National University Of Computer & Emerging Sciences Karachi Campus

Project Report

Data Structures

Section 3E

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"Suicide Rates Overview 1985 to 2016"

Introduction

A period of almost 2.5 months has enabled the group to recognize and define a real time problem and propose a solution for it . After an information gathering process from several websites and application of different types of algorithms, we are able to design a system according to the knowledge provided to us in the course throughout. The system is carefully designed to ensure maximum efficiency.The system was skillfully and carefully coded to seal any possible loopholes in the system.The system designed enables analysts to predict the suicide rates around the globe according to the trends formed and help in drawing an accurate conclusion towards the current situation. The dataset ranges for selected has data in the following forms:

This system is made to assist the people in authority to come with certain tasks and measures, to decrease the rate of suicide cases around the world.
It predicts the suicide cases for the next years as well as analayses the data of each country profoundly.

- Country Name
- Genders
- Age Group (5-15,15-24,25-34,35-54,55-74,75+)
- Year (1985-2016)
- Population
- Suicides per 100k
- Gdp per capita

Functionalities Provided

1) Operations

Searching
- Country with Age
- Country with Year
- Gender
- Country Name

Sorting
- Number of suicide cases
- GDP
- Population

2) Analysis

- Maximum/Minimum Suicide Rates
- Linear Regression Model :- Predicting future cases with the help of gradient
- Gender Analysis:- Which gender has the largest Suicide cases reported.
- Age Group:- Which Age group has the most Suicide cases.
- Rich Countries and Poor Countries analysis of Suicide Cases
- Highly Populated and Less Populated Countries Analysis.

Data Structures Used

1. AVL tree-Sorting
2. Doubly LinkedList (Main)
3. Hash Table-Searching
4. Heap(max heap)-Max/Min
5. Sorting(Merge Sort/Bubble Sort)
6. Searching(Linear,Hashing)
7. Linear Regression Model
8. Deep Learning

Tools and Technologies Used

Programming Language: C++

IDE: Dev C++ and Xcode(Mac-IOS)

#include<iostream>

#include<conio.h>

#include<stdio.h>

#include<fstream>

#include<iostream>

#include<stdlib.h>

#include<string.h>

#include<windows.h>

System Details and Deep Learning

In today's world the reasons to commit suicide are increasing day by day and are mostly causing an affect on young generation. Most of the cases are registered either too late or not at all causing an uneven graph to keep a proper track of the rates throughout.This system helps in an efficient tracking and administration by comparing the graphs of different countries.

This program is able to tell each country's suicide rates. Stats are presented through sorting algorithms and graphical representation to get a proper overview of the rates.Our program fetches the dataset related to suicide rates across the globe from over a period of 30 years and using appropriate data structures algorithms, prediction for the situation in the upcoming years would be made easier. The final conclusion will be a result of analysis of every data present in the data set fetched which will be a very close representation of any authentic prediction.

Main Page

```
                      *** WorldWide Suicide Overview ***
-------------------------------------------------------------------------------

        Select a Suitable Option:
-------------------------------------------------------------------------------


        <1> Operations
        <2> Analysis
        <0> Exit
```

<1> Operations

```
                    *** WorldWide Suicide Overview ***
-----------------------------------------------------------------------

        Select a Suitable Option:
-----------------------------------------------------------------------


        <1> Search
        <2> Sort
        <0> Exit
```

