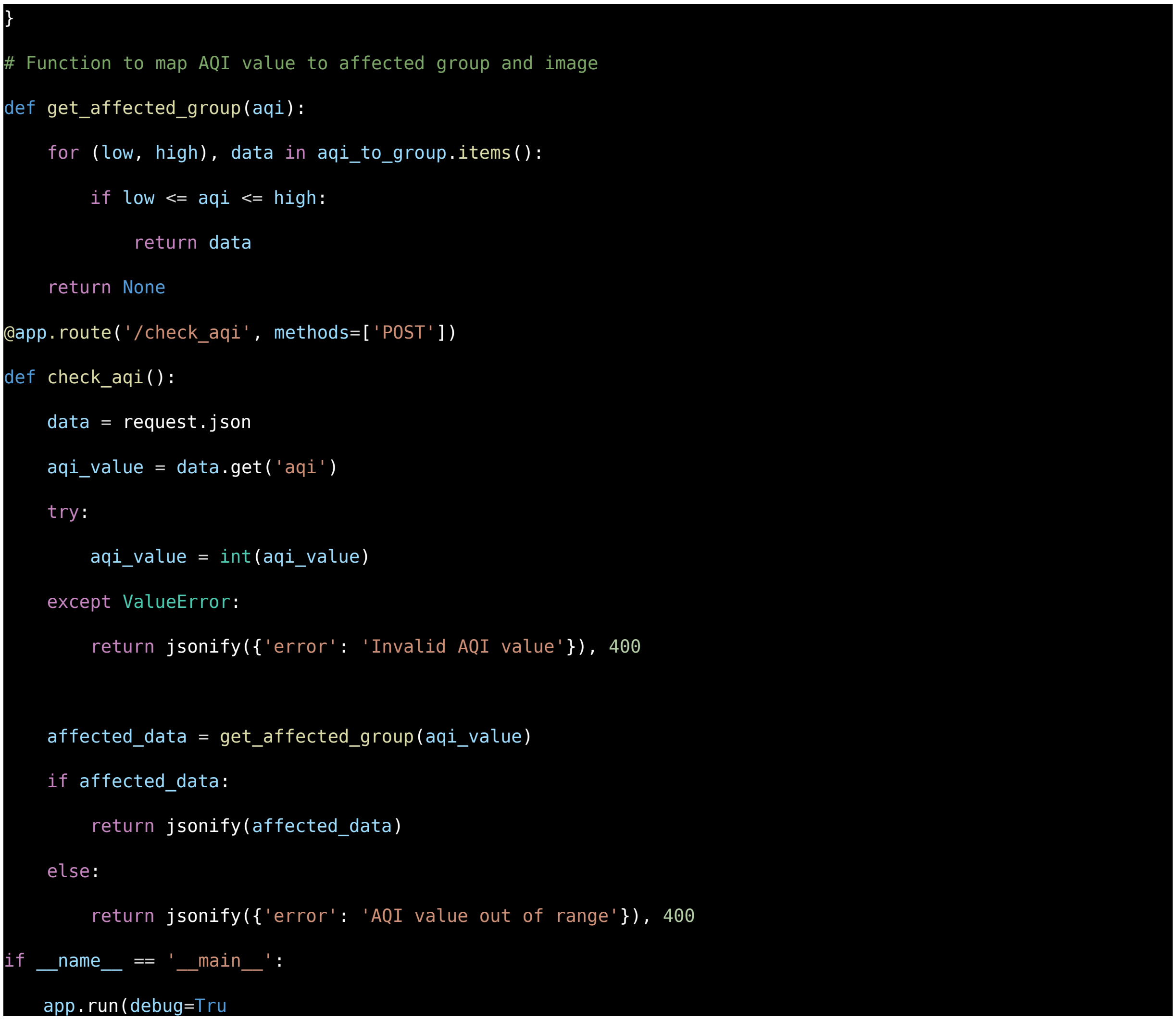
Java Script:

```
document.getElementById('aqi-form').addEventListener('submit', function(event) {
  event.preventDefault();
  const aqiValue = document.getElementById('aqi-input').value;
  const result = determineHealthImpact(aqiValue);
  document.getElementById('result').textContent = result;
});


function determineHealthImpact(aqi) {
  const value = parseInt(aqi, 10);
  if (isNaN(value)) return 'Please enter a valid AQI value.';
  if (value <= 50) return 'Good - No health implications.';
  if (value <= 100) return 'Moderate - Some people may experience health effects.';
  if (value <= 150) return 'Unhealthy for Sensitive Groups - Children, elderly, and individuals with respiratory or heart conditions should limit outdoor exertion.';
  if (value <= 200) return 'Unhealthy - Everyone may begin to experience health effects; members of sensitive groups may experience more serious health effects.';
  if (value <= 300) return 'Very Unhealthy - Health alert: everyone may experience more serious health effects.';
  return 'Hazardous - Health warnings of emergency conditions. The entire population is more likely to be affected.';
}
function submitAQI() {
  const aqiValue = document.getElementById('aqiInput').value;

  axios.post('http://127.0.0.1:5000/check_aqi', { aqi: aqiValue })
    .then(response => {
      const result = response.data;
      document.getElementById('result').textContent = `Affected Group: ${result.group}`;
      document.getElementById('resultImage').innerHTML = `<img src="${result.image}" alt="AQI Impact">`;
      // Scroll to the result section
      document.getElementById('result').scrollIntoView({ behavior: 'smooth' });
    })
    .catch(error => {
      document.getElementById('result').textContent = `Error: ${error.response.data.error}`;
      document.getElementById('resultImage').innerHTML = '';
    });
  // Clear input field after submission
  document.getElementById('aqiInput').value = '';
}
```

```
// Attach event listener to the submit button

document.getElementById('submitBtn').addEventListener('click', submitAQI);
```

