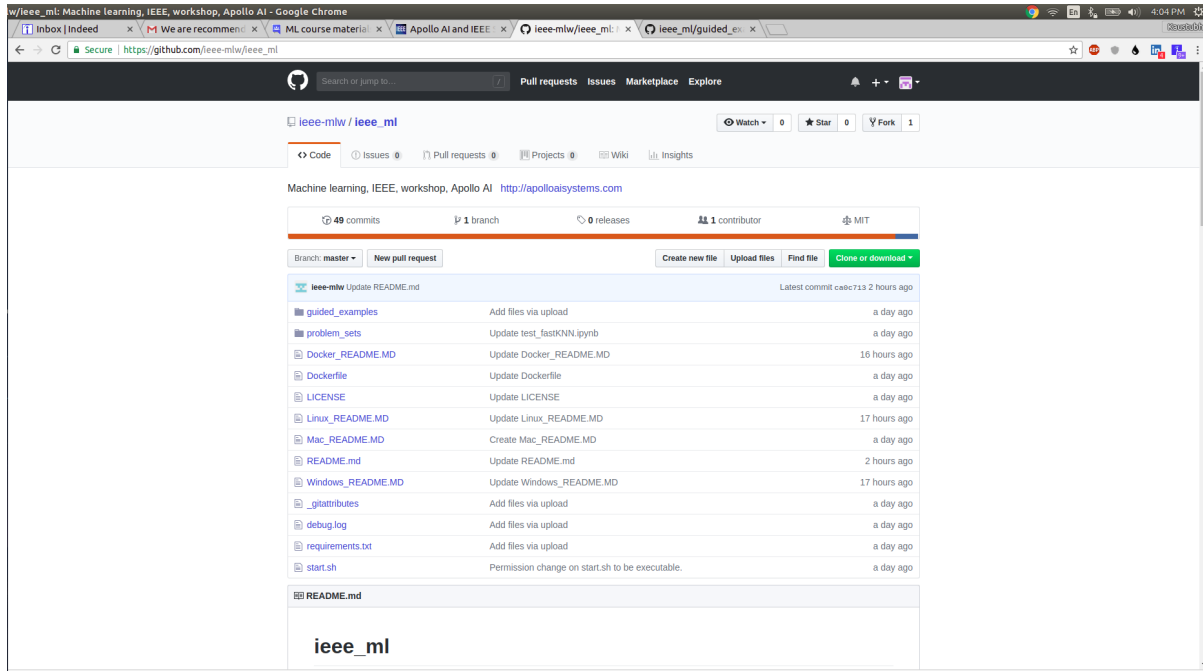
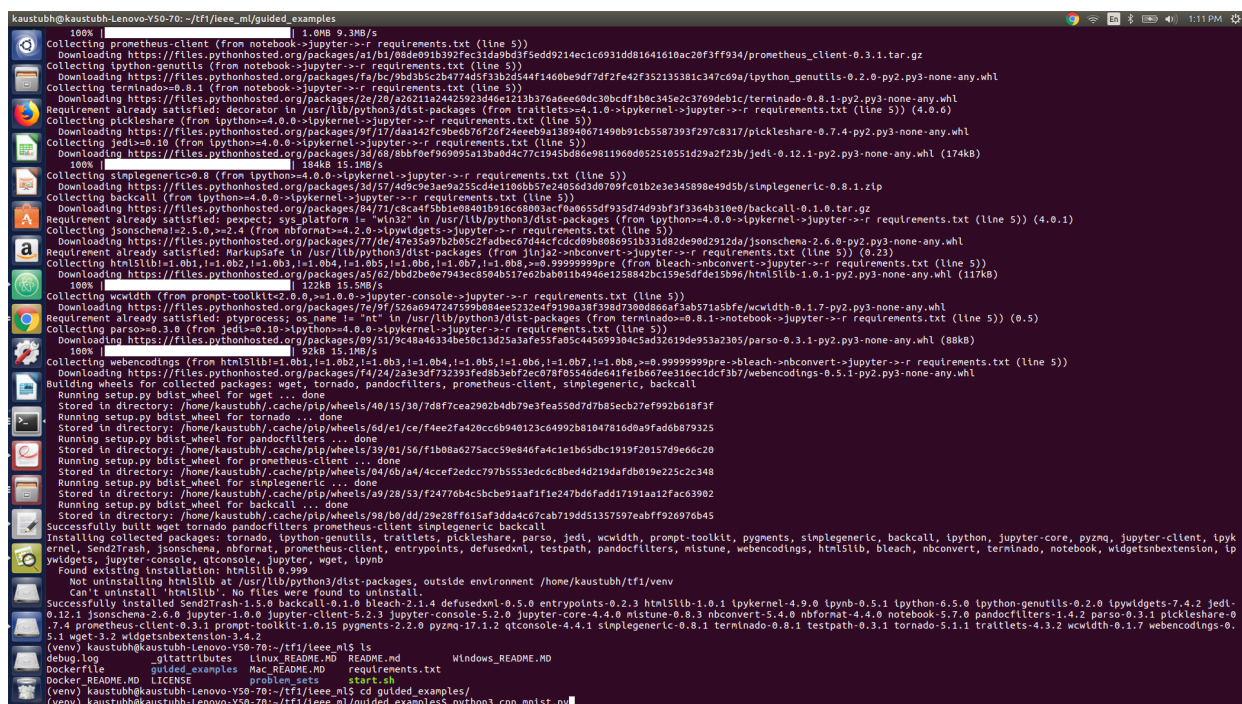


