

Tutorial 7 Assignment (Due 03/08/17 by 11:59 PM)*Dayu Wang (45)***1. TensorFlow Programming****1.1. Dataset Description**

We are doing an acid-base titration experiment. Different acids have different pH value, which can be describe as

$$\text{pH} = -\lg[\text{H}^+]$$

where $[\text{H}^+]$ is the concentration (mol L^{-1}) of H^+ in the solution. For example, if an acid solution's pH value is 3, then the concentration of H^+ is $10^{-3} \text{ mol L}^{-1}$, or 0.001 mol L^{-1} .

Suppose we have 25 mL of each acid solution for titration, and we have NaOH solution ready to neutralize the acids. The concentration of OH^- in the NaOH solution is 0.04 mol L^{-1} . Our data records the amount (in mL) used of NaOH to completely titrate the acids. For example,

$X = [6, 3, 11, 9, \dots]$,
 $Y = [0.00061250, 0.61250000, 0.00000001, 0.00000063, \dots]$.

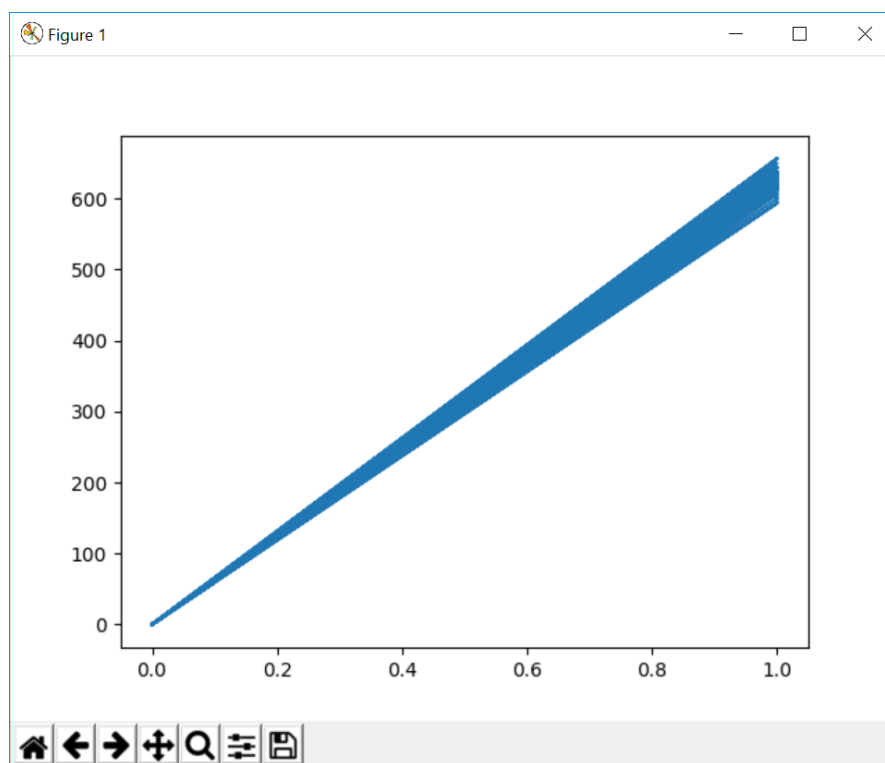
Our work is to verify the linear relation in acid-base titration.

1.2. Critical Code for Input/Output

```
# Read raw data from file.
trX = []
trY = []
xy = 0
file = open('data/rawData.txt', 'r')
for line in file.readlines():
    for i in line.split():
        if xy == 0:
            trX.append(float(pow(10, -int(i))))
            xy = 1
        else:
            trY.append(float(i))
            xy = 0
```

1.3. Screenshots of Results

```
Run LinearRegression
Optimization Finished!
Training cost = 59.0975 W = 627.021 b = -0.293598
Testing... (Mean square loss Comparison)
Testing cost = 385.902
Absolute mean square loss difference: 326.805
```



The results proves a very nice proportionality of acid-base titration.