

# APPENDIX A

## Informatics Practices Class XII Project (2021–22)

**Front-end: Python Pandas**

**Back-end: csv**

**Plots: matplotlib**

**#Project on World University Rankings**

```
import matplotlib.pyplot as mp
import numpy as np
import pandas as pd
df = pd.read_csv('C:\\Users\\User2\\OneDrive\\Desktop\\world_
university_rankings.csv',nrows = 250)
while True :
    print('-----')
    print('| WORLD UNIVERSITY RANKING PROJECT |','\n')
    print('-----','\n')
    print('| MAIN MENU |')
    print('-----')
    print(''| 1.Display Data |
        \n| 2. Accessing Data |
        \n| 3. Data Manipulation |
        \n| 4. Data Analysis |
        \n| 5. Data Visualisation |
        \n| 6. Exit |'')
    print('-----')
    print()
    ch = int(input('Enter your choice :'))
    if ch == 1:
        print('-----')
        print('| Display Data |')
        print('-----')
        print(''| 1.Display full data |
            \n| 2.Display first n rows |
            \n| 3.Display last n rows |
            \n| 4.Boolean Indexing |
            \n| 5.Exit |'')
        print('-----')
        print()
        dis = int(input('Enter your choice :'))
        print()
        if dis == 1 :
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        print('---{ DISPLAYING FULL DATA }---')
        print()
        print(df)
elif dis == 2 :
    print('---{ FIRST n ROWS }---')
    print()
    f = int(input('Enter number of rows to be dispalyed:'))
    print()
    print(df.head(f))
elif dis == 3 :
    print('---{ LAST n ROWS }---')
    print()
    s = int(input('Enter number of rows to be displayed :'))
    print()
    print(df.tail(s))
elif dis == 4:
    print('-----')
    print('|    BOOLEAN INDEXING    |')
    print('-----')
    print(''''| 1.World Rank          |
           \n| 2.National Rank      |
           \n| 3.Quality of Faculty |
           \n| 4.Exit                    |''')
    print('-----')
    print()
    bo = int(input('Enter your choice :'))
    print()
    if bo == 1:
        print(df.Worldrank)
        b1 = int(input('Enter the limit:'))
        print('-----')
        print('|    WORLD RANK    |')
        print('-----')
        print('| 1.More than ', b1, '| '
              ' \n| 2.Less than ', b1, '| '
              ' \n| 3.Equal to ', b1, '| '
              ' \n| 4.Exit | ')
        print('-----')
        print()
        ch = int(input('Enter your choice :'))
        if ch == 1:
            print(df.Worldrank>100)
        elif ch == 2:
            print(df.Worldrank<250)