<1> Operations => <1> **Search**

```
                    *** WorldWide Suicide Overview ***
-----------------------------------------------------------------------

        Select a Suitable Option:
-----------------------------------------------------------------------


        <1> Search
        <2> Sort
        <0> Exit
        1
-----------------------------------------------------------------------

        Select a Suitable Option:
-----------------------------------------------------------------------

        <1>Suicide Cases of Country
        <2>Suicide Cases of Country-AgeWise
        <3>Suicide Cases of Country-YearWise
        <4>Suicide Cases Genderwise
        <0> Exit
```
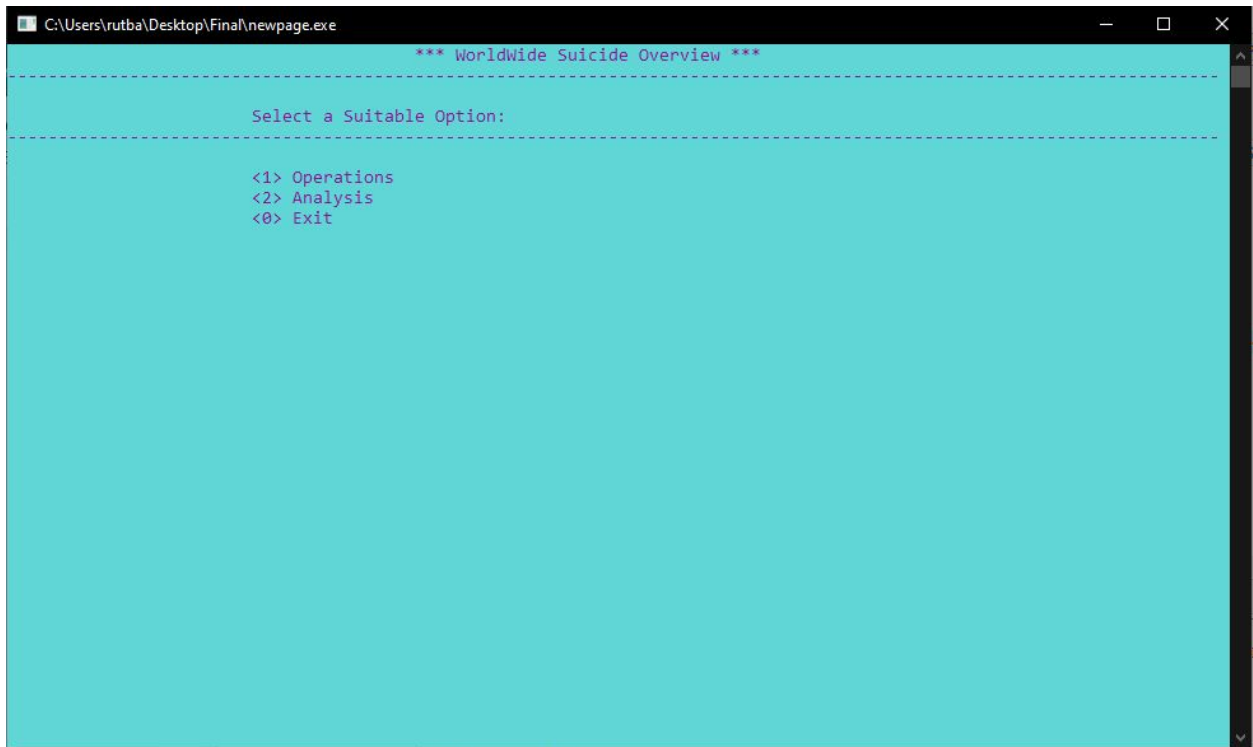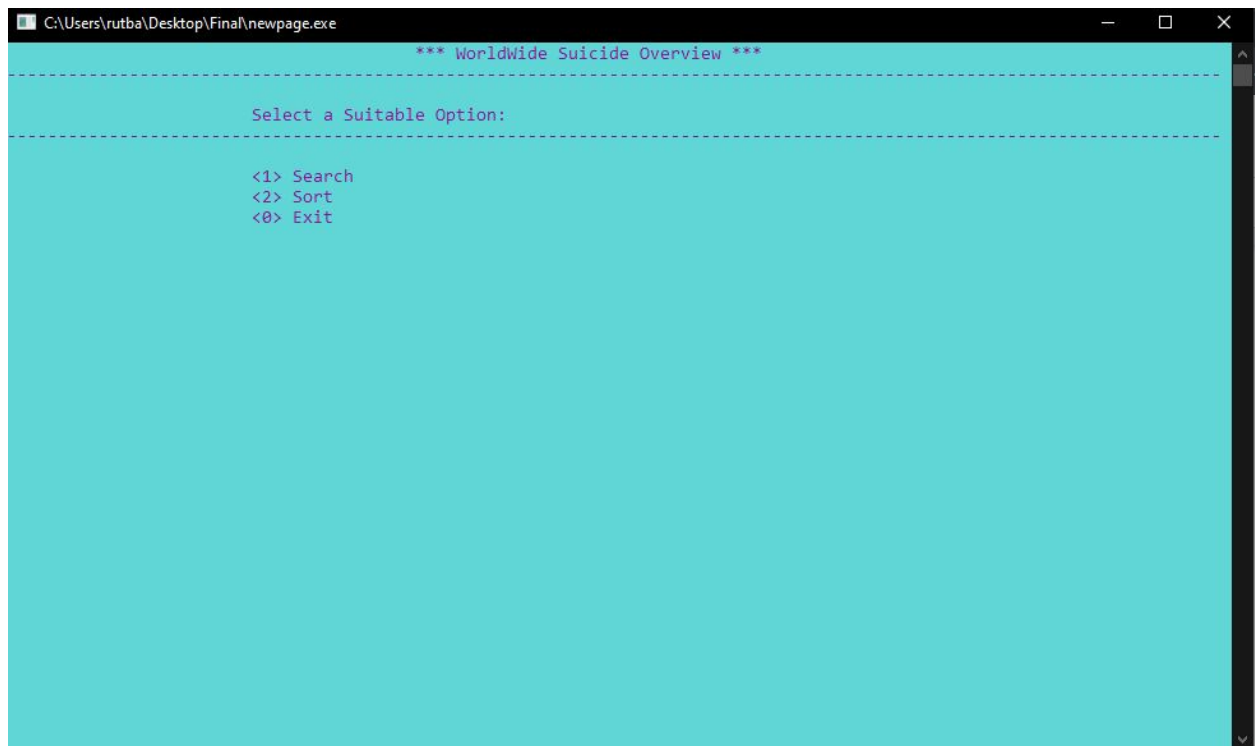
<1> Operations => <1> Search => <2> **Country Wise**

```
C:\Users\rutba\Desktop\Final\newpage.exe                                    —    □    ×
Enter Country name: Japan
The Total Number of Suicide Cases in Japan is: 806902
-------------------------------------------------------------------------------------
                    Select a Suitable Option:
-------------------------------------------------------------------------------------

                    <1>Suicide Cases of Country
                    <2>Suicide Cases of Country-AgeWise
                    <3>Suicide Cases of Country-YearWise
                    <4>Suicide Cases Genderwise
                    <0> Exit
```

