```
! pip install numpy pandas matplotlib seaborn

import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns

df = pd.read_csv("FDI data.csv")
print(df.head())
```

```
                     Sector  2000-01  2001-02  2002-03  2003-04  2004-
05  \
0  METALLURGICAL INDUSTRIES    22.69    14.14    36.61     8.11
200.38
1                     MINING     1.32     6.52    10.06    23.48
9.92
2                      POWER    89.42   757.44    59.11    27.09
43.37
3   NON-CONVENTIONAL ENERGY     0.00     0.00     1.70     4.14
1.27
4            COAL PRODUCTION     0.00     0.00     0.00     0.04
0.00

   2005-06  2006-07  2007-08  2008-09  2009-10  2010-11  2011-12
2012-13  \
0   149.13   169.94  1175.75   959.94   419.88  1098.14  1786.14
1466.23
1     7.40     6.62   444.36    34.16   174.40    79.51   142.65
57.89
2    72.69   157.15   988.68   907.66  1271.79  1271.77  1652.38
535.68
3     1.35     2.44    58.82   125.88   622.52   214.40   452.17
1106.52
4     9.14     1.30    14.08     0.22     0.00     0.00     0.00
0.00

   2013-14  2014-15  2015-16  2016-17
0   567.63   359.34   456.31  1440.18
1    12.73   684.39   520.67    55.75
2  1066.08   707.04   868.80  1112.98
3   414.25   615.95   776.51   783.57
4     2.96     0.00     0.00     0.00
```

```
df.describe()
```

```
          2000-01     2001-02     2002-03     2003-04     2004-05  \
count   63.000000   63.000000   63.000000   63.000000   63.000000
mean    37.757302   63.931587   42.925714   34.727778   51.090317
std    112.227860  157.878737   86.606439   67.653735  101.934873
min      0.000000    0.000000    0.000000    0.000000    0.000000
25%      0.000000    0.000000    0.200000    0.215000    0.715000
```

```
50%      4.030000    5.070000   11.010000    6.370000    9.090000
75%     23.510000   44.830000   36.555000   38.660000   43.205000
max    832.070000  873.230000  419.960000  368.320000  527.900000