```

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elif ch == 3:
    print(df.Worldrank == 100)
elif ch == 4:
    pass
else :
    print('INVALID INPUT')
elif bo == 2:
    print(df.Nationalrank)
    b2 = int(input('Enter the limit:'))
    print('-----')
    print('| NATIONAL RANK |')
    print('-----')
    print('| 1.More than ',b2,' |'
          '\n| 2.Less than ',b2,' |'
          '\n| 3.Equal to ',b2 ,' |'
          '\n| 4.Exit |')
    print('-----')
    print()
    ch = int(input('Enter your choice :'))
    if ch == 1:
        print(df.Nationalrank>5)
    elif ch == 2:
        print(df.Nationalrank<58)
    elif ch == 3:
        print(df.Nationalrank == 10)
    elif ch == 4:
        pass
    else :
        print('INVALID INPUT')
elif bo == 3:
    print(df.Qualityoffaculty)
    b3 = int(input('Enter the limit:'))
    print('-----')
    print('| QUALITY OF FACULTY |')
    print('-----')
    print('| 1.More than ',b3,' |'
          '\n| 2.Less than ',b3,' |'
          '\n| 3.Equal to ',b3 ,' |'
          '\n| 4.Exit |')
    print('-----')
    print()
    ch = int(input('Enter your choice :'))
    if ch == 1:
        print(df.Qualityoffaculty>94)
    elif ch == 2:

```

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        print(df.Qualityoffaculty<101)
    elif ch == 3:
        print(df.Qualityoffaculty ==10)
    elif ch == 4:
        pass
    else :
        print('INVALID INPUT')
elif bo == 4:
    pass
else:
    print('INVALID CHOICE')
elif dis == 5:
    pass
else :
    print('INVALID CHOICE')
elif ch == 2:
    print('-----')
    print('|      ACCESSING DATA      |')
    print('-----')
    print(''''| 1.Scalar Value      |
          \n| 2.Individual columns  |
          \n| 3.Multiple columns    |
          \n| 4.subset                |
          \n| 5.Individual rows      |
          \n| 6.Multiple rows        |
          \n| 7.Exit                |''')
    print('-----')
    print()
    a = int(input('Enter your choice :'))
    if a == 1:
        print()
        print('--{ COLUMN NAMES }--')
        for i in df.columns:
            print(i)
            sc = input('Enter the column name to be accessed:')
            sc = sc.capitalize()
            ro = int(input('Enter the index number of the row to be
                           accessed:'))

            print()
            print('-----')
            print('|      ACCESSING SCALAR VALUE      |')
            print('-----')
            print(df[sc][ro])
    elif a == 2:
        print(df.columns)

```

```

print()
ai = input('Enter the COLUMN to be accessed:')
ai = ai.capitalize()
print()
print('-----')
print('|    ACCESSING INDIVIDUAL COLUMN    |')
print('-----')
print(df[ai])
elif a == 3:
    print(df.columns)
    print()
    ac = int(input('Enter the number of COLUMNS to be accessed:'))
    n = []
    for i in range(ac):
        s = input('Enter the column name:')
        s = s.capitalize()
        n.append(s)
        print()
        print('-----')
        print('    ACCESSING MULTIPLE COLUMNS    ')
        print('-----')
        print(df[n])
elif a == 4:
    print(df.columns)
    print()
    s1 = int(input('Enter the starting row index:'))
    s2 = int(input('Enter the ending row index:'))
    s3 = input('Enter the starting column:')
    s4 = input('Enter the ending column:')
    s3 = s3.capitalize()
    s4 = s4.capitalize()
    print()
    print('-----')
    print('|    SUBSETS    |')
    print('-----')
    print(df.loc[s1:s2, s3:s4])
elif a == 5:
    print(df.columns)
    print()
    i1 = int(input('Enter the row index to be accessed: '))
    print()
    print('-----')
    print('|    ACCESSING INDIVIDUAL ROW    |')
    print('-----')
    print(df.loc[i1])

```

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elif a == 6:
    print(df.columns)
    print()
    i1 = int(input('Enter the starting row index:'))
    print()
    i2 = int(input('Enter the ending row index:'))
    print()
    print('-----')
    print('|   ACCESSING MULTIPLE ROWS   |')
    print('-----')
    print(df.loc[i1:i2])
elif a == 7:
    pass
else :
    print('Invalid Choice')
elif ch == 3:
    print('-----')
    print('|   Data Manipulation   |')
    print('-----')
    print(''| 1.Delete           |
          \n| 2.Rename           |
          \n| 3.Update           |
          \n| 4.Exit             | ''')
    print('-----')
    print()
    man = int(input('Enter Your Choice:'))
    if man == 1 :
        print('-----')
        print('| DELETE |')
        print('-----')
        print(''| 1.Delete Single Row |
              \n| 2.Delete Multiple rows |
              \n| 3.Delete Single column |
              \n| 4.Delete Multiple column |
              \n| 5.Exit             | ''')
        print('-----')
        print()
        p = int(input('Enter your choice:'))
        if d == 1:
            print()
            i = int(input('Enter the index number of the row to be
                           deleted:'))
            delete = df.drop(i)
            print(delete)
            print('ROW DELETED')

```

