SCIPY & MATPLOTLIB - Assignment

By Prakash Ghosh

Scipy:

- We have the min and max temperatures in a city In India for each months of the year.
- We would like to find a function to describe this and show it graphically, the dataset given below.
- Task:
- 1. fitting it to the periodic function
- 2. plot the fit
- Data
- Max = 39, 41, 43, 47, 49, 51, 45, 38, 37, 29, 27, 25
- Min = 21, 23, 27, 28, 32, 35, 31, 28, 21, 19, 17, 18

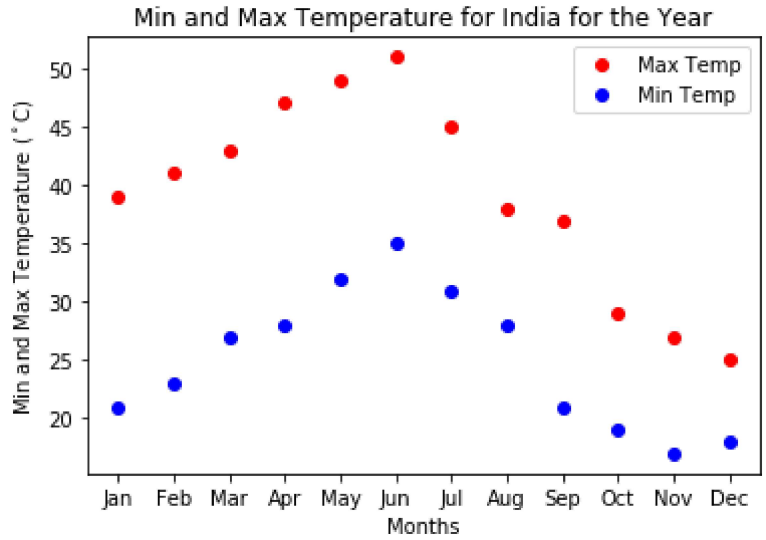
In [1]:
```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
from scipy import linalg
from scipy import optimize
```

In [2]:
```
# Array to store Min and Max Temperature for each months of the year
temp_max=np.array([39, 41, 43, 47, 49, 51, 45, 38, 37, 29, 27, 25])
temp_min=np.array([21, 23, 27, 28, 32, 35, 31, 28, 21, 19, 17, 18])
```

In [3]:
```
#Settings for Month Name
lst_mm =list(range(1,13))
lst_mon=['Jan','Feb','Mar','Apr','May','Jun','Jul','Aug','Sep','Oct','Nov','Dec']
```

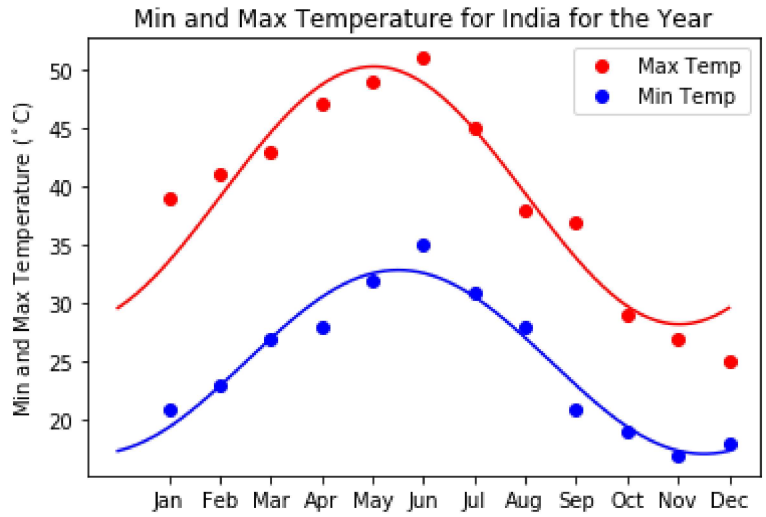
1. Fitting it to the periodic function and Printing the Plot

In [7]:
```
# Fitting it to the periodic function
def yearly_temps(times, avg, ampl, time_offset):
    return (avg + ampl * np.cos((times + time_offset) * 2 * np.pi / times.max()))

res_max, cov_max = optimize.curve_fit(yearly_temps, lst_mm, temp_max, [50,40,30])
res_min, cov_min = optimize.curve_fit(yearly_temps, lst_mm, temp_min, [20,30,40])

# Printing the Plot
plt.plot(lst_mm,temp_max,'ro',label='Max Temp')
plt.plot(lst_mm,temp_min,'bo',label='Min Temp')
plt.xticks(lst_mm,lst_mon)
plt.xlabel('Months')
plt.ylabel('Min and Max Temperature ($^\circ$C)')
plt.title('\nMin and Max Temperature for India for the Year')
plt.legend()
plt.show()
```



2. Plot the fit

In [8]:
```
days = np.linspace(0, 12, num=365)
plt.figure()
plt.plot(lst_mm, temp_max, 'ro',label='Max Temp')
plt.plot(days, yearly_temps(days, *res_max), 'r-')
plt.plot(lst_mm, temp_min, 'bo', label='Min Temp')
plt.plot(days, yearly_temps(days, *res_min), 'b-')
plt.xticks(lst_mm,lst_mon)
plt.ylabel('Min and Max Temperature ($^\circ$C)')
plt.title('\nMin and Max Temperature for India for the Year')
plt.legend()
plt.show()
```