           2005-06      2006-07      2007-08      2008-09      2009-10
\
count    63.000000    63.000000    63.000000    63.000000    63.000000

mean     87.932540   198.281905   390.085714   498.348571   410.069524

std     206.436967   686.783115  1026.249935  1134.649040   926.814626

min       0.000000     0.000000     0.000000     0.000000     0.000000

25%       1.230000     4.160000     9.950000    11.950000     7.880000

50%      22.620000    25.820000    58.820000    84.880000    69.740000

75%      63.855000   108.325000   279.270000   383.320000   341.595000

max    1359.970000  4713.780000  6986.170000  6183.490000  5466.130000


           2010-11      2011-12      2012-13      2013-14      2014-15
\
count    63.000000    63.000000    63.000000    63.000000    63.000000

mean    339.413810   557.472698   355.930000   385.703492   490.959841

std     627.141139  1031.474056   778.091368   658.429944   837.787060

min       0.000000     0.000000     0.000000     0.000000     0.000000

25%       8.430000    22.720000    15.115000    16.610000    33.800000

50%      58.070000   129.360000    95.410000   113.780000   177.220000

75%     304.280000   593.525000   288.025000   473.060000   595.390000

max    3296.090000  5215.980000  4832.980000  3982.890000  4443.260000


           2015-16      2016-17
count    63.000000    63.000000
mean    634.936349   690.131111
std    1335.307706  1411.965354
min       0.000000     0.000000
25%      30.000000    19.905000
50%     159.130000   110.860000
75%     519.070000   741.220000
max    6889.460000  8684.070000
```

```
df.columns
```

```
Index(['Sector', '2000-01', '2001-02', '2002-03', '2003-04', '2004-
05',
       '2005-06', '2006-07', '2007-08', '2008-09', '2009-10', '2010-
11',
       '2011-12', '2012-13', '2013-14', '2014-15', '2015-16', '2016-
17'],
      dtype='object')
```

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

```
Sector     0
2000-01    0
2001-02    0
