

## **ABOUT THE PROJECT**

The project on “Prediction of CO<sub>2</sub> Emissions” aims to show the CO<sub>2</sub> Emissions from 2020-2050. This was facilitated by two options:-

1. Prediction with Graphs
2. Prediction without Graphs

The regions comprised of Africa, Asia-Pacific, CIS(Commonwealth of Independent States), Europe, Latin America, Middle East, and North America.

A database (csproject) was created in MySQL server which contained information about the CO<sub>2</sub> emissions (in million metric tons) in the above-mentioned regions from 2020-2050. The information was taken from already predicted data which was stored in a table (pred\_emissions) in the database.

The database was introduced on the python environment with the help of MySQL connector. The graph was plotted with installing and importing different libraries and with the help of various built-in functions.

The X- axis of the graph displayed the seven different regions whereas the Y-axis of the graph displayed the CO<sub>2</sub> emissions. Each region consisted of seven vertical bars (width = 0.1) of different colours which showed the emissions from 2020-2050 in the respective region with an increasing five year gap. The legend in the graph helps to explain the amount of emissions in a particular year in a particular region.

This project can be extended by adding additional options to it, as required.

## **SOURCE CODE**

1. Creating a database named 'csproject' :-

```
mysql>create databse csproject;
```

2. Creating a table named 'pred\_emissions' with the required fields to store the data :-

```
mysql> create table pred_emissions
-> (REGION char (25) primary key,
-> YEAR_2020 int (5),
-> YEAR_2025 int (5),
-> YEAR_2030 int (5),
-> YEAR_2035 int (5),
-> YEAR_2040 int (5),
-> YEAR_2045 int (5),
-> YEAR_2050 int (5));
```

```
Query OK, 0 rows affected, 7 warnings (0.02 sec)
```

### 3. Inserting the values into the table 'pred\_emissions': -

```
mysql> insert into pred_emissions values
-> ("EUROPE", 3546, 3179, 2499, 1919, 1481, 1196,986);
Query OK, 1 row affected (0.00 sec)

mysql> insert into pred_emissions values
-> ("ASIA-PACIFIC", 18977, 20830, 21251, 20147,17840, 15532,12684);
Query OK, 1 row affected (0.00 sec)

mysql> insert into pred_emissions values
-> ("AFRICA", 1286, 1557, 1751, 1924, 2106,2244,2347);
Query OK, 1 row affected (0.00 sec)

mysql> insert into pred_emissions values
-> ("MIDDLE-EAST", 2078,2185,2148, 2100, 1979, 1788, 1670);
Query OK, 1 row affected (0.01 sec)

mysql> insert into pred_emissions values
-> ("NORTH-AMERICA", 5078, 4366, 3074, 2301, 1800, 1217,764);
Query OK, 1 row affected (0.00 sec)

mysql> insert into pred_emissions values
-> ("LATIN AMERICA", 1478, 1618, 1700, 1690, 1647, 1525, 1377);
Query OK, 1 row affected (0.01 sec)

mysql> insert into pred_emissions values
-> ("CIS", 2461, 2489, 2278, 2046, 1830, 1638, 1469) ;
Query OK, 1 row affected (0.00 sec)
```

### 4. Python Code to Plot the graph: -

```
print("MENU")
print("SELECT YOUR CHOICE....")
print("1. SHOW PREDICTED EMISSIONS WITH GRAPH")
print("2. SHOW PREDICTED EMISSIONS WITHOUT GRAPH")

import mysql.connector
import numpy as np
import matplotlib.pyplot as plt

mydb = mysql.connector.connect(host = "localhost",user = "root",passwd =
"Dubai@#123",database = "csproject")
mycursor = mydb.cursor()

mycursor.execute("SELECT
REGION,YEAR_2020,YEAR_2025,YEAR_2030,YEAR_2035,YEAR_2040,YEAR_2045,YEAR_2050 FROM
PRED_EMISSIONS")
myresult = mycursor.fetchall()
```

```
REGIONS = []
YEAR_2020 = []
YEAR_2025 = []
YEAR_2030 = []
YEAR_2035 = []
YEAR_2040 = []
YEAR_2045 = []
YEAR_2050 = []
```

```
for i in myresult:
```

```
    REGIONS.append(i[0])
    YEAR_2020.append(i[1])
    YEAR_2025.append(i[2])
    YEAR_2030.append(i[3])
    YEAR_2035.append(i[4])
    YEAR_2040.append(i[5])
    YEAR_2045.append(i[6])
    YEAR_2050.append(i[7])
```

```
x = int(input("Enter your choice(1-2): "))
```

```
if x==1:
```

```
    print("Regions :- ",REGIONS)
    print("Year 2020 :- ",YEAR_2020)
    print("Year 2025 :- ",YEAR_2025)
    print("Year 2030 :- ",YEAR_2030)
    print("Year 2035 :- ",YEAR_2035)
    print("Year 2040 :- ",YEAR_2040)
    print("Year 2045 :- ",YEAR_2045)
    print("Year 2050 :- ",YEAR_2050)
```

```
X=["AFRICA","ASIA-PACIFIC","CIS","EUROPE","LATIN AMERICA","MIDDLE-EAST","NORTH-AMERICA"]
```

```
X_axis=np.arange(len(X))
plt.bar(X_axis-0.3,YEAR_2020,0.1,label=2020)
plt.bar(X_axis-0.2,YEAR_2025,0.1,label=2025)
plt.bar(X_axis-0.1,YEAR_2030,0.1,label=2030)
plt.bar(X_axis-0.0,YEAR_2035,0.1,label=2035)
plt.bar(X_axis+0.1,YEAR_2040,0.1,label=2040)
plt.bar(X_axis+0.2,YEAR_2045,0.1,label=2045)
plt.bar(X_axis+0.3,YEAR_2050,0.1,label=2050)
```

```
plt.xticks(X_axis,X)
plt.xlabel("Regions")
plt.ylabel("CO2 EMISSIONS (in million metric tons)")
plt.title("Prediction of CO2 Emissions")
plt.legend()
plt.show()
```

```
if x==2:
```

```
    print("Regions  :- ",REGIONS)
    y = input("Enter a Region: ")
```

```
    if y == "AFRICA":
```

```
        mycursor.execute("select *from pred_emissions where REGION='AFRICA'")
        myresult=mycursor.fetchall()
        for row in myresult:
            print(row)
```

```
    elif y == "ASIA-PACIFIC":
```

```
        mycursor.execute("select *from pred_emissions where REGION='ASIA-PACIFIC'")
        myresult=mycursor.fetchall()
        for row in myresult:
            print(row)
```

```
    elif y == "CIS":
```

```
        mycursor.execute("select *from pred_emissions where REGION='CIS'")
        myresult=mycursor.fetchall()
        for row in myresult:
            print(row)
```

```
    elif y == "EUROPE":
```

```
        mycursor.execute("select *from pred_emissions where REGION='EUROPE'")
        myresult=mycursor.fetchall()
        for row in myresult:
            print(row)
```

```
    elif y == "LATIN AMERICA":
```

```
        mycursor.execute("select *from pred_emissions where REGION='LATIN AMERICA'")
        myresult=mycursor.fetchall()
        for row in myresult:
            print(row)
```

```
    elif y == "MIDDLE-EAST":
```

```
        mycursor.execute("select *from pred_emissions where REGION='MIDDLE-EAST'")
        myresult=mycursor.fetchall()
        for row in myresult:
```

```

print(row)

elif y == "NORTH-AMERICA":
    mycursor.execute("select *from pred_emissions where REGION='NORTH-AMERICA'")
    myresult=mycursor.fetchall()
    for row in myresult:
        print(row)
print("*** All the values are in 'million metric tons' **")