Matplotlib:

- This assignment is for visualization using matplotlib:
- data to use: url=https://raw.githubusercontent.com/Geoyi/Cleaning-Titanic-Data/master/titanic_original.csv (https://raw.githubusercontent.com/Geoyi/Cleaning-Titanic-Data/master/titanic_original.csv)
- titanic = pd.read_csv(url)
- Charts to plot:
- 1. Create a pie chart presenting the male/female proportion

- 2. Create a scatterplot with the Fare paid and the Age, differ the plot color by gender

In [9]:
```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
from scipy import linalg
from scipy import optimize
```

In [10]:
```
#Read Data
url='https://raw.githubusercontent.com/Geoyi/Cleaning-Titanic-Data/master/titanic_original.csv'
titanic_df = pd.read_csv(url)
titanic_df.head(10)
```

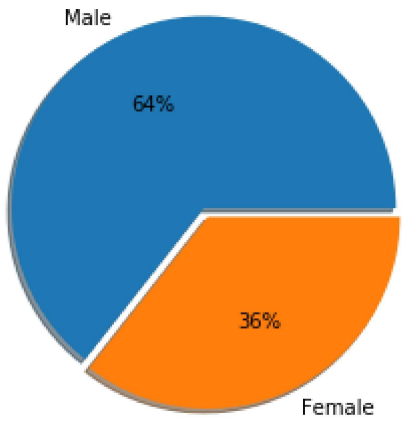
Out[10]:

	pclass	survived	name	sex	age	sibsp	parch	ticket	fare	cabin	embarked	boat	body	home.dest
0	1.0	1.0	Allen, Miss. Elisabeth Walton	female	29.0000	0.0	0.0	24160	211.3375	B5	S	2	NaN	St Louis, MO
1	1.0	1.0	Allison, Master. Hudson Trevor	male	0.9167	1.0	2.0	113781	151.5500	C22 C26	S	11	NaN	Montreal, PQ / Chesterville, ON
2	1.0	0.0	Allison, Miss. Helen Loraine	female	2.0000	1.0	2.0	113781	151.5500	C22 C26	S	NaN	NaN	Montreal, PQ / Chesterville, ON
3	1.0	0.0	Allison, Mr. Hudson Joshua Creighton	male	30.0000	1.0	2.0	113781	151.5500	C22 C26	S	NaN	135.0	Montreal, PQ / Chesterville, ON
4	1.0	0.0	Allison, Mrs. Hudson J C (Bessie Waldo Daniels)	female	25.0000	1.0	2.0	113781	151.5500	C22 C26	S	NaN	NaN	Montreal, PQ / Chesterville, ON
5	1.0	1.0	Anderson, Mr. Harry	male	48.0000	0.0	0.0	19952	26.5500	E12	S	3	NaN	New York, NY
6	1.0	1.0	Andrews, Miss. Kornelia Theodosia	female	63.0000	1.0	0.0	13502	77.9583	D7	S	10	NaN	Hudson, NY
7	1.0	0.0	Andrews, Mr. Thomas Jr	male	39.0000	0.0	0.0	112050	0.0000	A36	S	NaN	NaN	Belfast, NI
8	1.0	1.0	Appleton, Mrs. Edward Dale (Charlotte Lamson)	female	53.0000	2.0	0.0	11769	51.4792	C101	S	D	NaN	Bayside, Queens, NY
9	1.0	0.0	Artagaveytia, Mr. Ramon	male	71.0000	0.0	0.0	PC 17609	49.5042	NaN	C	NaN	22.0	Montevideo, Uruguay

1. Create a pie chart presenting the male/female proportion

In [22]:
```
#Derive male and Female Count
MaleCount=titanic_df.loc[(titanic_df.sex=='male')].sex.count()
FeMaleCount=titanic_df.loc[(titanic_df.sex=='female')].sex.count()

print('Male Count:\t',MaleCount)
print('Female Count:\t',FeMaleCount)

# Pie chart, where the slices will be ordered and plotted counter-clockwise:
labels = ['Male', 'Female']
sizes = [MaleCount, FeMaleCount]
explode = (0.05,0)  # only "explode" the 2nd slice (i.e. 'Hogs')

#a pie chart presenting the male/female proportion
fig1, ax1 = plt.subplots()
ax1.pie(sizes,  labels=labels,explode=explode, autopct='%1.0f%%',shadow=True, startangle=0)
ax1.axis('equal')  # Equal for pie is circle.
plt.show()
```

```
Male Count:      843
Female Count:    466
```



Problem 2. Create a scatterplot with the Fare paid and the Age, differ the plot color by gender

In [11]:
```
# Delete Null Rows for sex
titanic_df = titanic_df.dropna(subset=['sex'])

Age=titanic_df.age
Fare=titanic_df.fare
Sex=pd.factorize(titanic_df['sex'])[0]
plt.scatter(Age,Fare,c=Sex)

Sex=titanic_df['sex'].map({'male' : 'blue', 'female' : 'red'})

plt.title('Age wise Fare paid')
plt.xlabel('Age')
plt.ylabel('Fare in($)')
plt.scatter(Age,Fare,c=Sex)
plt.legend('MF')
plt.show()
```