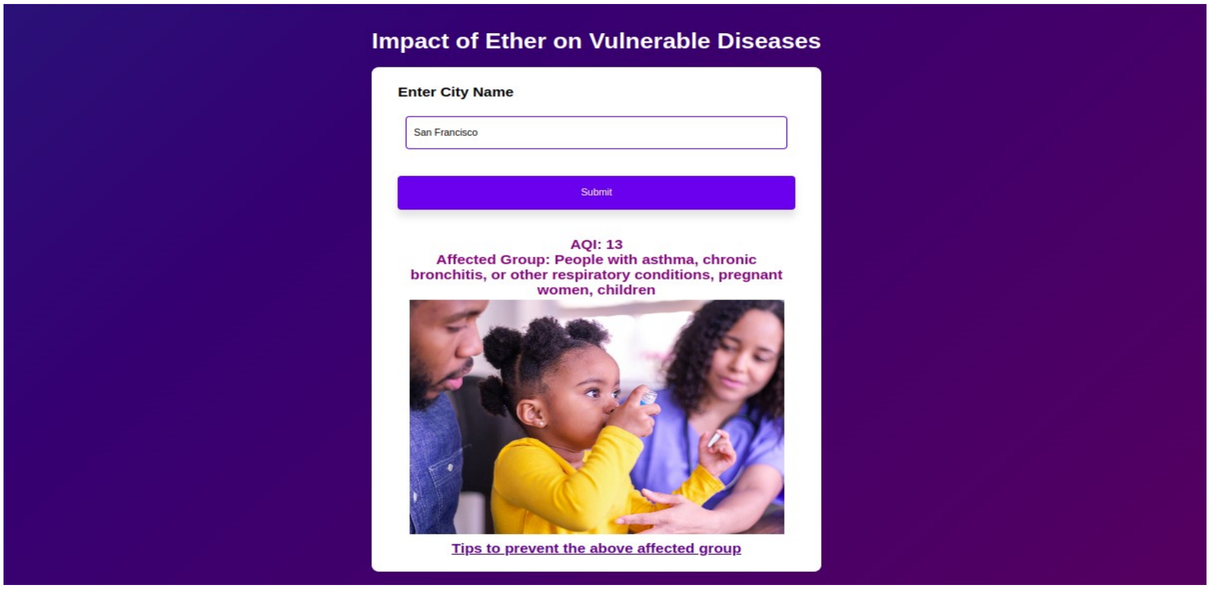
6.9 Combining Front end and back end using Flask :

```
from flask import Flask, request, jsonify

from flask_cors import CORS



app = Flask(__name__)

CORS(app)  # This will enable CORS for all routes

# Define the AQI ranges, affected groups, and images

aqi_to_group = {

    (0, 50): {

        'group': 'People with asthma, chronic bronchitis, or other respiratory conditions, pregnant women, children',

        'image': 'good.png'

    },

    (51, 100): {

        'group': 'People with heart disease or other cardiovascular conditions, people who spend a lot of time outdoors, such as outdoor workers or athletes',

        'image': 'moderate.png'

    },

    (101, 150): {

        'group': 'Older adults, hypertension, chest pain, palpitations, or shortness of breath',

        'image': 'unhealthy_sensitive.png'

    },

    (151, 200): {

        'group': 'Chronic Obstructive Pulmonary Disease (COPD), Allergic Rhinitis, throat irritation, respiratory diseases',

        'image': 'unhealthy.png'

    },

    (201, float('inf')): {

        'group': 'Asthma, Chronic Obstructive Pulmonary Disease (COPD), Bronchitis',

        'image': 'very_unhealthy.png'

    }
```



```
}
# Function to map AQI value to affected group and image
def get_affected_group(aqi):
    for (low, high), data in aqi_to_group.items():
        if low <= aqi <= high:
            return data
    return None
@app.route('/check_aqi', methods=['POST'])
def check_aqi():
    data = request.json
    aqi_value = data.get('aqi')
    try:
        aqi_value = int(aqi_value)
    except ValueError:
        return jsonify({'error': 'Invalid AQI value'}), 400

    affected_data = get_affected_group(aqi_value)
    if affected_data:
        return jsonify(affected_data)
    else:
        return jsonify({'error': 'AQI value out of range'}), 400
if __name__ == '__main__':
    app.run(debug=Tru
```