```

## OUTPUT

Structure of table 'pred\_emissions':-

```
mysql> desc pred_emissions;
```

Field	Type	Null	Key	Default	Extra
REGION	char(25)	NO	PRI	NULL	
YEAR_2020	int	YES		NULL	
YEAR_2025	int	YES		NULL	
YEAR_2030	int	YES		NULL	
YEAR_2035	int	YES		NULL	
YEAR_2040	int	YES		NULL	
YEAR_2045	int	YES		NULL	
YEAR_2050	int	YES		NULL	

8 rows in set (0.01 sec)

Data in the table 'pred\_emissions':-

```
mysql> select *from pred_emissions;
```

REGION	YEAR_2020	YEAR_2025	YEAR_2030	YEAR_2035	YEAR_2040	YEAR_2045	YEAR_2050
AFRICA	1286	1557	1751	1924	2106	2244	2347
ASIA-PACIFIC	18977	20830	21251	20147	17840	15532	12684
CIS	2461	2489	2278	2046	1830	1638	1469
EUROPE	3546	3179	2499	1919	1481	1196	986
LATIN AMERICA	1478	1618	1700	1690	1647	1525	1377
MIDDLE-EAST	2078	2185	2148	2100	1979	1788	1670
NORTH-AMERICA	5078	4366	3074	2301	1800	1217	764

7 rows in set (0.00 sec)

## Output of Python Program:-

```
MENU
SELECT YOUR CHOICE....
1. SHOW PREDICTED EMISSIONS WITH GRAPH
2. SHOW PREDICTED EMISSIONS WITHOUT GRAPH
Enter your choice(1-2): 1
Regions :- ['AFRICA', 'ASIA-PACIFIC', 'CIS', 'EUROPE', 'LATIN AMERICA', 'MIDDLE-EAST', 'NORTH-AMERICA']
Year 2020 :- [1286, 18977, 2461, 3546, 1478, 2078, 5078]
Year 2025 :- [1557, 20830, 2489, 3179, 1618, 2185, 4366]
Year 2030 :- [1751, 21251, 2278, 2499, 1700, 2148, 3074]
Year 2035 :- [1924, 20147, 2046, 1919, 1690, 2100, 2301]
Year 2040 :- [2106, 17840, 1830, 1481, 1647, 1979, 1800]
Year 2045 :- [2244, 15532, 1638, 1196, 1525, 1788, 1217]
Year 2050 :- [2347, 12684, 1469, 986, 1377, 1670, 764]
```

```
MENU
SELECT YOUR CHOICE....
1. SHOW PREDICTED EMISSIONS WITH GRAPH
2. SHOW PREDICTED EMISSIONS WITHOUT GRAPH
Enter your choice(1-2): 2
Regions :- ['AFRICA', 'ASIA-PACIFIC', 'CIS', 'EUROPE', 'LATIN AMERICA', 'MIDDLE-EAST', 'NORTH-AMERICA']
Enter a Region: AFRICA
('AFRICA', 1286, 1557, 1751, 1924, 2106, 2244, 2347)
** All the values are in 'million metric tons' **
```

```
MENU
SELECT YOUR CHOICE....
1. SHOW PREDICTED EMISSIONS WITH GRAPH
2. SHOW PREDICTED EMISSIONS WITHOUT GRAPH
Enter your choice(1-2): 2
Regions :- ['AFRICA', 'ASIA-PACIFIC', 'CIS', 'EUROPE', 'LATIN AMERICA', 'MIDDLE-EAST', 'NORTH-AMERICA']
Enter a Region: CIS
('CIS', 2461, 2489, 2278, 2046, 1830, 1638, 1469)
** All the values are in 'million metric tons' **
```