Cloning the Github repository; IEEE Machine Learning Workshop

- Open https://github.com/ieee-mlw/ieee_ml
- Click *Clone or Download* and *Download ZIP* ---> *Unzip the files to local disk*
- Else, run “*git clone* [https://github.com/ieee-mlw/ieee_ml.git](https://github.com/ieee-mlw/ieee_ml)” on Terminal (Linux/ Mac OS) or Command Prompt (Windows).
- The screenshot below is the repository webpage. The above instructions can be easily implemented at this stage.



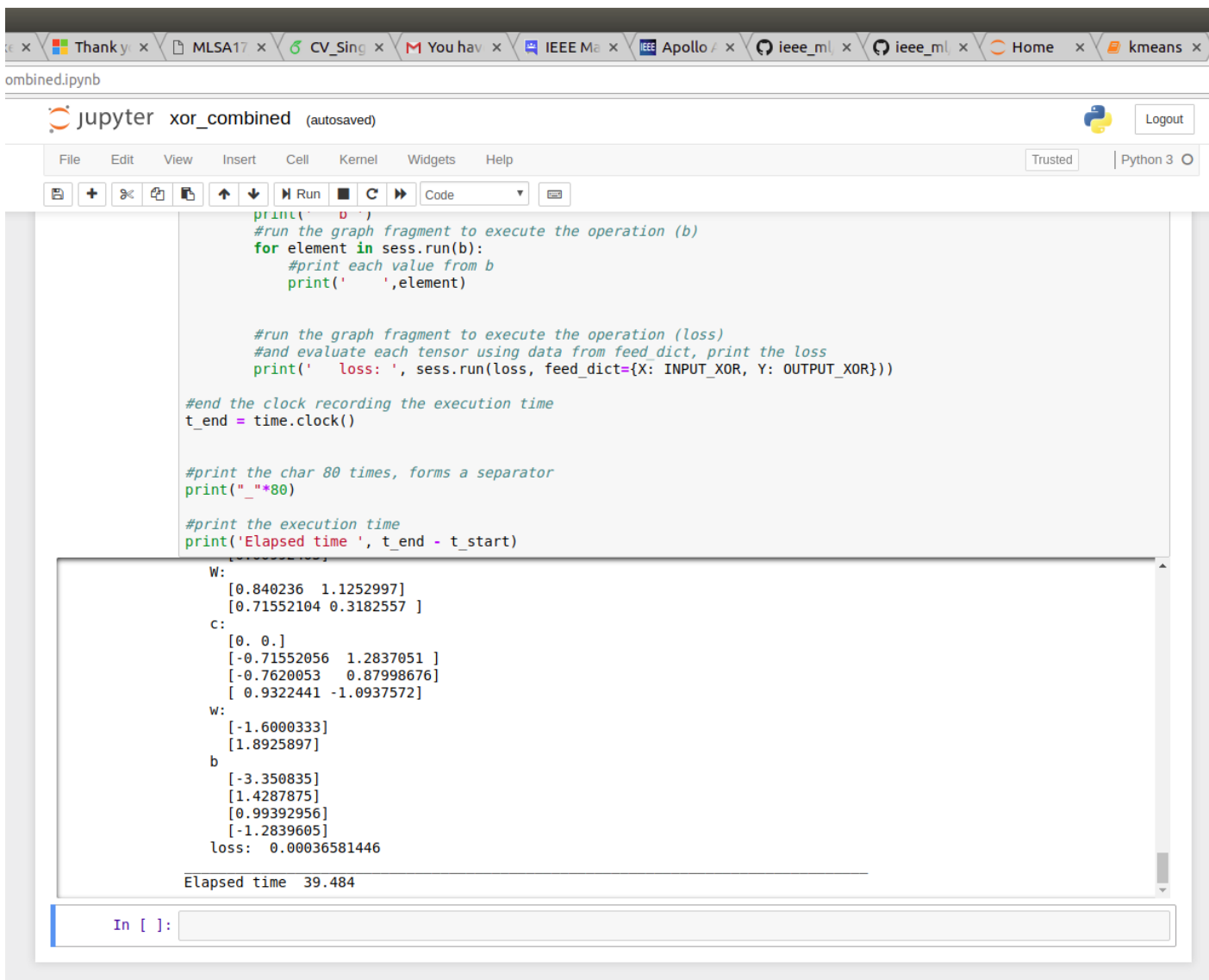
- The below image illustrates the cloning of `ieee_mlw` to local directory. A virtual environment for Python is also set up in this directory.



