

Deep Learning Lab Assignment-1

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Introduction:

This lab assignment helps in learning about the working of tensor flow with logistic regression using python. Visualization charts and graphs are created and displayed in tensor board.

Objective:

The main objective for this lab assignment is to know the working of

- Logistic regression using tensor flow
- Creating visualization graphs using tensor board
- To change the hyper parameters and get the results

Configuration:

- PyCharm IDE
- Python 3.6.4
- TensorFlow

Approaches/Methods:

Applying the sigmoid function to the given equation in order to get the result in Boolean function,

- $Z = \text{Sigmoid}(X*W+b)$

To calculate the loss we have used the built in entropy function

'tf.nn.sigmoid_cross_entropy_with_logits()',

- `loss = tf.reduce_mean(tf.nn.sigmoid_cross_entropy_with_logits(logits=Z, labels=y))`

Workflow:

The workflow for the entire model is as follows,

- Importing load_breast_cancer from sklearn datasets
- Assigning data and target datasets to the define variable
- Reshaping the array of values to tensor flow values
- Minimizing error using cross entropy
- Gradient descent
- Initializing the session
- Creating the graphs usinf FileWriter method
- Displaying cost reduction for each iteration

- Calling the function
- Calculating accuracy score for the regression model

Dataset:

The dataset consists of 569 rows and 30 columns consist of 2 classes.

Parameters:

The parameters to be considered while constructing the model are,

- No over fitting of the model
- There should be no empty values in the set
- Must use gradient descent optimizer for accurate results

Evaluation and Discussion:

```

1 import tensorflow as tf
2 import numpy as np
3 #Importing load_breast_cancer from sklearn datasets
4 from sklearn.datasets import load_breast_cancer
5 from Sample import pred
6
7 dataset = load_breast_cancer()
8
9 #Assigning data and target datasets to the define variables
10 data = dataset.data
11 labels = dataset.target
12
13 labels = np.array(labels).reshape(569, 1)
14
15 #Reshaping the array of values to tensor flow values
16 X = tf.placeholder(tf.float32, shape=[None, 30])
17 y = tf.placeholder(tf.float32, shape=[None, 1])
18
19 tf.set_random_seed(1)
20
21 W = tf.Variable(tf.zeros([30, 1]))
22 b = 0
23
24 Z = tf.nn.sigmoid(tf.add(tf.matmul(X, W), b))
25
26 #Minimizing error using cross entropy
27 loss = tf.reduce_mean(tf.nn.sigmoid_cross_entropy_with_logits(logits=Z, labels=y))
28 #Gradient descent
29 opt = tf.train.GradientDescentOptimizer(learning_rate=0.0001).minimize(loss)
30

```

Run LA4.1

```

/Users/Saki/venv/LA4_DL/bin/python /Users/Saki/PycharmProjects/LA4_DL/LA4.1.py
2018-04-06 23:11:21.384283: I tensorflow/core/platform/cpu_feature_guard.cc:140] Your CPU supports instructions that this TensorFlow binary was not compiled to use: AVX2
cost: 0.66036826
cost: 0.6097292
cost: 0.60912275
cost: 0.56753373
cost: 0.544262
cost: 0.53703195
cost: 0.5330947
cost: 0.5299948
cost: 0.5274859
cost: 0.52541125
Accuracy Score is: 83.47072926833769 %

```

Python Console | Terminal | Run | Debug | TODO | Event Log

Packages installed successfully: Installed packages: 'scipy' (today 9:04 PM)

29:77 LF UTF-8

LA4_DL LA4_1.py

Project LA4_DL ~/PycharmProjects/LA4

- graphs
 - logistic_reg
 - events.out.tfevents.15
 - events.out.tfevents.15
- LA4.py
- LA4_1.py
- Sample.py
- skle.py
- External Libraries

```
1 import tensorflow as tf
2 import numpy as np
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22 b = 0
23
24 Z = tf.nn.sigmoid(tf.add(tf.matmul(X, W), b))
25
26 #Minimizing error using cross entropy
27 loss = tf.reduce_mean(tf.nn.sigmoid_cross_entropy_with_logits(logits=Z, labels=y))
28 #Gradient descent
29 opt = tf.train.GradientDescentOptimizer(learning_rate=0.001).minimize(loss)
30
```

Run LA4_1

/Users/Saki/venv/LA4_DL/bin/python /Users/Saki/PycharmProjects/LA4_DL/LA4_1.py
2018-04-06 23:13:33.586123: I tensorflow/core/platform/cpu_feature_guard.cc:140] Your CPU supports instructions that this TensorFlow binary was not compiled to use: AVX2
cost: 0.66836826
cost: 0.69314694
cost: 0.69314694
cost: 0.69314694
cost: 0.69314694
cost: 0.69314694
cost: 0.69314694
cost: 0.69314694
cost: 0.69314694
Accuracy Score is: 37.25834821372352 %

Python Console Terminal Run Debug TODO

Packages installed successfully: Installed packages: 'scipy' (today 9:04 PM)