```

elif d == 2:
    print()
    r = int(input('Enter the number of rows to be deleted:'))
    print()
    for i in range(r):
        re = int(input('Enter the row index to be deleted:'))
        delete = df.drop(re)
        print(delete)
        print('ROWS DELETED')
elif d == 3:
    print(df.columns)
    print()
    c = input('Enter the column name to be deleted:')
    c = c.capitalize()
    delete = df.drop(c,axis = 1)
    print(delete)
    print('COLUMN DELETED')
elif d == 4:
    print(df.columns)
    print()
    c = int(input('Enter the number of columns to be deleted:'))
    print()
    for i in range(c):
        re = input('Enter the column name to be deleted:')
        re = re.capitalize()
        delete = df.drop(re,axis = 1)
        print(delete)
        print('COLUMNS DELETED')
elif d == 5:
    pass
else :
    print('INVALID CHOICE')
elif man == 2 :
    print('-----')
    print('| RENAME |')
    print('-----')
    print(''| 1.Rename single column      |
          \n| 2.Rename multiple column  |
          \n| 3.Exit                      |''')
    print('-----')
    print()
    r = int(input('Enter your choice:'))
    if r == 1:
        print(df.columns)
        print()

```

```

        r1 = input('Enter the column to be renamed:')
        r1 = r1.capitalize()
        print()
        r2 = input('Enter the new name to be put:')
        r2 = r2.capitalize()
        re = df.rename(columns = {r1:r2}, inplace = False)
        print(re)
        print('COLUMN RENAMED')
    elif r == 2:
        print(df.columns)
        print()
        rc = int(input('Enter the number of columns to be
                        renamed:'))

        di = {}
        for i in range(rc):
            x = input('Enter the column to be renamed:')
            x = x.capitalize()
            print()
            y = input('Enter the new name to be put:')
            y = y.capitalize()
            re2 = df.rename(columns = {x:y}, inplace = False)
            print(re2)
            print('COLUMNS RENAMED')
    elif r == 3:
        pass
    else:
        print('INVALID CHOICE')
elif man == 3:
    print('-----')
    print('| UPDATE |')
    print('-----')
    print(''''|      1.Update Particular value      |
              \n| 2.Exit |''')
    print('-----')
    print()
    u = int(input('Enter your choice:'))
    if u == 1:
        print(df.columns)
        print()
        u1 = input('Enter column name :')
        u1 = u1.capitalize()
        r = int(input('Enter the index number of row:'))
        print()
        u2 = input('Enter the new value:')

```



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        if type(u2) == int:
            u2 = int(u2)
            n = df.at[r, u1] = u2
        else:
            n = df.at[r, u1] = u2
            print(n)
            print(df)
            print('COLUMN UPDATED')
    elif man == 4:
        pass
    else:
        print()
        print('INVALID CHOICE')
elif ch == 4:
    print('-----')
    print('|          DATA ANALYSIS          |')
    print('-----')
    print(''''| 1.Minimum value          |
          \n| 2.Maximum value       |
          \n| 3.Information regarding data |
          \n| 4.Shape                    |
          \n| 5.Mean                      |
          \n| 6.Median                    |
          \n| 7.Mode                     |
          \n| 8.Sort                      |
          \n| 9.Group by                   |
          \n| 10.Exit                      |''')
    print('-----')
    print()
    an = int(input('Enter Your Choice:'))
    print()
    if an == 1:
        print(df.columns)
        print()
        print('TO DISPALY THE MINIMUM VALUE')
        print()
        m = input('Enter the column name:')
        m = m.capitalize()
        print()
        print('Min Value:', df[m].min())
    elif an == 2:
        print(df.columns)
        print()
        print('TO DISPALY THE MAXIMUM VALUE')
        print()