2002-03    0
2003-04    0
2004-05    0
2005-06    0
2006-07    0
2007-08    0
2008-09    0
2009-10    0
2010-11    0
2011-12    0
2012-13    0
2013-14    0
2014-15    0
2015-16    0
2016-17    0
dtype: int64
```

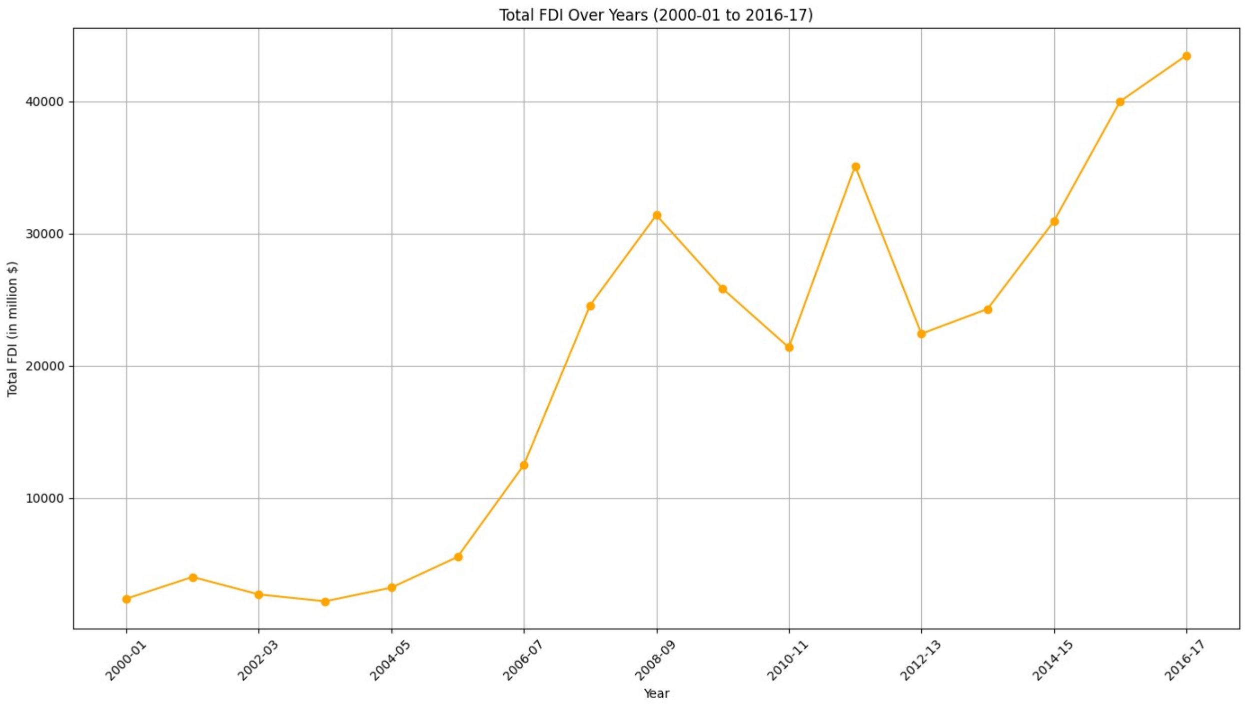
```
grouped = df.groupby(['2000-01', '2001-02', '2002-03', '2003-04',
'2004-05', '2005-06', '2006-07', '2007-08', '2008-09', '2009-10',
'2010-11', '2011-12', '2012-13', '2013-14', '2014-15', '2015-16',
'2016-17']).sum().reset_index()
print(grouped)
```

```
   2000-01  2001-02  2002-03  2003-04  2004-05  2005-06  2006-07
2007-08  \
0     0.00     0.00     0.00     0.00     0.00     0.00     0.00
1.27
1     0.00     0.00     0.00     0.00     0.00     0.00     0.00
1.27
2     0.00     0.00     0.00     0.00     0.00     0.93    64.06
182.92
3     0.00     0.00     0.00     0.00     0.05     0.00     0.00
0.00
4     0.00     0.00     0.00     0.00     0.47     0.59     0.04
0.01
```

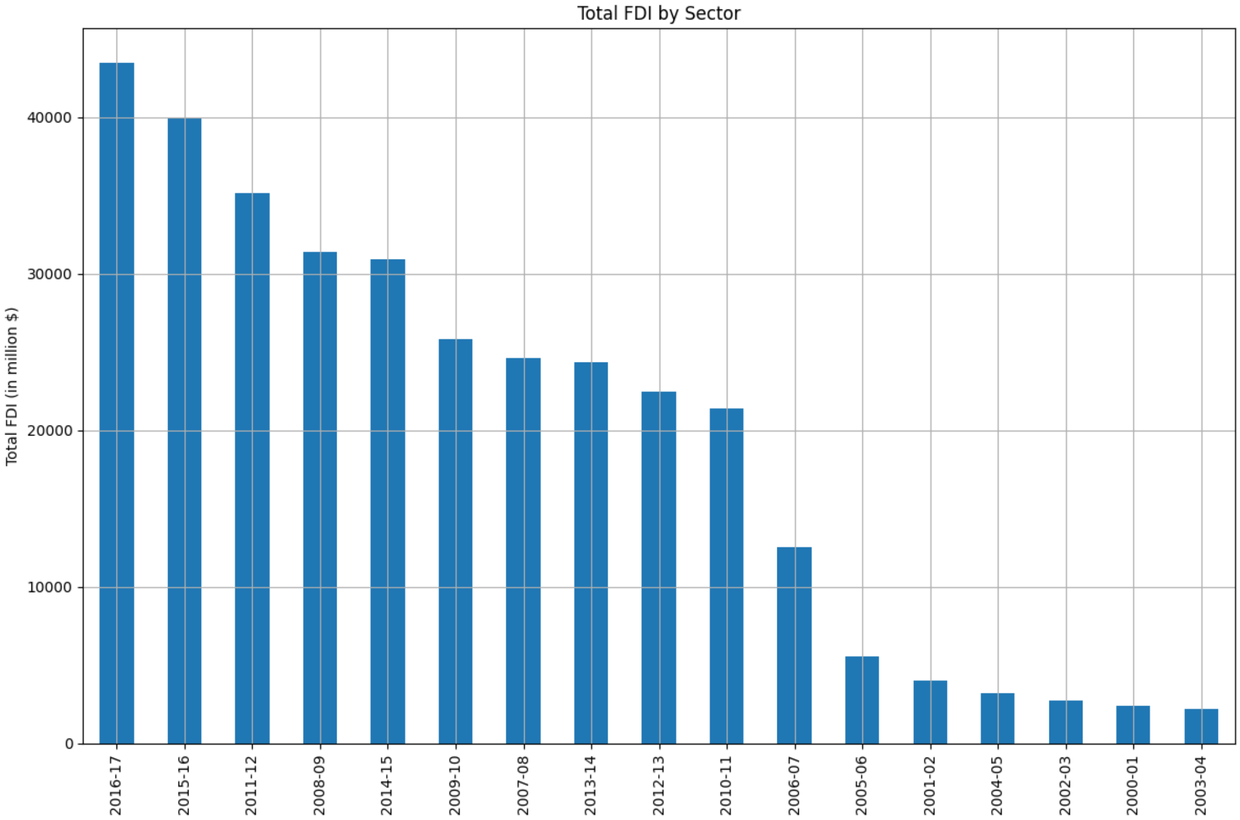
```
..      ...      ...      ...      ...      ...      ...      ...
...
58   111.14    87.23   128.12    20.24    69.39   387.72   138.85
233.70
59   177.69   873.23   191.60    86.49   118.33   617.98   476.51
1260.70
60   195.33   235.76   419.96   119.09   121.97   139.93   260.72
656.10
61   228.39   419.39   314.24   368.32   527.90  1359.97  2613.33
1382.25
62   832.07   221.37   218.76   235.48   121.83   164.76   304.87
528.42

    2008-09  2009-10  2010-11  2011-12  2012-13  2013-14  2014-15
2015-16  \
0      0.00     0.00     0.00     0.00     6.71     0.00     0.00
0.00
1      0.09    13.73    26.27    31.70    22.31    11.30   168.72
262.24
2    172.70   324.56   675.07   386.28   283.89   485.37   870.25
4510.71
3      0.00     0.00     0.00     3.66     0.41     0.82     0.08
0.10
4      0.00     0.25     0.10     0.55     0.15     0.54     1.36
0.00
..      ...      ...      ...      ...      ...      ...      ...
