tf1-custom

August 22, 2019

1 Example of TF-1 custom model

[1]:
```
import tensorflow as tf
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
```

2 Build training data

[2]:
```
n = 100
TRUE_W = 3.0
TRUE_b = 2.0

# random samples from normal distribution
np.random.seed(1)
r = np.random.normal(loc=0, scale=0.5, size=n)

# build data
inputs = np.random.normal(loc=0, scale=0.5, size=n)
outputs = TRUE_W * inputs + TRUE_b + r
```

3 Define model

3.1 Construct model

[3]:
```
# graph input placeholders
X = tf.placeholder("float")
Y = tf.placeholder("float")

# trainable variables
W = tf.Variable(5.0, name="weight")
b = tf.Variable(0.0, name="bias")

# linear model
pred = tf.add(tf.multiply(X, W), b)
```

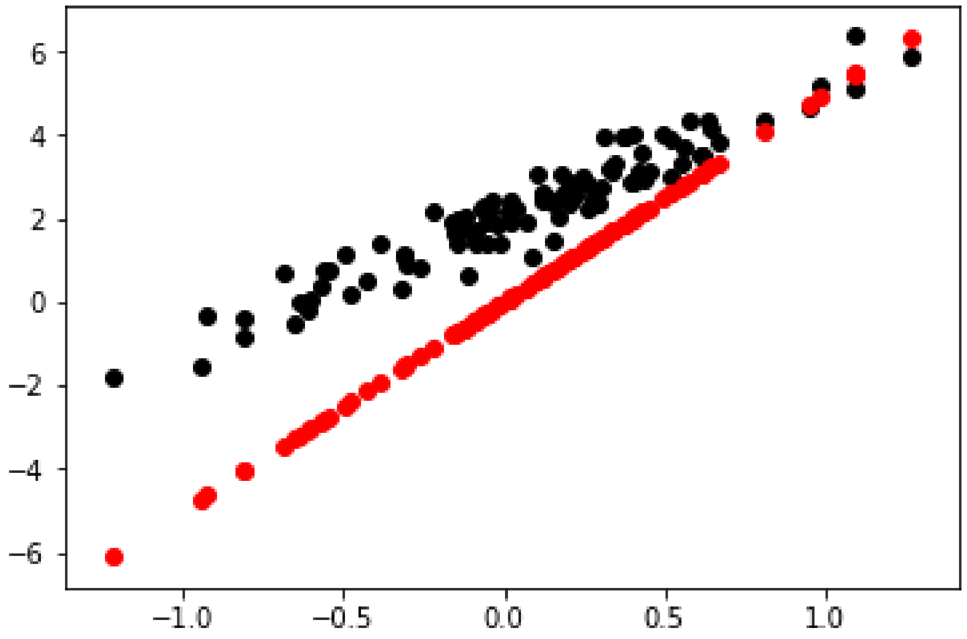
3.2 Show model prediction before training

[4]:
```
def plot_model(p):
    plt.scatter(inputs, outputs, c='black')
    plt.scatter(inputs, p, c='r')
    plt.show()
```

[5]:
```
# create a session
untrained_sess = tf.Session()

# initialize variables
init = tf.global_variables_initializer()
untrained_sess.run(init)

untrained_pred = untrained_sess.run(pred, feed_dict={X: inputs, Y: outputs})
plot_model(untrained_pred)
```



4 Train model

4.1 Setup configurations

[6]:
```
N_EPOCHS = 100
LEARNING_RATE = 0.1

# loss
```

```
loss = tf.reduce_mean(tf.square(pred - Y))

# Gradient descent
optimizer = tf.train.GradientDescentOptimizer(LEARNING_RATE).minimize(loss)
```

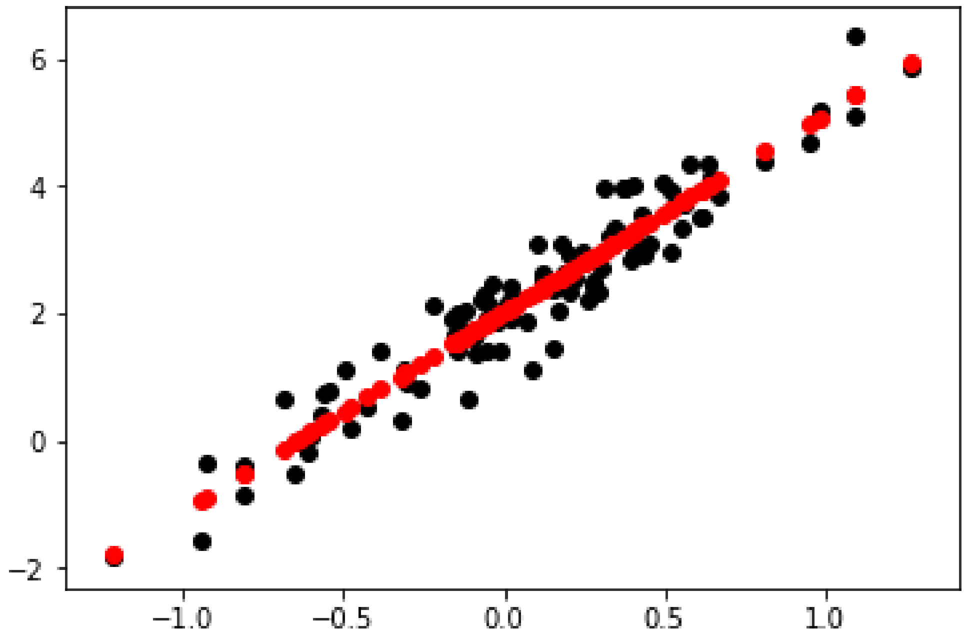
4.2 Execute training

[7]:
```
with tf.Session() as sess:
    sess.run(init)
    epochs = range(N_EPOCHS)
    for epoch in epochs:
        sess.run(optimizer, feed_dict={X: inputs, Y: outputs})

    trained_pred = sess.run(pred, feed_dict={X: inputs, Y: outputs})
```

4.3 Show model prediction after training

[8]:
```
plot_model(trained_pred)
```



6
4
2
0
−2
−1.0
−0.5
0.0
0.5
1.0