RESULTS: Jupyter Notebook --- With Tensorflow

Directory: ./ieee_ml/guided_examples

xor_combined.ipynb



```
print(' 0 ')
#run the graph fragment to execute the operation (b)
for element in sess.run(b):
    #print each value from b
    print(' ',element)

#run the graph fragment to execute the operation (loss)
#and evaluate each tensor using data from feed_dict, print the loss
print('  loss: ', sess.run(loss, feed_dict={X: INPUT_XOR, Y: OUTPUT_XOR}))

#end the clock recording the execution time
t_end = time.clock()

#print the char 80 times, forms a separator
print("_"*80)

#print the execution time
print('Elapsed time ', t_end - t_start)
```

```
W:
[[0.840236  1.1252997]
 [0.71552104 0.3182557 ]]
c:
[[0. 0.]
 [-0.71552056  1.2837051 ]
 [-0.7620053  0.87998676]
 [ 0.9322441 -1.0937572]]
w:
[[-1.6000333]
 [1.8925897]]
b
[[-3.350835]
 [1.4287875]
 [0.99392956]
 [-1.2839605]]
loss:  0.00036581446

Elapsed time  39.484
```

In []:

cnn_mnist_no_debugger.ipynb

```
print(eval_results)
```

```
In [5]: #Run the model, steps set to 200 instead of 20000 as the execution time was large
#Changing steps back to 20000 in model training results in an accuracy of 97%
if __name__ == "__main__":
    tf.app.run()
```

```
[0.10013346 0.10733296 0.09383339 0.11717818 0.08821133 0.09826022
 0.10653783 0.07923961 0.09977552 0.10949753]
[0.09679346 0.09052335 0.09933376 0.10306576 0.11570939 0.11412918
 0.09125133 0.09304617 0.099822    0.0963256 ]
[0.08822507 0.10097422 0.10311835 0.10756416 0.09707446 0.08734853
 0.09079584 0.1065184  0.09994359 0.11843739]] (9.599 sec)
```

```
INFO:tensorflow:Saving checkpoints for 400 into /tmp/mnist_convnet_model/model.ckpt.
INFO:tensorflow:Loss for final step: 2.208863.
INFO:tensorflow:Calling model_fn.
INFO:tensorflow:Done calling model_fn.
INFO:tensorflow:Starting evaluation at 2018-09-20-18:47:02
INFO:tensorflow:Graph was finalized.
INFO:tensorflow:Restoring parameters from /tmp/mnist_convnet_model/model.ckpt-400
INFO:tensorflow:Running local init op.
INFO:tensorflow:Done running local_init op.
INFO:tensorflow:Finished evaluation at 2018-09-20-18:47:08
INFO:tensorflow:Saving dict for global step 400: accuracy = 0.4699, global_step = 400, loss = 2.2138305
INFO:tensorflow:Saving 'checkpoint_path' summary for global step 400: /tmp/mnist_convnet_model/model.ckpt-400
{'loss': 2.2138305, 'global_step': 400, 'accuracy': 0.4699}
```

```
In [ ]:
```

```
In [ ]:
```

```
In [ ]:
```