...
58   651.22   365.94  2354.40  4040.71   292.16   786.76   762.76
1469.95
59  2548.63  2539.26  1664.50  1997.24   303.87  1306.95  2894.94
1324.40
60  1150.03  1236.29  1299.41   922.99  1537.28  1517.28  2725.64
2526.82
61  1543.34   871.86   779.81   796.35   485.96  1126.27  2296.04
5904.36
62  1549.70  1147.56  1475.97   813.38   229.49   468.74   765.88
668.77

    2016-17                                             Sector
0      0.00  MATHEMATICAL,SURVEYING AND DRAWING INSTRUMENTS
1    450.94                                     RETAIL TRADING
2   1860.73        CONSTRUCTION (INFRASTRUCTURE) ACTIVITIES
3      0.00                                 DEFENCE INDUSTRIES
4      0.00                                               COIR
..      ...                                                ...
58  1392.80               CHEMICALS (OTHER THAN FERTILIZERS)
59  5563.69                                 TELECOMMUNICATIONS
60  1609.32                                AUTOMOBILE INDUSTRY
61  3651.71                      COMPUTER SOFTWARE & HARDWARE
```

```
62   296.40                        MISCELLANEOUS INDUSTRIES

[63 rows x 18 columns]

df.set_index('Sector', inplace=True)

data_transposed = df.transpose()
df.head()

                          2000-01  2001-02  2002-03  2003-04  2004-05
\
Sector

METALLURGICAL INDUSTRIES    22.69    14.14    36.61     8.11   200.38

MINING                       1.32     6.52    10.06    23.48     9.92

POWER                       89.42   757.44    59.11    27.09    43.37

NON-CONVENTIONAL ENERGY      0.00     0.00     1.70     4.14     1.27

COAL PRODUCTION              0.00     0.00     0.00     0.04     0.00


                          2005-06  2006-07  2007-08  2008-09  2009-10
\
Sector

METALLURGICAL INDUSTRIES   149.13   169.94  1175.75   959.94   419.88

MINING                       7.40     6.62   444.36    34.16   174.40

POWER                       72.69   157.15   988.68   907.66  1271.79