<1> Operations => <1> Search => <2> **Country-Age wise**

```
C:\Users\rutba\Desktop\Final\newpage.exe                                    —    □    ×
Enter Country name: Japan
Enter Age: 5-24 years
The Total Number of Suicide Cases in Japan of 5-24 years is 52288
-------------------------------------------------------------------------------------
                    Select a Suitable Option:
-------------------------------------------------------------------------------------

                    <1>Suicide Cases of Country
                    <2>Suicide Cases of Country-AgeWise
                    <3>Suicide Cases of Country-YearWise
                    <4>Suicide Cases Genderwise
                    <0> Exit
```
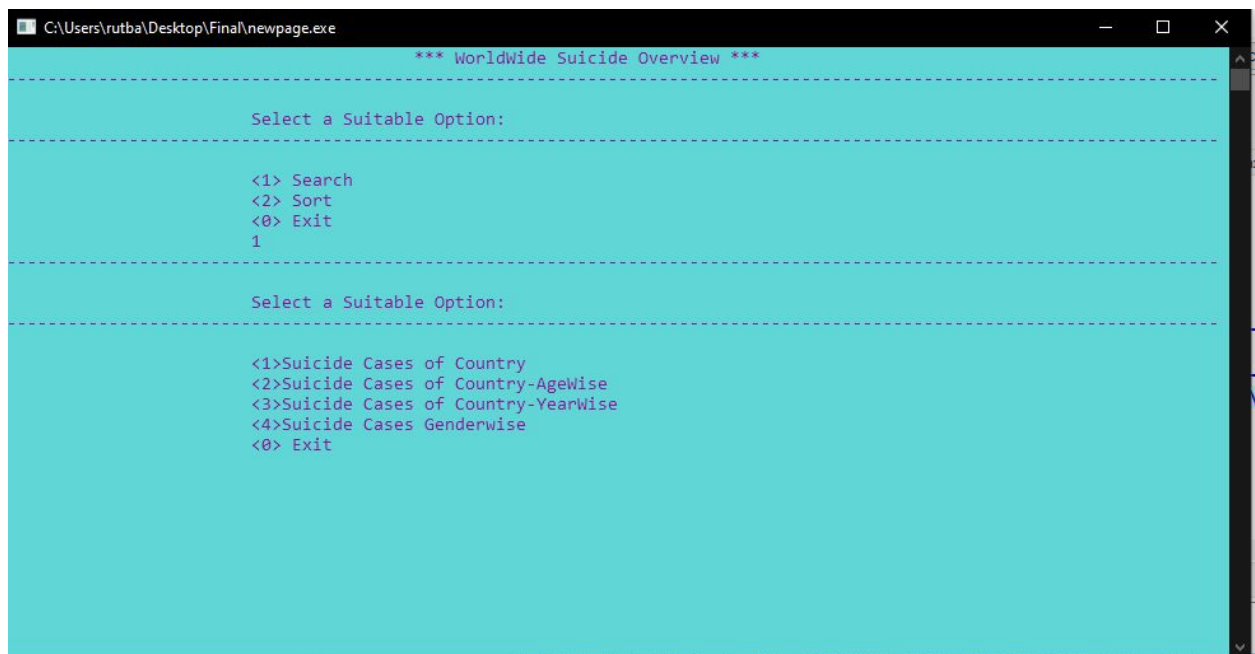
<1> Operations => <1> Search => <3> **Country-Year Wise**


```
C:\Users\rutba\Desktop\Final\newpage.exe                                    —    □    X
Enter Country name: Qatar
Enter Year: 2015
The Total Number of Suicide Cases in Qatar of the year 2015 is 66
-----------------------------------------------------------------------------------------
                    Select a Suitable Option:
-----------------------------------------------------------------------------------------

                    <1>Suicide Cases of Country
                    <2>Suicide Cases of Country-AgeWise
                    <3>Suicide Cases of Country-YearWise
                    <4>Suicide Cases Genderwise
                    <0> Exit
```

