# datascience_assignment_8.1

July 14, 2018

## 0.1 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

## 0.2 Steps

- Import libraries numpy, scipy, matplotlib
- Define months as a sequence of numbers from 0 to 11 representing months of year i.e. 0 represents January, 11 represent December
- Define array for the max temperature data as max_temp and min temperature as min_temp
- Define a cosine periodic function yearly_temps for curve fit
- Using curve_fit method of optimize fit max_temp and min_temp
- Plot maximum temperature with red color with actual temperature as scatter plot and the line curve for representing curve fit for maximum temperature
- Plot minimum temperature with blue color with actual temperature as scatter plot and the line curve for representing curve fit for minimum temperature

```python
In [9]: import numpy as np
        from scipy import optimize
        import matplotlib.pyplot as plt
        %matplotlib inline
```

```python
In [11]: # Define months as a sequence of numbers from 0 to 11 representing months of year i.e
         # January, 11 represent December
         months = np.arange(12)

         # Define array for the max temperature data as max_temp and min temperature as min_te
         max_temp= np.array([39, 41, 43, 47, 49, 51, 45, 38, 37, 29, 27, 25])
         min_temp = np.array([21, 23, 27, 28, 32, 35, 31, 28, 21, 19, 17, 18])

         # Define a cosine periodic function yearly_temps for curve fit
         # yearly_temps take four arguments times, avg, ampl, time_offset
         def yearly_temps(times, avg, ampl, time_offset):
             return (avg + ampl * np.cos((times + time_offset) * 2 * np.pi / times.max()))
```

```python
# Using curve_fit method of optimize fit max_temp and min_temp
res_max, cov_max = optimize.curve_fit(yearly_temps, months, max_temp, [20, 10, 10])
res_min, cov_min = optimize.curve_fit(yearly_temps, months, min_temp, [20, 10, 10])

# Plot maximum temperature with red color with actual temperature as scatter plot and
# the line curve for representing curve fit for maximum temperature
plt.plot(months, max_temp, 'ro')
plt.plot(months, yearly_temps(months, *res_max), 'r-')

#Plot minimum temperature with blue color with actual temperature as scatter plot and
# the line curve for representing curve fit for minimum temperature
plt.plot(months, min_temp, 'bo')
plt.plot(months, yearly_temps(months, *res_min), 'b-')

# Plot the graph
plt.xlabel('Month')
plt.ylabel('Degree(o C)')
plt.show()
```