NON-CONVENTIONAL ENERGY      1.35     2.44    58.82   125.88   622.52

COAL PRODUCTION              9.14     1.30    14.08     0.22     0.00


                          2010-11  2011-12  2012-13  2013-14  2014-15
\
Sector

METALLURGICAL INDUSTRIES  1098.14  1786.14  1466.23   567.63   359.34

MINING                      79.51   142.65    57.89    12.73   684.39

POWER                     1271.77  1652.38   535.68  1066.08   707.04

NON-CONVENTIONAL ENERGY    214.40   452.17  1106.52   414.25   615.95

COAL PRODUCTION              0.00     0.00     0.00     2.96     0.00
```

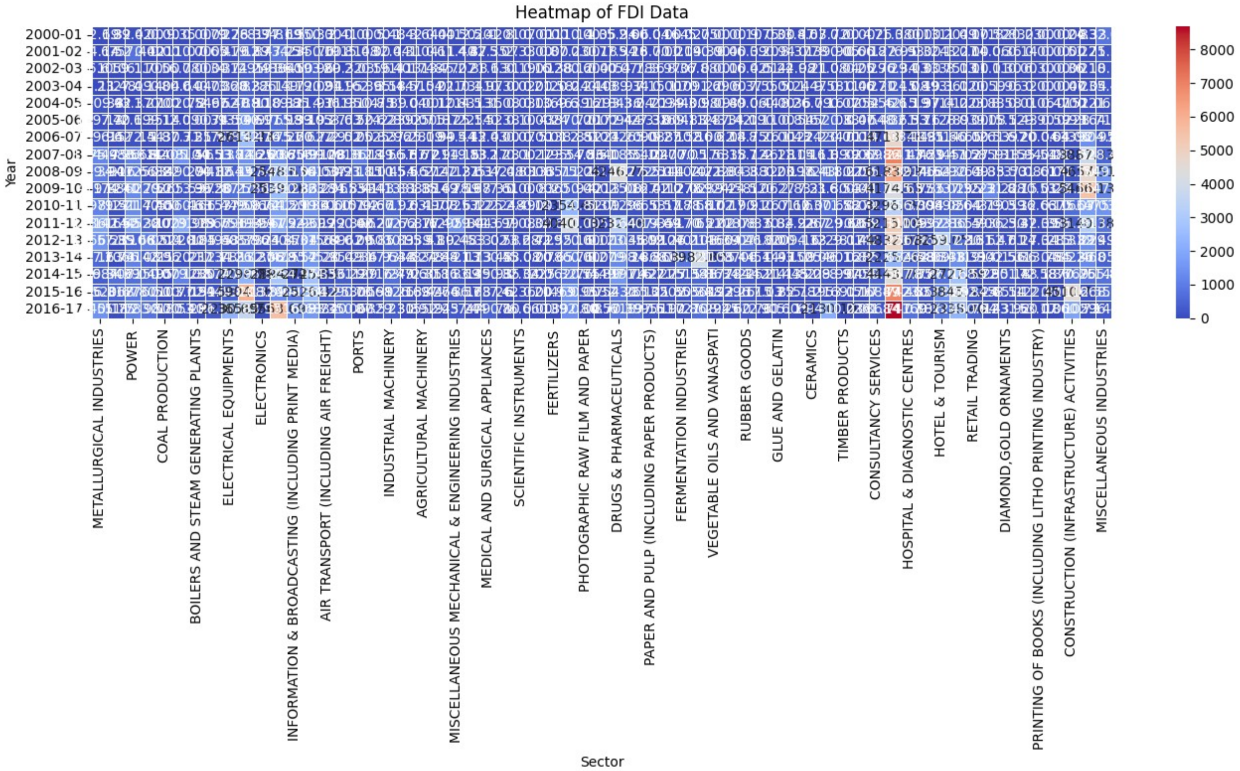
```
                            2015-16  2016-17
Sector
METALLURGICAL INDUSTRIES     456.31  1440.18
MINING                       520.67    55.75
POWER                        868.80  1112.98
NON-CONVENTIONAL ENERGY      776.51   783.57
COAL PRODUCTION                0.00     0.00

year_totals = data_transposed.sum(axis=1)

# Plotting Year-wise Investment
plt.figure(figsize=(14, 8))
year_totals.plot(marker='o', color='orange')
plt.title('Total FDI Over Years (2000-01 to 2016-17)')
plt.xlabel('Year')
plt.ylabel('Total FDI (in million $)')
plt.xticks(rotation=45)
plt.grid()
plt.tight_layout()
plt.show()
```



```
plt.figure(figsize=(12, 8))
df.sum().sort_values(ascending=False).plot(kind='bar')
plt.title('Total FDI by Sector')
plt.ylabel('Total FDI (in million $)')
plt.xticks(rotation=90)
plt.grid()
plt.tight_layout()
plt.show()
```



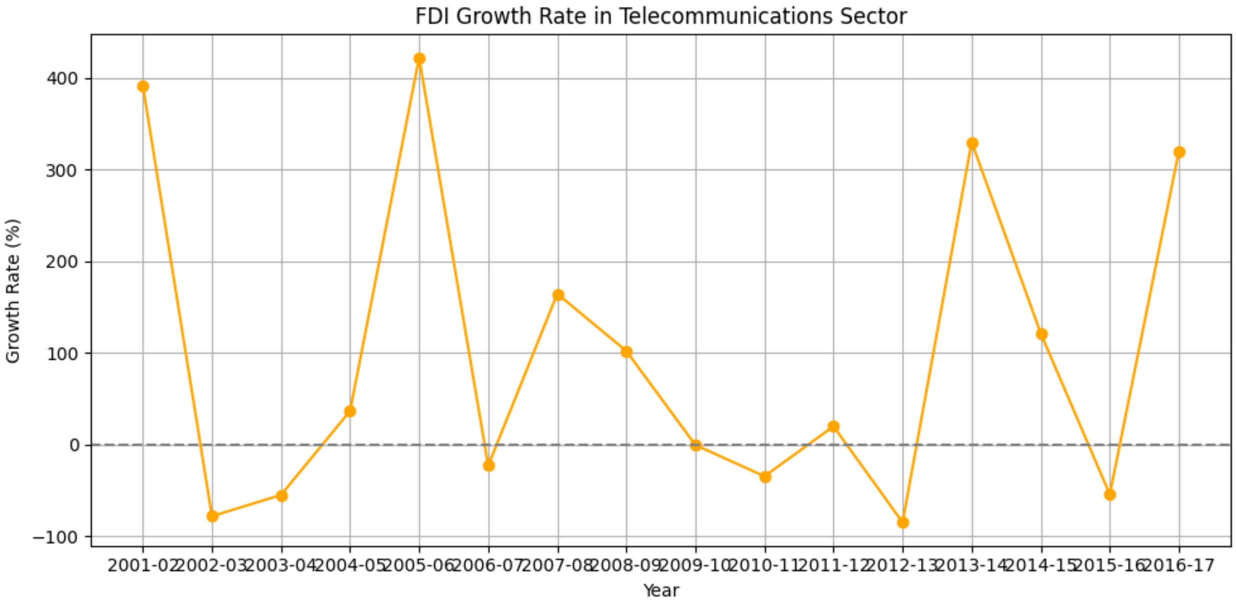
```
plt.figure(figsize=(14, 8))
sns.heatmap(data_transposed, annot=True, fmt=".2f", cmap='coolwarm',
linewidths=.5)
plt.title('Heatmap of FDI Data')
plt.xlabel('Sector')
plt.ylabel('Year')
plt.tight_layout()
plt.show()
```



```
telecom_fdi = df.loc['TELECOMMUNICATIONS']
telecom_growth_rate = telecom_fdi.pct_change() * 100
df.head()

                          2000-01  2001-02  2002-03  2003-04  2004-05
\
Sector

METALLURGICAL INDUSTRIES    22.69    14.14    36.61     8.11   200.38

