568 Homework 5

bf289

March 2019

1 Question 1

1.1 Error = 0.1

```
Please input learning rate : 0.5
Please input expected error : 0.1
the initial input weight----------------
[[-0.3522721    0.10008197]
 [ 0.74394497 -0.76862395]]
the initial hide weight----------------
[[ 0.52882983]
 [-0.99237369]]
first-batch error------------------------
0.1262910398322138
final input node weight------------------
[[-0.78232157 -2.83935984]
 [-0.08707697 -2.77166008]]
final hide node weight-------------------
[[ 1.08626642]
 [-2.74229953]]
final-batch error------------------------
0.09999754371747757
total number of batches------------------
3334
```

```
Please input learning rate : 1
Please input expected error : 0.1
the initial input weight----------------
[[-0.94551674  0.98980891]
 [-0.88657293  0.84830186]]
the initial hide weight----------------
[[-0.10525525]
 [-0.44746638]]
first-batch error------------------------
0.12939533026188782
final input node weight------------------
[[-3.07339616  1.63798251]
 [-3.07234409  1.57954451]]
final hide node weight-------------------
[[-2.87831529]
 [ 0.59341367]]
final-batch error------------------------
0.09999120925773217
total number of batches------------------
2260
```

rate	0.5	1	1.5	2	3	5
error	0.1	0.1	0.1	0.1	0.1	0.1
batch	3334	2260	3597	3383	2305	12689

From the table, we could find that when learning rate is 1 or 3, the batch is smallest, which seems the best one.

```
Please input learning rate : 1.5
Please input expected error : 0.1
the initial input weight----------------
[[-0.3407295   0.97157531]
 [-0.11688082  0.703173  ]]
the initial hide weight----------------
[[-0.17993303]
 [-0.13591805]]
first-batch error------------------------
0.12614506628965422
final input node weight------------------
[[0.53437791 3.00137454]
 [0.57701257 2.99755441]]
final hide node weight------------------
[[-2.95796536]
 [ 2.3119961 ]]
final-batch error------------------------
0.09999511218323077
total number of batches------------------
3597
```

```
Please input learning rate : 2
Please input expected error : 0.1
the initial input weight----------------
[[ 0.72859676 -0.29563164]
 [-0.74444775 -0.62080631]]
the initial hide weight----------------
[[0.8595722 ]
 [0.34007002]]
first-batch error------------------------
0.13494242124213238
final input node weight------------------
[[ 0.38826011 -2.56312233]
 [-1.72215188 -2.81563727]]
final hide node weight------------------
[[ 1.14506868]
 [-2.65913434]]
final-batch error------------------------
0.0999850458947579
total number of batches------------------
3383
```

```
Please input learning rate : 3
Please input expected error : 0.1
the initial input weight----------------
[[-0.52804706 -0.75255078]
 [-0.86575586 -0.84861803]]
the initial hide weight----------------
[[0.16188309]
 [0.82731489]]
first-batch error------------------------
0.12978009897921894
final input node weight------------------
[[-2.76383065 -0.40413503]
 [-2.82111219 -0.61439645]]
final hide node weight------------------
[[-2.71954052]
 [ 1.13912777]]
final-batch error------------------------
0.09998665895107153
total number of batches------------------
2305
```

```
Please input learning rate : 5
Please input expected error : 0.1
the initial input weight----------------
[[ 0.38739024  0.57316146]
 [ 0.64207263 -0.81392616]]
the initial hide weight----------------
[[0.46850163]
 [0.94179247]]
first-batch error------------------------
0.14051537939498615
final input node weight------------------
[[ 1.85505273  3.20938625]
 [-2.29434458 -6.35482138]]
final hide node weight------------------
[[-3.29646187]
 [ 3.63580872]]
final-batch error------------------------
0.09999870257551263
total number of batches------------------
12689
```