<1> Operations => <1> Search => <4> **Gender wise**


```
C:\Users\rutba\Desktop\Final\newpage.exe                                    —    □    X
Enter Country name: Israel
Enter Gender: female
The Total Number of Suicide Cases in Israel of female are 2681
-----------------------------------------------------------------------------------------
                    Select a Suitable Option:
-----------------------------------------------------------------------------------------

                    <1>Suicide Cases of Country
                    <2>Suicide Cases of Country-AgeWise
                    <3>Suicide Cases of Country-YearWise
                    <4>Suicide Cases Genderwise
                    <0> Exit
```
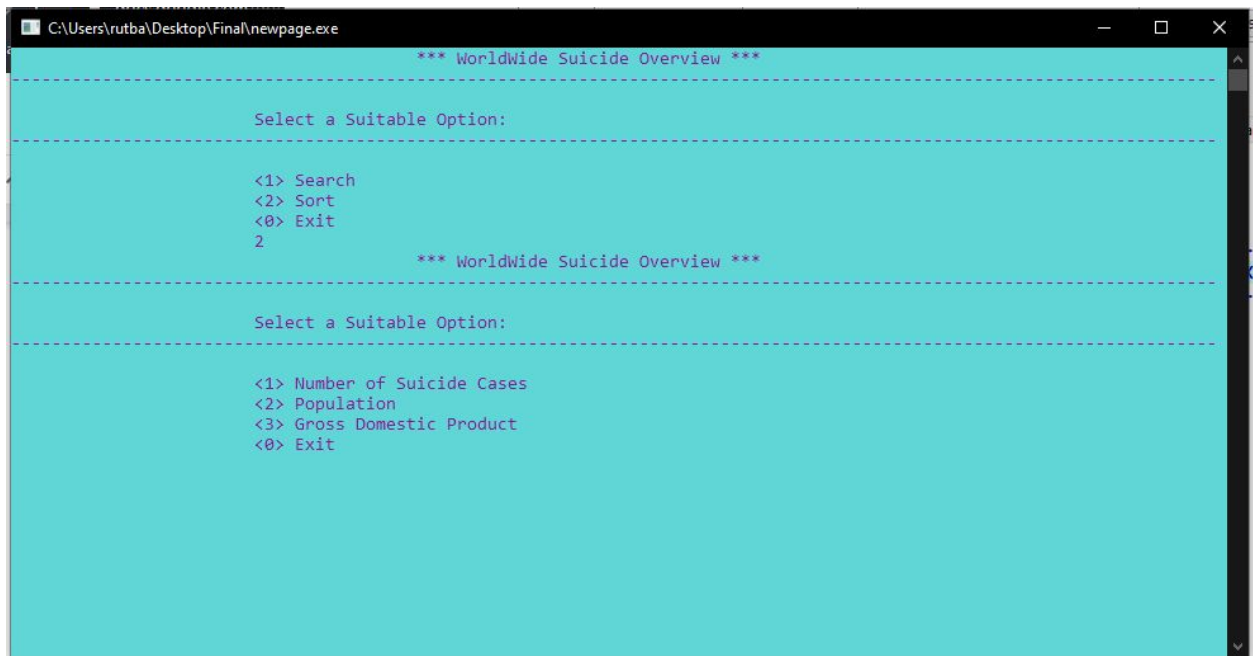
<1> Operations => <2> Sort Data

```
C:\Users\rutba\Desktop\Final\newpage.exe                          —   □   ×

                    *** WorldWide Suicide Overview ***
--------------------------------------------------------------------------------

        Select a Suitable Option:
--------------------------------------------------------------------------------

        <1> Search
        <2> Sort
        <0> Exit
        2
                    *** WorldWide Suicide Overview ***
--------------------------------------------------------------------------------

        Select a Suitable Option:
--------------------------------------------------------------------------------

        <1> Number of Suicide Cases
        <2> Population
        <3> Gross Domestic Product
        <0> Exit
```

```
C:\Users\rutba\Desktop\Final\newpage.exe                                                         —    □    ×
Country Name:Cyprus              Number of Suicides:5          Year:2009        Population:66107
Country Name:Cyprus              Number of Suicides:5          Year:2008        Population:112837
Country Name:Cyprus              Number of Suicides:5          Year:2006        Population:64866
Country Name:Cyprus              Number of Suicides:5          Year:2000        Population:73992
Country Name:Cuba                Number of Suicides:5          Year:2013        Population:659106
Country Name:Cuba                Number of Suicides:5          Year:2004        Population:798394
Country Name:Cuba                Number of Suicides:5          Year:2001        Population:846361
Country Name:Cuba                Number of Suicides:5          Year:1999        Population:826609
Country Name:Cuba                Number of Suicides:5          Year:1997        Population:868234
Country Name:Cuba                Number of Suicides:5          Year:1992        Population:802100
Country Name:Croatia             Number of Suicides:5          Year:2012        Population:245431
Country Name:Croatia             Number of Suicides:5          Year:1999        Population:322700
Country Name:Croatia             Number of Suicides:5          Year:1996        Population:318000
Country Name:Costa Rica          Number of Suicides:5          Year:2014        Population:340748
Country Name:Costa Rica          Number of Suicides:5          Year:2013        Population:325956
Country Name:Costa Rica          Number of Suicides:5          Year:2012        Population:377001
Country Name:Costa Rica          Number of Suicides:5          Year:2011        Population:381413
Country Name:Costa Rica          Number of Suicides:5          Year:2010        Population:386778
Country Name:Costa Rica          Number of Suicides:5          Year:2010        Population:287471
Country Name:Costa Rica          Number of Suicides:5          Year:2009        Population:275859
Country Name:Costa Rica          Number of Suicides:5          Year:2008        Population:265460
Country Name:Costa Rica          Number of Suicides:5          Year:2006        Population:390001
Country Name:Costa Rica          Number of Suicides:5          Year:2006        Population:48273
Country Name:Costa Rica          Number of Suicides:5          Year:2004        Population:43755