nearest_neighbor.ipynb

IEEE Machine x Apollo AI and x ieee_ml/Linux x ieee_ml/probl x Home x nearest_neigh x kmeans x xor_combin

st_neighbor.ipynb

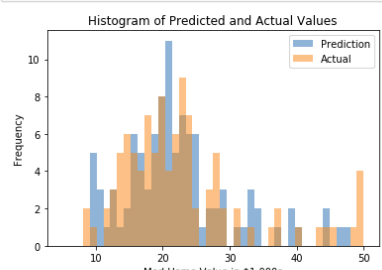
Jupyter nearest_neighbor (unsaved changes) Logout

File Edit View Insert Cell Kernel Widgets Help Not Trusted Python 3

Batch #1 MSE: 14.38

```
In [10]: #the output of plotting commands is displayed inline within frontends, stored in notebook
%matplotlib inline
# Plot prediction and actual distribution
#store 45 evenly spaced numbers between 5 and 50
bins = np.linspace(5, 50, 45)

#plot the histogram for predicted values
plt.hist(predictions, bins, alpha=0.5, label='Prediction')
#plot the histogram for actual values
plt.hist(y_batch, bins, alpha=0.5, label='Actual')
#set title for the histogram
plt.title('Histogram of Predicted and Actual Values')
#labeling the x-axis of the plot
plt.xlabel('Med Home Value in $1,000s')
#labeling the y-axis of the plot
plt.ylabel('Frequency')
#set the location of the legend on the plot
plt.legend(loc='upper right')
#display the plot
plt.show()
```



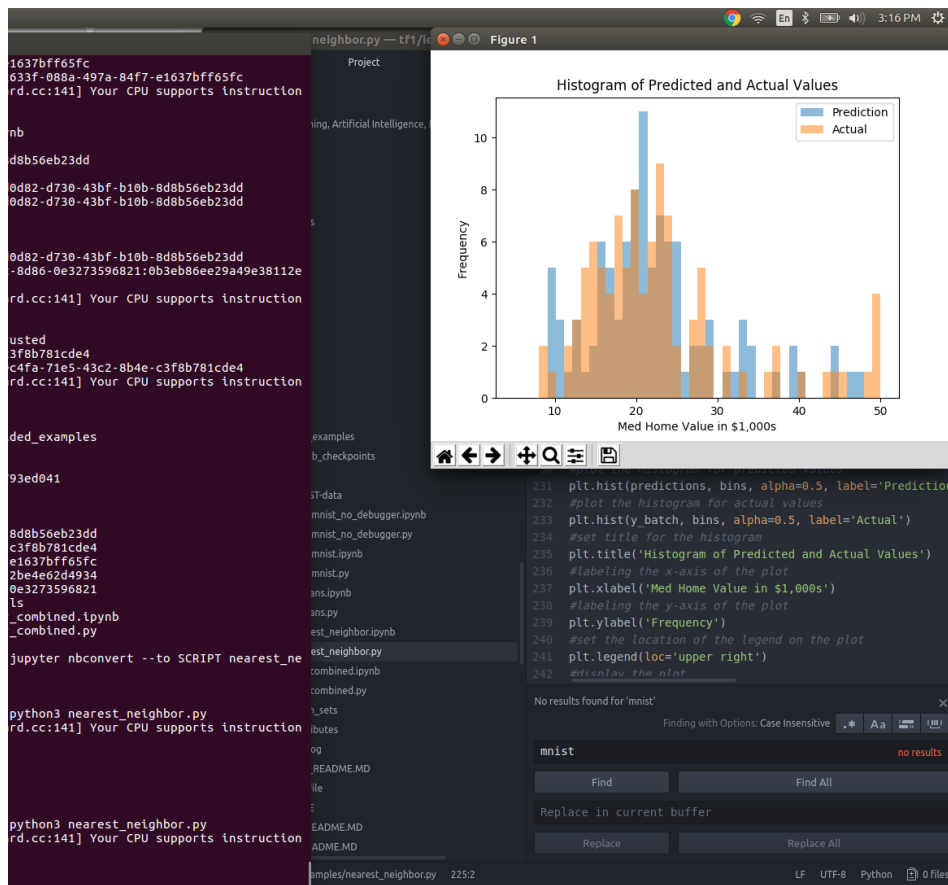
RESULTS: Python Scripts --- With Tensorflow; installed requirements.txt in a virtualenv