MINING                       1.32     6.52    10.06    23.48     9.92

POWER                       89.42   757.44    59.11    27.09    43.37

NON-CONVENTIONAL ENERGY      0.00     0.00     1.70     4.14     1.27

COAL PRODUCTION              0.00     0.00     0.00     0.04     0.00


                          2005-06  2006-07  2007-08  2008-09  2009-10
\
Sector

METALLURGICAL INDUSTRIES   149.13   169.94  1175.75   959.94   419.88

MINING                       7.40     6.62   444.36    34.16   174.40
```

```
POWER                       72.69   157.15   988.68   907.66  1271.79

NON-CONVENTIONAL ENERGY      1.35     2.44    58.82   125.88   622.52

COAL PRODUCTION              9.14     1.30    14.08     0.22     0.00


                          2010-11  2011-12  2012-13  2013-14  2014-15
\
Sector

METALLURGICAL INDUSTRIES  1098.14  1786.14  1466.23   567.63   359.34

MINING                      79.51   142.65    57.89    12.73   684.39

POWER                     1271.77  1652.38   535.68  1066.08   707.04

NON-CONVENTIONAL ENERGY    214.40   452.17  1106.52   414.25   615.95

COAL PRODUCTION              0.00     0.00     0.00     2.96     0.00


                          2015-16  2016-17
Sector
METALLURGICAL INDUSTRIES   456.31  1440.18
MINING                     520.67    55.75
POWER                      868.80  1112.98
NON-CONVENTIONAL ENERGY    776.51   783.57
COAL PRODUCTION              0.00     0.00
```

```python
plt.figure(figsize=(10, 5))
plt.plot(telecom_growth_rate.index, telecom_growth_rate, marker='o',
color='orange')
plt.title('FDI Growth Rate in Telecommunications Sector')
plt.xlabel('Year')
plt.ylabel('Growth Rate (%)')
plt.axhline(0, color='grey', linestyle='--')
plt.grid()
plt.tight_layout()
plt.show()
```


FDI Growth Rate in Telecommunications Sector
Growth Rate (%)
400
300
200
100
0
−100
2001-02
2002-03
2003-04
2004-05
2005-06
2006-07
2007-08
2008-09
2009-10
2010-11
2011-12
2012-13
2013-14
2014-15
2015-16
2016-17
Year