6.10 OUTPUT:

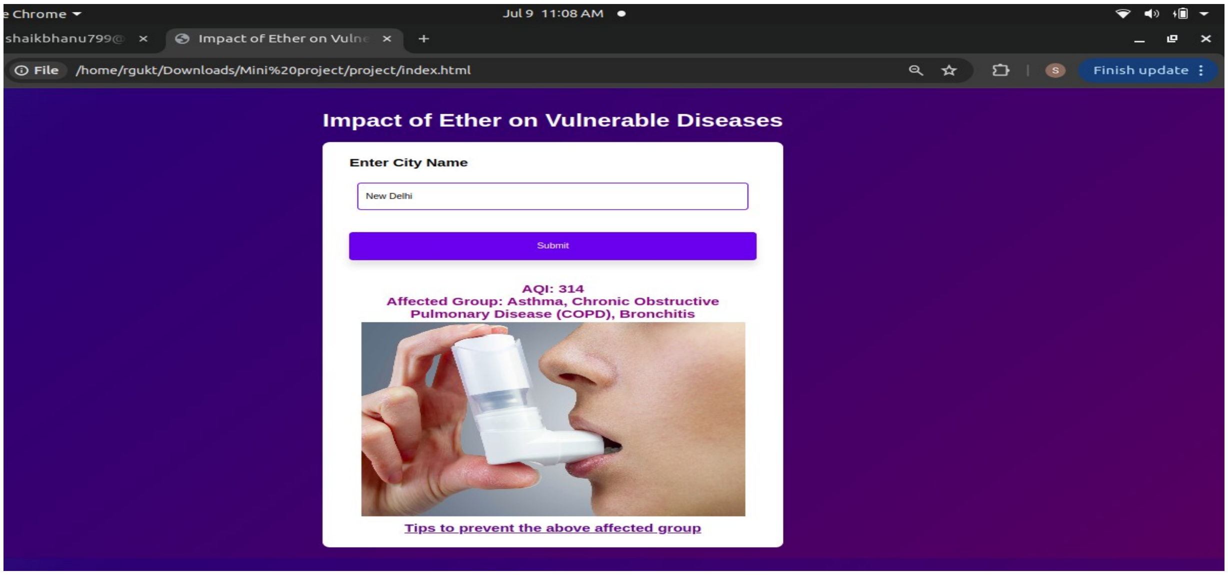


Impact of Ether on Vulnerable Diseases

Enter City Name

San Francisco

AQI: 13
Affected Group: People with asthma, chronic bronchitis, or other respiratory conditions, pregnant women, children



Chrome
Jul 9 11:08 AM
shaikbhanu799@
Impact of Ether on Vulne
File
/home/rgukt/Downloads/Mini%20project/project/index.html
S
Finish update

Impact of Ether on Vulnerable Diseases

Enter City Name

New Delhi

AQI: 314
Affected Group: Asthma, Chronic Obstructive Pulmonary Disease (COPD), Bronchitis

Tips to prevent the above affected group

7. RESULT

The project meets all the defined requirements and produces the mentioned above and there is an increase in the accuracy than existing system.

8. CONCLUSION

The problem statement will be resolved with Decision tree algorithm in Machine Learning and model will achieve the ultimate scope with accuracy score of more than 96% approximately .

9. FUTURE SCOPE

Incorporate additional environmental data such as humidity and temperature to provide a more comprehensive health impact analysis.

10. REFERENCES

- https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8564952/
- https://ieeexplore.ieee.org/document/9915802