```

```

        m = input('Enter the column name:')
        m = m.capitalize()
        print()
        print('Max Value:', df[m].max())
    elif an == 3:
        print('THE INFORMATION REGARDING DATA')
        print()
        print(df.info())
    elif an == 4:
        print('SHAPE OF THE DATA')
        print()
        print(df.shape)
    elif an == 5:
        print(df.columns)
        print('TO GET THE MEAN FROM THE DATA')
        print()
        m = input('Enter the column name:')
        m = m.capitalize()
        print(df[m].mean())
    elif an == 6:
        print(df.columns)
        print('TO GET THE MEDIAN FROM THE DATA')
        print()
        m = input('Enter the column name:')
        m = m.capitalize()
        print(df[m].median())
    elif an == 7:
        print(df.columns)
        print('TO GET THE MODE FROM THE DATA')
        print()
        m = input('Enter the column name:')
        m = m.capitalize()
        print(df[m].mode())
    elif an == 8:
        print('-----')
        print('| SORT                                     |')
        print('-----')
        print(''''| 1.Sort in Ascending order      |
                        \n| 2.Sort in Descending order |
                        \n| 5.Exit |'''')
        print('-----')
        print()
        z = int(input('Enter your choice:'))
        if z == 1:

```

```

        print(df.columns)
        print()
        print('FOR SORTING IN ASCENDING ORDER')
        print()
        s = input('Enter the column name:')
        s = s.capitalize()
        print()
        print(df.sort_values(s,inplace = False))
        print()
        print('SORTED IN ASCENDING ORDER')
    elif z == 2:
        print(df.columns)
        print()
        print('FOR SORTING IN DESCENDING ORDER')
        print()
        s = input('Enter the column name:')
        s = s.capitalize()
        print()
        print(df.sort_values(s,inplace = False,ascending =
                                False))

        print()
        print('SORTED IN DESCENDING ORDER')
    elif z == 3:
        pass
    else:
        print('INVALID CHOICE')
elif an == 9:
    print('-----')
    print('|                GROUP BY                |')
    print('-----')
    print(''| 1.Group by count function      |
          \n| 2.Group by average function |
          \n| 5.Exit                        |''')
    print('-----')
    print()
    o = int(input('Enter your choice:'))
    if o == 1:
        print(df.columns)
        print()
        print('TO GROUP BY COUNT FUNCTION')
        print()
        o1 = input('Enter the first column name:')
        o1 = o1.capitalize()
        print()
        o2 = input('Enter the second column name:')

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        o2 = o2.capitalize()
        print(df.groupby(o1)[o2].count())
        print()
    elif o == 2:
        print(df.columns)
        print()
        print('TO GROUP BY AVERAGE FUNCTION')
        print()
        o1 = input('Enter the first column name:')
        o1 = o1.capitalize()
        print()
        o2 = input('Enter the second column name:')
        o2 = o2.capitalize()
        av = df.groupby(o1)[o2].mean()
        print(av)
        print()
    elif o == 3:
        pass
    else:
        print('INVALID CHOICE')
elif an == 10:
    pass
else:
    print('INVALID CHOICE')
elif ch == 5:
    print('-----')
    print('|                                DATA VISUALISATION                                |')
    print('-----')
    print(''''| 1.World Rank & Score                                |
        \n| 2.Quality of Education & Quality of Faculty |
        \n| 3.National Rank & Influence                                |
        \n| 4.Exit                                |''')
    print('-----')
    print()
    v = int(input('Enter Your Choice:'))
    print()
    if v == 1:
        print('-----')
        print('|          WORLD RANK & SCORE          |')
        print('-----')
        print(''''| 1.Scatter Chart                                |
        \n| 2.Bar Chart                                |
        \n| 3.Histogram                                |
        \n| 4.Exit                                |''')