Country Name:Costa Rica          Number of Suicides:5          Year:2000        Population:465213
Country Name:Costa Rica          Number of Suicides:5          Year:1999        Population:33964
Country Name:Costa Rica          Number of Suicides:5          Year:1998        Population:428449
Country Name:Costa Rica          Number of Suicides:5          Year:1997        Population:407029
Country Name:Costa Rica          Number of Suicides:5          Year:1997        Population:30984
Country Name:Costa Rica          Number of Suicides:5          Year:1995        Population:414500
Country Name:Costa Rica          Number of Suicides:5          Year:1994        Population:22300
Country Name:Costa Rica          Number of Suicides:5          Year:1992        Population:288800
Country Name:Costa Rica          Number of Suicides:5          Year:1990        Population:283000
Country Name:Costa Rica          Number of Suicides:5          Year:1990        Population:19000
Country Name:Costa Rica          Number of Suicides:5          Year:1987        Population:231900
Country Name:Costa Rica          Number of Suicides:5          Year:1987        Population:14000
Country Name:Colombia            Number of Suicides:5          Year:2014        Population:690028
Country Name:Colombia            Number of Suicides:5          Year:2013        Population:665950
```

```
C:\Users\rutba\Desktop\Final\newpage.exe                                                         —    □    ×
Country Name:Albania             Number of Suicides:0          Year:1999        Population:391300
Country Name:Albania             Number of Suicides:0          Year:1998        Population:42300
Country Name:Albania             Number of Suicides:0          Year:1997        Population:187000
Country Name:Albania             Number of Suicides:0          Year:1994        Population:344400
Country Name:Albania             Number of Suicides:0          Year:1993        Population:39300
Country Name:Albania             Number of Suicides:0          Year:1992        Population:23900
Country Name:Albania             Number of Suicides:0          Year:1992        Population:362900
Country Name:Albania             Number of Suicides:0          Year:1992        Population:38700
Country Name:Albania             Number of Suicides:0          Year:1992        Population:336700
Country Name:Albania             Number of Suicides:0          Year:1989        Population:349700
Country Name:Albania             Number of Suicides:0          Year:1989        Population:37000
Country Name:Albania             Number of Suicides:0          Year:1989        Population:321900
Country Name:Albania             Number of Suicides:0          Year:1988        Population:345000
Country Name:Albania             Number of Suicides:0          Year:1988        Population:317200
Country Name:Albania             Number of Suicides:0          Year:1987        Population:338200
Country Name:Albania             Number of Suicides:0          Year:1987        Population:144600
Country Name:Albania             Number of Suicides:0          Year:1987        Population:311000
                            *** WorldWide Suicide Overview ***
--------------------------------------------------------------------------------------------

              Select a Suitable Option:
--------------------------------------------------------------------------------------------

              <1> Search
              <2> Sort
              <0> Exit
              2
                            *** WorldWide Suicide Overview ***
--------------------------------------------------------------------------------------------

              Select a Suitable Option:
--------------------------------------------------------------------------------------------

              <1> Number of Suicide Cases
              <2> Population
              <3> Gross Domestic Product
              <0> Exit
              2
```