Directory: ./ieee_ml/guided_examples

cnn_mnist_debugger.py

```
kaustubh@kaustubh-Lenovo-Y50-70: ~/tf1/ieee_ml/guided_examples
[0.0988884 0.09722076 0.10235957 0.11588337 0.09849569 0.08619877
0.09551321 0.09894627 0.11579292 0.09070105]
[0.08191335 0.08794197 0.10693712 0.09883408 0.10989894 0.08524351
0.10026984 0.12300982 0.10033911 0.10561224]
[0.09193891 0.05974283 0.14130653 0.09977353 0.08670455 0.07746109
0.14213791 0.08977164 0.11420345 0.09695952]
[0.08910347 0.1262262 0.09232976 0.10660678 0.08877778 0.09397586
0.11359387 0.0927956 0.09153717 0.10505351]
[0.09737985 0.10685921 0.09340405 0.10204153 0.08563652 0.09226882
0.10320377 0.0931766 0.1095899 0.11643969]
[0.09864882 0.09490003 0.08660225 0.10369986 0.09282756 0.08554486
0.10667569 0.10900991 0.12476221 0.09732889]
[0.09289897 0.09369006 0.08560194 0.10978056 0.11147806 0.08414986
0.09824451 0.10040345 0.10543718 0.11831545]
[0.08292393 0.10854173 0.08734751 0.09567393 0.08961972 0.10699028
0.12813851 0.09089294 0.1065873 0.10328419]
[0.10066188 0.10881539 0.09713323 0.09823561 0.08941639 0.0943235
0.10979003 0.1019631 0.09907211 0.10058868]
[0.09438425 0.08367937 0.11101761 0.12948033 0.10705356 0.08089142
0.10100988 0.09841748 0.09357511 0.10049101]
[0.10689441 0.07389403 0.09636527 0.13579428 0.08277199 0.09069786
0.11398707 0.0768159 0.12321109 0.0995681 ]
[0.11355357 0.08616661 0.09304288 0.1355462 0.09009891 0.1007816
0.09046813 0.0988925 0.08829809 0.10315152]
[0.08828008 0.08548035 0.1070675 0.12100103 0.09257936 0.09311588
0.09614176 0.0965607 0.1109831 0.1087902 ]
[0.10198446 0.08974582 0.09573783 0.10516486 0.09029564 0.09689061
0.10792381 0.1029169 0.0995921 0.10974796]
[0.11238855 0.09520917 0.08285773 0.10477732 0.07335424 0.10606258
0.10761729 0.10372189 0.11434663 0.09966464]
[0.0952408 0.07214656 0.08387039 0.11255922 0.10736264 0.11662341
0.10402453 0.09537137 0.11533106 0.09747005]
[0.10808193 0.06919657 0.1212079 0.11691414 0.08392238 0.07887762
0.11192013 0.1014451 0.10374864 0.10468548]
[0.10441051 0.08368456 0.14248523 0.10446695 0.09905753 0.08653864
0.10509466 0.09057389 0.09467336 0.08901455]
[0.10956525 0.08778011 0.12109634 0.12426312 0.11722266 0.06820896
0.08890762 0.09608127 0.09781986 0.08905476]
[0.09955976 0.0983674 0.0814124 0.12571897 0.09149501 0.11256406
0.10436753 0.08490054 0.11158805 0.0900263 ]
[0.09692878 0.07952689 0.11118738 0.12405466 0.09646593 0.09938586
0.10568684 0.0916921 0.10156874 0.0935028 ]
[0.09241376 0.10826959 0.0897615 0.12381802 0.08063325 0.10043418
0.10068139 0.10343482 0.10348012 0.09707339]
[0.08943892 0.10543074 0.0692348 0.13220476 0.08753152 0.08000214
0.09785667 0.11921176 0.10392844 0.11516012]] (9.340 sec)
INFO:tensorflow:Saving checkpoints for 600 into /tmp/mnist_convnet_model/model.ckpt.
INFO:tensorflow:Loss for final step: 2.1284597.
INFO:tensorflow:Calling model_fn.
INFO:tensorflow:Done calling model_fn.
INFO:tensorflow:Starting evaluation at 2018-09-20-19:18:18
INFO:tensorflow:Graph was finalized.
INFO:tensorflow:Restoring parameters from /tmp/mnist_convnet_model/model.ckpt-600
INFO:tensorflow:Running local_init_op.
INFO:tensorflow:Done running local_init_op.
INFO:tensorflow:Finished evaluation at 2018-09-20-19:18:23
INFO:tensorflow:Saving dict for global step 600: accuracy = 0.5676, global_step = 600, loss = 2.1415043
INFO:tensorflow:Saving 'checkpoint_path' summary for global step 600: /tmp/mnist_convnet_model/model.ckpt-600
11 {'loss': 2.1415043, 'accuracy': 0.5676, 'global_step': 600}
(venv) kaustubh@kaustubh-Lenovo-Y50-70:~/tf1/ieee_ml/guided_examples$
```