14:1 LF UTF-8

LA4_DL LA4_1.py

Project LA4_DL ~/PycharmProjects/LA4

- graphs
 - logistic_reg
 - events.out.tfevents.15
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19 tf.set_random_seed(1)
20
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22 b = 0
23
24 Z = tf.nn.sigmoid(tf.add(tf.matmul(X, W), b))
25
26 #Minimizing error using cross entropy
27 loss = tf.reduce_mean(tf.nn.sigmoid_cross_entropy_with_logits(logits=Z, labels=y))
28 #Gradient descent
29 opt = tf.train.GradientDescentOptimizer(learning_rate=0.0002).minimize(loss)
30
```

Run LA4_1

/Users/Saki/venv/LA4_DL/bin/python /Users/Saki/PycharmProjects/LA4_DL/LA4_1.py
2018-04-06 23:13:58.250151: I tensorflow/core/platform/cpu_feature_guard.cc:140] Your CPU supports instructions that this TensorFlow binary was not compiled to use: AVX2
cost: 0.66836826
cost: 0.6923814
cost: 0.6145849
cost: 0.5644291
cost: 0.6152582
cost: 0.55678387
cost: 0.53747797
cost: 0.5210949
cost: 0.5189763
cost: 0.5173805
Accuracy Score is: 86.02189874969599 %

Python Console Terminal Run Debug TODO

Packages installed successfully: Installed packages: 'scipy' (today 9:04 PM)

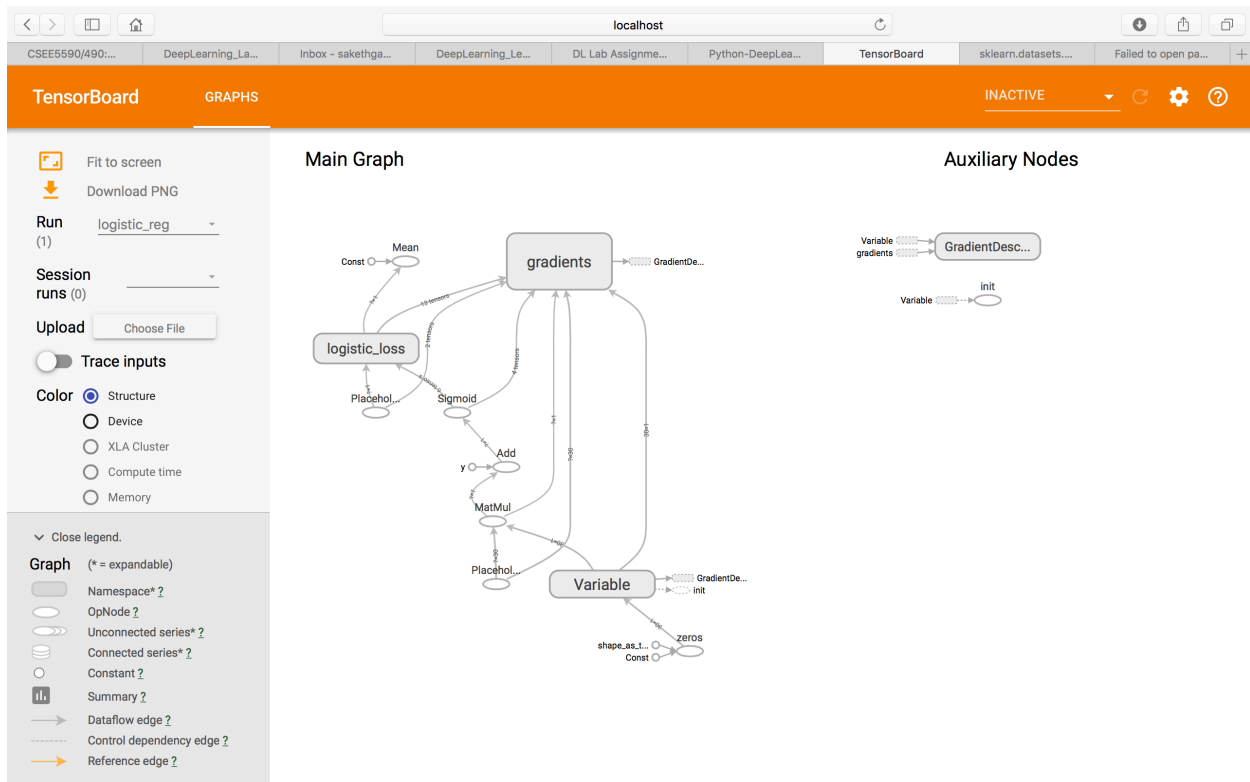
20:1 LF UTF-8

```
1 import tensorflow as tf
2
3 def pred(X, parameters):
4     parameters = tf.convert_to_tensor(parameters)
5
6     x = tf.placeholder(tf.float32, [None, 30])
7
8     z = tf.nn.sigmoid(tf.matmul(x, parameters))
9
10    sess = tf.Session()
11    prediction = sess.run(z, feed_dict={x: X})
12
13    return prediction
```

Run LA4_1

```
cost: 0.6097292
cost: 0.60912275
cost: 0.56753373
cost: 0.544262
cost: 0.53703195
cost: 0.5330947
cost: 0.5299948
cost: 0.5274859
cost: 0.52541125
Accuracy Score is: 83.47072926833769 %
Process finished with exit code 0
```

When we change the hyper parameter i.e. learning rate the accuracy rate varies for each iteration. If learning rate is increased the accuracy is decreased accordingly and if learning rate is decreased then the accuracy is increased.



References:

- http://scikit-learn.org/stable/modules/generated/sklearn.datasets.load_breast_cancer.html
- <https://www.tensorflow.org/tutorials/wide>