<1> Operations => <2> Sort => <2> **Population**

```
C:\Users\rutba\Desktop\Final\newpage.exe                                                               —    □    ×

Country Name:Suriname        Number of Suicides:2      Year:2004        Population:49715
Country Name:Kuwait          Number of Suicides:0      Year:2005        Population:49714
Country Name:Qatar           Number of Suicides:0      Year:2001        Population:49711
Country Name:Bahrain         Number of Suicides:0      Year:1985        Population:49700
Country Name:Bahrain         Number of Suicides:3      Year:1985        Population:49700
Country Name:Cyprus          Number of Suicides:0      Year:2005        Population:49682
Country Name:Suriname        Number of Suicides:3      Year:2007        Population:49661
Country Name:Bahrain         Number of Suicides:1      Year:1999        Population:49631
Country Name:Malta           Number of Suicides:2      Year:2010        Population:49604
Country Name:Mauritius       Number of Suicides:3      Year:1987        Population:49500
Country Name:Suriname        Number of Suicides:0      Year:2003        Population:49482
Country Name:Suriname        Number of Suicides:18     Year:2013        Population:49480
Country Name:Montenegro      Number of Suicides:0      Year:2003        Population:49464
Country Name:Montenegro      Number of Suicides:0      Year:2000        Population:49448
Country Name:Montenegro      Number of Suicides:0      Year:2001        Population:49448
Country Name:Montenegro      Number of Suicides:0      Year:2002        Population:49448
Country Name:Montenegro      Number of Suicides:7      Year:2008        Population:49423
Country Name:Suriname        Number of Suicides:1      Year:2008        Population:49401
Country Name:Bahrain         Number of Suicides:0      Year:1987        Population:49400
Country Name:Luxembourg      Number of Suicides:5      Year:1988        Population:49400
Country Name:New Zealand          Number of Suicides:18          Year:1986          Population:49400
Country Name:Maldives        Number of Suicides:0      Year:2008        Population:49380
Country Name:Malta           Number of Suicides:8      Year:2012        Population:49347
Country Name:Luxembourg      Number of Suicides:3      Year:2012        Population:49311
Country Name:Armenia         Number of Suicides:7      Year:2007        Population:49296
Country Name:Qatar           Number of Suicides:0      Year:2010        Population:49265
Country Name:Suriname        Number of Suicides:3      Year:2002        Population:49195
Country Name:Paraguay        Number of Suicides:8      Year:2006        Population:49190
Country Name:Guyana          Number of Suicides:35     Year:2013        Population:49177
Country Name:Guatemala       Number of Suicides:3      Year:1994        Population:49144
Country Name:Mauritius       Number of Suicides:12     Year:1994        Population:49100
Country Name:Jamaica         Number of Suicides:4      Year:2011        Population:49098
Country Name:Panama          Number of Suicides:2      Year:2008        Population:49093
Country Name:Suriname        Number of Suicides:3      Year:2009        Population:49092
Country Name:Albania         Number of Suicides:6      Year:2003        Population:49088
Country Name:Suriname        Number of Suicides:17     Year:2012        Population:49082
Country Name:Cabo Verde      Number of Suicides:2      Year:2011        Population:49078
Country Name:Cyprus          Number of Suicides:0      Year:2008        Population:49044
```

```
C:\Users\rutba\Desktop\Final\newpage.exe                                    —   □   ✕

Age:5-54 years
Year:2014
Suicide Rate:3.57
-------------------------------------------------------------------------------
Number of Suicides:3
-------------------------------------------------------------------------------

Country Name:Luxembourg
Population:31718
GDP:126352
Gender:male
Age:-14 years
Year:2014
Suicide Rate:3.15
-------------------------------------------------------------------------------
Number of Suicides:1
-------------------------------------------------------------------------------

Country Name:Luxembourg
Population:30054
GDP:126352
Gender:female
Age:-14 years
Year:2014
Suicide Rate:0
-------------------------------------------------------------------------------
Number of Suicides:0
-------------------------------------------------------------------------------
                        *** WorldWide Suicide Overview ***
-------------------------------------------------------------------------------

Select a Suitable Option:
-------------------------------------------------------------------------------

<1> Search
<2> Sort
<0> Exit
```