nearest_neighbor.py



```
(venv) kaustubh@kaustubh-Lenovo-Y50-70:~/tf1$ bash start.sh
[W 02:12:42.263 NotebookApp] All authentication is disabled. Anyone who can connect to this server will be able to run code.
[I 02:12:42.263 NotebookApp] The port 8888 is already in use, trying another port.
[I 02:12:42.271 NotebookApp] Serving notebooks from local directory: /home/kaustubh/tf1
[I 02:12:42.271 NotebookApp] The Jupyter Notebook is running at:
[I 02:12:42.271 NotebookApp] http://localhost:8889/
[I 02:12:42.271 NotebookApp] Use Control-C to stop this server and shut down all kernels (twice to skip confirmation).
[I 02:12:52.069 NotebookApp] Saving file at /ieee_ml/guided_examples/cnn_mnist.ipynb
ATTENTION: default value of option force_s3tc_enable overridden by environment.
Created new window in existing browser session.
I0921 02:13:04.774982 140584477603584 debugger_plugin_loader.py:114] Starting Interactive Debugger Plugin at gRPC port -1
Creating InteractiveDebuggerPlugin at port 6064
TensorBoard 1.10.0 at http://kaustubh-Lenovo-Y50-70:6006 (Press CTRL+C to quit)
[I 02:13:10.768 NotebookApp] Starting buffering for 723c96a0-29b9-47d7-a457-ebccf961822d:18b9b89776804807908f8b0f6ab94b93
```

xor_combined.py

kaustubh@kaustubh-Lenovo-Y50-70: ~/tf1/ieee_ml/guided_examples

```
c:
[0. 0.]
[ 0.6861168 -0.15585247]
[0. 0.]
[-0.32943392 0. ]
```

```
w:
[1.1591136]
[-0.33628222]
```

```
b
[-1.9635091]
[1.0887645]
[1.9635091]
[-1.9649372]
```

Epoch: 9999

```
y_estimated:
[0.12308062]
[0.9436296]
[0.8769194]
[0.12292658]
```

```
W:
[-0.476192 -1.0162752]
[0.80550265 0.15565667]
```

```
c:
[0. 0.]
[ 0.6861342 -0.15585247]
[0. 0.]
[-0.32943392 0. ]
```

```
w:
[1.1591136]
[-0.33628222]
```

```
b
[-1.9635755]
[1.0887796]
[1.9635755]
[-1.9650035]
```

Epoch: 10000

```
y_estimated:
[0.12307346]
[0.94369433]
[0.87692654]
[0.12291943]
```

```
W:
[-0.476192 -1.0162752]
[0.80552006 0.15565667]
```

```
c:
[0. 0.]
[ 0.6861516 -0.15585247]
[0. 0.]
[-0.32943392 0. ]
```

```
w:
[1.1591585]
[-0.33628222]
```

```
b
[-1.9636419]
[1.0887946]
[1.9636419]
[-1.9650698]
```

Elapsed time 45.813888

kaustubh@kaustubh-Lenovo-Y50-70:~/tf1/ieee_ml/guided_examples\$