1.2 Error = 0.02

```
Please input learning rate : 0.5
Please input expected error : 0.02
the initial input weight----------------
[[ 0.43372652  0.15471812]
 [ 0.9712824  -0.78852366]]
the initial hide weight----------------
[[-0.32261336]
 [-0.80827904]]
first-batch error------------------------
0.033642089304592455
final input node weight------------------
[[3.95441328 0.65100456]
 [3.9520858  0.65036234]]
final hide node weight------------------
[[ 3.95076915]
 [-5.13530474]]
final-batch error------------------------
0.019999519330994583
total number of batches------------------
26723
```

```
Please input learning rate : 1
Please input expected error : 0.02
the initial input weight----------------
[[-0.33751797 -0.67116733]
 [-0.67583248 -0.61617074]]
the initial hide weight----------------
[[0.24629209]
 [0.05514685]]
first-batch error------------------------
0.03139060597632326
final input node weight------------------
[[-0.59814228 -3.94498001]
 [-1.18389741 -4.08777271]]
final hide node weight------------------
[[ 2.30125714]
 [-4.93643665]]
final-batch error------------------------
0.019999825027727312
total number of batches------------------
20619
```

rate	0.2	0.5	0.7	1	1.5	2
error	0.02	0.02	0.02	0.02	0.02	0.02
batch	100000	26723	18043	20619	37172	34896

From the table above, we could find the best learning rate is 0.7 when the error is 0.02.

```
Please input learning rate : 0.2
Please input expected error : 0.02
the initial input weight----------------
[[ 0.850611    0.90269339]
 [-0.725168   -0.48838352]]
the initial hide weight----------------
[[-0.45569602]
 [-0.02107252]]
first-batch error------------------------
0.0317230870729731
final input node weight-------------------
[[ 8.00536672  4.3307707 ]
 [-5.54027163 -5.16785886]]
final hide node weight-------------------
[[-4.70260801]
 [ 5.46762495]]
final-batch error------------------------
0.022347493329179006
total number of batches-------------------
100000
```
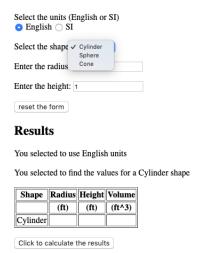
```
Please input learning rate : 0.7
Please input expected error : 0.02
the initial input weight----------------
[[-0.73426823 -0.13804206]
 [ 0.70987206 -0.81191454]]
the initial hide weight----------------
[[ 0.05839658]
 [-0.82176279]]
first-batch error------------------------
0.03191238181273353
final input node weight-------------------
[[-2.20686605 -4.18992668]
 [ 0.08458074 -3.75761884]]
final hide node weight-------------------
[[ 2.14850243]
 [-4.84494072]]
final-batch error------------------------
0.01999983542957153
total number of batches-------------------
18043
```

```
Please input learning rate : 1.5
Please input expected error : 0.02
the initial input weight----------------
[[0.39723542 0.8974557 ]
 [0.50703631 0.76289718]]
the initial hide weight----------------
[[-0.33299939]
 [-0.91403106]]
first-batch error------------------------
0.03653724028468148
final input node weight-------------------
[[3.94929606 0.65402402]
 [3.90526739 0.64736099]]
final hide node weight-------------------
[[ 3.96006779]
 [-5.14656217]]
final-batch error------------------------
0.01999966392654895
total number of batches-------------------
37172
```

```
Please input learning rate : 2
Please input expected error : 0.02
the initial input weight----------------
[[ 0.93299547  0.19279192]
 [ 0.82468609 -0.72518455]]
the initial hide weight----------------
[[-0.28899206]
 [ 0.37710265]]
first-batch error------------------------
0.031411024728004944
final input node weight-------------------
[[3.99978834 0.65924049]
 [3.88646996 0.64242078]]
final hide node weight-------------------
[[ 3.95490579]
 [-5.14003722]]
final-batch error------------------------
0.019999854414057997
total number of batches-------------------
34896
```

2   Question 2

This web site will find the volulme for a Cylinder, Sphere or Cone

Select the units (English or SI)
◉ English ○ SI

Select the shape

| ✓ Cylinder |
| Sphere |
| Cone |

Enter the radius

Enter the height: [1]

[reset the form]

Results

You selected to use English units

You selected to find the values for a Cylinder shape

Shape	Radius	Height	Volume
	(ft)	(ft)	(ft^3)
Cylinder			

[Click to calculate the results]

This web site will find the volulme for a Cylinder, Sphere or Cone

Select the units (English or SI)
◉ English ○ SI

Select the shape: [Sphere ◇]

Enter the radius: [5]

Enter the height: [2]

[reset the form]

Results

You selected to use English units

You selected to find the values for a Sphere shape

Shape	Radius	Height	Volume
	(ft)	(ft)	(ft^3)
Sphere	5	2	392.6991

[Click to calculate the results]