<2> Analysis

```
                        *** WorldWide Suicide Overview ***
------------------------------------------------------------------------------------

        Select a Suitable Option:
------------------------------------------------------------------------------------

        <1> Operations
        <2> Analysis
        <0> Exit
        2
```
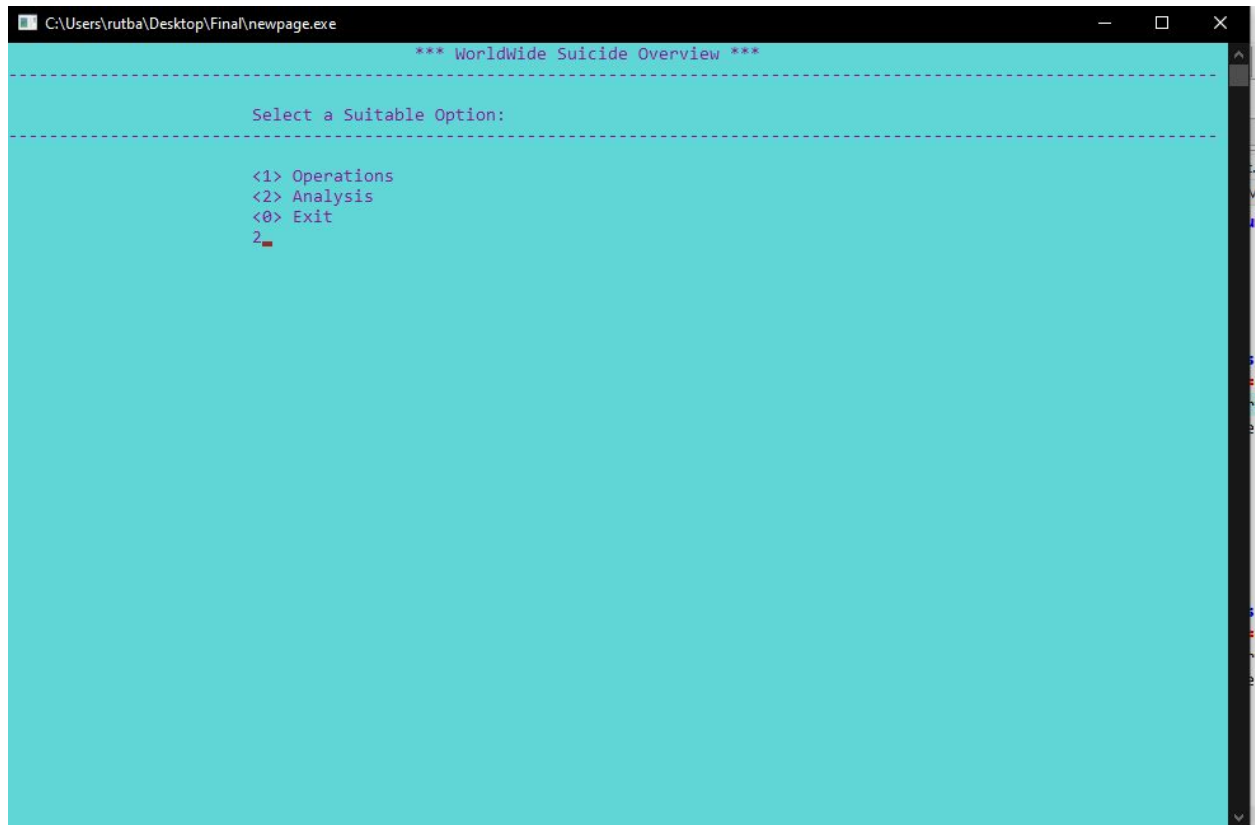
<2> Analysis => <1> Maximum Suicide Cases

```
C:\Users\rutba\Desktop\Final\newpage.exe                                        —    □    ✕
Enter the Country:
Qatar
21
21 0
21 0 0
21 0 0 0
21 0 0 0 0
21 0 0 0 0 0
21 0 0 0 0 0 0
21 0 0 0 0 0 0 0
21 0 0 0 0 0 0 0 0
21 4 0 0 0 0 0 0 0 0
21 11 0 0 4 0 0 0 0 0 0
21 11 5 0 4 0 0 0 0 0 0 0
21 11 5 0 4 2 0 0 0 0 0 0 0
21 11 5 0 4 2 1 0 0 0 0 0 0 0
21 11 5 0 4 2 1 0 0 0 0 0 0 0 0
21 14 5 11 4 2 1 0 0 0 0 0 0 0 0 0
21 14 5 11 4 2 1 4 0 0 0 0 0 0 0 0 0
21 14 5 11 4 2 1 4 3 0 0 0 0 0 0 0 0 0
21 17 5 14 4 2 1 4 11 0 0 0 0 0 0 0 0 0 3
29 21 5 14 17 2 1 4 11 4 0 0 0 0 0 0 0 0 3 0
41 29 5 14 21 2 1 4 11 17 0 0 0 0 0 0 0 0 3 0 4
41 33 5 14 29 2 1 4 11 17 21 0 0 0 0 0 0 0 3 0 4 0
44 41 5 14 33 2 1 4 11 17 29 0 0 0 0 0 0 0 3 0 4 0 21
47 41 44 14 33 5 1 4 11 17 29 2 0 0 0 0 0 0 3 0 4 0 21 0
50 41 47 14 33 44 1 4 11 17 29 5 0 0 0 0 0 0 3 0 4 0 21 0 2
50 41 47 14 33 44 1 4 11 17 29 5 43 0 0 0 0 0 3 0 4 0 21 0 2 0
50 41 47 14 33 44 1 4 11 17 29 5 43 0 0 0 0 0 3 0 4 0 21 0 2 0 37
55 41 50 14 33 44 47 4 11 17 29 5 43 1 0 0 0 0 3 0 4 0 21 0 2 0 37 0
66 41 55 14 33 44 50 4 11 17 29 5 43 47 0 0 0 0 3 0 4 0 21 0 2 0 37 0 1
68 41 66 14 33 44 55 4 11 17 29 5 43 47 50 0 0 0 3 0 4 0 21 0 2 0 37 0 1 0
------------------------------------------------------------------------------------------
                        Maximum number of Suicides in Qatar=68
------------------------------------------------------------------------------------------
Press any key to continue . . .
```