```

```

print('-----')
print()
ap = int(input('Enter your choice:'))
if ap == 1:
    mp.scatter(df.Score,df.Worldrank,color = 'pink',
               label = 'World Rank')
    mp.title('WORLD RANK & SCORE SCATTER CHART')
    mp.xlabel('SCORE')
    mp.ylabel('WORLD RANK')
    mp.legend()
    mp.show()
elif ap == 2:
    df.groupby('Worldrank')['Score'].plot.bar(color =
        'pink',edgecolor = 'black',legend=True)
    mp.title('WORLD RANK & SCORE BAR CHART')
    mp.xlabel('SCORE')
    mp.ylabel('WORLD RANK')
    mp.show()
elif ap == 3:
    df.groupby('Worldrank')['Score'].plot.hist(legend=True)
    mp.title('WORLD RANK & SCORE HISTOGRAM')
    mp.xlabel('SCORE')
    mp.ylabel('WORLD RANK')
mp.xticks([5,10,15,20,25,30,35,40,45,50,55,60,65,70,75,80,85,90,95,100])
mp.show()
elif ap == 4:
    pass
else:
    print('INVALID CHOICE')
elif v == 2:
    print('-----')
    print('|Quality of Education & Quality of Faculty| ')
    print('-----')
    print(''| 1.Scatter Chart |
           | 2.Bar Chart |
           | 3.Histogram |
           | 4.Exit |'')
    print('-----')
    print()
    ip = int(input('Enter your choice:'))
    if ip == 1:
mp.scatter(df.Qualityoffaculty,df.Qualityofeducation,color =
'brown',label = 'Quality of Education')
        mp.title('Quality of Education & Quality of Faculty
                  SCATTER CHART')
        mp.xlabel('Quality of Faculty')

```

```

        mp.ylabel('Quality of Education')
        mp.legend()
        mp.show()
    elif ip == 2:
        h = df.head(100)
        mp.bar(h.Qualityoffaculty,h.Qualityofeducation,
               label = 'Quality of Education',color =
               'brown',edgecolor = 'black')
        mp.title('Quality of Education & Quality of Faculty
                  BAR CHART')
        mp.xlabel('Quality of Faculty')
        mp.ylabel('Quality of Education')
        mp.legend()
        mp.show()
    elif ip == 3:
        mp.hist(df.Qualityofeducation,color =
               'brown',edgecolor = 'black',label =
               'Quality of Education')
        mp.title('Quality of Education & Quality of Faculty
                  HISTOGRAM')
        mp.xlabel('Quality of Faculty')
        mp.ylabel('Quality of Education')
        mp.legend()
        mp.show()
    elif ip == 4:
        pass
    else:
        print('INVALID CHOICE')
elif v == 3:
    print('-----')
    print('|  NATIONAL RANK AND INFLUENCE  |')
    print('-----')
    print(''''| 1.Scatter Chart          |
              \n| 2.Bar Chart          |
              \n| 3.Histogram          |
              \n| 4.Exit              |''')
    print('-----')
    print()
    choice = int(input('Enter your choice:'))
    if choice == 1:
        mp.scatter(df.Nationalrank,df.Influence,label =
                  'Influence',color = 'orange')
        mp.title('NATIONAL RANK AND INFLUENCE SCATTER
                  CHART')
        mp.xlabel('NATIONAL RANK')
        mp.ylabel('INFLUENCE')

```

```

        mp.legend()
        mp.show()
    elif choice == 2:
        h = df.head(100)
        mp.bar(h.Nationalrank,h.Influence,color =
                'orange',label = 'Influence',edgecolor =
                'black')
        mp.title('NATIONAL RANK AND INFLUENCE BAR CHART')
        mp.xlabel('NATIONAL RANK')
        mp.ylabel('INFLUENCE')
        mp.legend()
        mp.show()
    elif choice == 3:
        mp.hist(df.Influence,color = 'orange',label =
                'Influence',edgecolor = 'black')
        mp.title('NATIONAL RANK AND INFLUENCE HISTOGRAM')
        mp.xlabel('NATIONAL RANK')
        mp.ylabel('INFLUENCE')
        mp.legend()
        mp.show()
    elif choice == 4:
        pass
    else:
        print('INVALID CHOICE')

elif ch == 6:
    pass
else:
    print('INVALID CHOICE')

```