<2> Analysis => <2> Gender Analysis

```
C:\Users\rutba\Desktop\Final\newpage.exe                                           —    □    ×

                        *** WorldWide Suicide Overview ***
--------------------------------------------------------------------------------

                 Select a Suitable Option:
--------------------------------------------------------------------------------

                         <1> Overall Maximum Suicide Cases
                         <2> Gender Analysis
                         <3> Prediction
                         <4> Suicide Rates in accordance with GDP
                         <5> Analysis of Ages
                         <0> Exit
                         2
Enter the Country:
Italy
Female Count:186
Male Count:372
--------------------------------------------------------------------------------
                 The Suicide Cases Count of Men is more than Women
--------------------------------------------------------------------------------
Press any key to continue . . .
```

<2> Analysis => <3> Prediction


```
C:\Users\rutba\Desktop\Final\newpage.exe                              —    □    ✕

                          Reading CSV
                   Making LinearRegressionModel
--------------------------------------------------------------------------------
         Plotting a Graph of Suicides Rate vs Year
--------------------------------------------------------------------------------
              Number weights = 1
              Weights 0 is = 9.404850
                      y =                    9.40 * x0

              Iteration left: 1000; MSE = 34090.2
              Number weights = 1
              Weights 0 is = 94.046127
                      y =                    94.05 * x0

              Iteration left: 900; MSE = 25245.3
              Number weights = 1
              Weights 0 is = 94.048828
                      y =                    94.05 * x0

              Iteration left: 800; MSE = 25245.4
              Number weights = 1
              Weights 0 is = 94.048759
                      y =                    94.05 * x0

              Iteration left: 700; MSE = 25245.4
              Number weights = 1
              Weights 0 is = 94.048836
                      y =                    94.05 * x0

              Iteration left: 600; MSE = 25245.4
              Number weights = 1
              Weights 0 is = 94.048790
                      y =                    94.05 * x0

              Iteration left: 500; MSE = 25245.4
              Number weights = 1
              Weights 0 is = 94.048866
                      y =                    94.05 * x0

              Iteration left: 400; MSE = 25245.4
              Number weights = 1
              Weights 0 is = 94.048798
                      y =                    94.05 * x0

              Iteration left: 300; MSE = 25245.4
              Number weights = 1
              Weights 0 is = 94.048752
                      y =                    94.05 * x0

              Iteration left: 200; MSE = 25245.4
              Number weights = 1
              Weights 0 is = 94.048828
                      y =                    94.05 * x0

              Iteration left: 100; MSE = 25245.4
              Suicide Cases:
              Number weights = 1
              Weights 0 is = 94.048866
```

```
C:\Users\rutba\Desktop\Final\newpage.exe                                    —    □    ×

                    Iteration left: 400; MSE = 25245.4
                    Number weights = 1
                    Weights 0 is = 94.048798
                            y =                         94.05 * x0

                    Iteration left: 300; MSE = 25245.4
                    Number weights = 1
                    Weights 0 is = 94.048752
                            y =                         94.05 * x0

                    Iteration left: 200; MSE = 25245.4
                    Number weights = 1
                    Weights 0 is = 94.048828
                            y =                         94.05 * x0

                    Iteration left: 100; MSE = 25245.4
                    Suicide Cases:
                    Number weights = 1
                    Weights 0 is = 94.048866
                            y =                         94.05 * x0

                            Testing for Different Points
                            Testing for X0 = 1, X1 = 123
                                Gradient = 94.0489
------------------------------------------------------------------------------------------
    It has been predicted that around 94 Suicide cases will be Reported in the Next Year.
------------------------------------------------------------------------------------------P
ress any key to continue . . . _
```

<2> Analysis => <2> In accordance with GDP

```
C:\Users\rutba\Desktop\Final\newpage.exe                                    —    □    ✕

              Age:5-34 years
              Year:2014
              Suicide Rate:4.89
-------------------------------------------------------------------------------------
              Number of Suicides:2
-------------------------------------------------------------------------------------

              Country Name:Luxembourg
              Population:84147
              GDP:126352
              Gender:female
              Age:5-54 years
              Year:2014
              Suicide Rate:3.57
-------------------------------------------------------------------------------------
              Number of Suicides:3
-------------------------------------------------------------------------------------

              Country Name:Luxembourg
              Population:31718
              GDP:126352
              Gender:male
              Age:-14 years
              Year:2014
              Suicide Rate:3.15
-------------------------------------------------------------------------------------
              Number of Suicides:1
-------------------------------------------------------------------------------------

              Country Name:Luxembourg
              Population:30054
              GDP:126352
              Gender:female
              Age:-14 years
              Year:2014
              Suicide Rate:0
-------------------------------------------------------------------------------------
              Number of Suicides:0
-------------------------------------------------------------------------------------
Press any key to continue . . .
```

<2> Analysis => <2> In accordance with GDP


```
C:\Users\rutba\Desktop\Final\newpage.exe

Age Groups
                    <1> 5-15 years
                    <2> 15-24 years
                    <3> 25-34 years
                    <4> 35-54 years
                    <5> 55-74 years
                    <6> 75+ years

Overall Suicide Cases of these Age Groups

                    5-15 years:0
                    15-24 years:717207
                    25-34 years:1013081
                    35-54 years:2184428
                    55-74 years: 1508769
                    75+ years   :594563
-------------------------------------------------------------------------------------
                    Maximum Sucide according to AgeGroup= 2184428
                    Minimum Sucide according to AgeGroup= 0
-------------------------------------------------------------------------------------P
ress any key to continue . . .
```

```
----------------------------------------------------------------------------------
                        Group Members:
<1> Rutba Asghari K19-0162
<2> Zoha Mobin K19-1469
<3> Midhat Karim K19-0226


----------------------------------------------------------------------------------
```