gru_12_unique

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In [1]:
```
# GRU WITH UNIQUE DATASET IMPLEMENTATION 12
# Depression Analysis in Bangla
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# Courtesy: https://github.com/mchablani/deep-learning/blob/master/sentiment-rnn/Senti
```

Out[1]:
```
'\nSELECT im2_tweets_depressive_nondepressive_balanced_rearranged.tweet\nINTO OUTFILE '
```

In [0]:
```
import numpy as np
import tensorflow as tf
from timeit import default_timer as timer
from collections import Counter
from string import punctuation
from google.colab import files
```

In [0]:
```
# Build the graph::

gru_size = 512
gru_layers = 3
batch_size = 5
learning_rate = 0.0001
epochs = 3
```

In [4]:
```
fileName = "data_all_unique_dnd_stratified_12_2"
checkpointName = "checkpoints/"+fileName+".ckpt"
print(checkpointName)
print(type(checkpointName))
```

```
checkpoints/data_all_unique_dnd_stratified_12_2.ckpt
<class 'str'>
```

In [5]:
```
files.upload()
files.upload()

with open('data_all_unique_dnd_stratified_text.txt', 'r', encoding="utf8") as f:
    tweets = f.read()
with open('data_all_unique_dnd_stratified_labels.txt', 'r', encoding="utf8") as f:
```

```
            labels_org = f.read()

        print('Done file uploading!')
```

```
<IPython.core.display.HTML object>
```

```
<IPython.core.display.HTML object>
```

```
Done file uploading!
```

```
In [0]: # Data preprocessing::
        #all_text = ''.join([c for c in tweets if c not in punctuation])
        all_text = ''.join([c for c in tweets])
        tweets = all_text.split('\n')

        all_text = ' '.join(tweets)
        words = all_text.split()
```

```
In [0]: counts = Counter(words)
        vocab = sorted(counts, key=counts.get, reverse=True)
        vocab_to_int = {word: ii for ii, word in enumerate(vocab, 1)}

        tweets_ints = []
        for each in tweets:
            tweets_ints.append([vocab_to_int[word] for word in each.split()])
```

```
In [8]: # Encoding the labels::
        list_labels = []

        for l in labels_org.split():
            if l == "depressive":
                list_labels.append(1)
            else:
                list_labels.append(0)

        labels = np.array(list_labels)
        print(len(labels))
```

```
1176
```

```
In [9]: tweets_lens = Counter([len(x) for x in tweets_ints])
        print("Zero-length tweets: {}".format(tweets_lens[0]))
        print("Maximum tweets length: {}".format(max(tweets_lens)))
```

```
Zero-length tweets: 1
Maximum tweets length: 63
```

```
In [0]: # Filter out that tweets with 0 length
        tweets_ints = [r[0:200] for r in tweets_ints if len(r) > 0]

In [11]: from collections import Counter
         tweets_lens = Counter([len(x) for x in tweets_ints])
         print("Zero-length tweets: {}".format(tweets_lens[0]))
         print("Maximum tweet length: {}".format(max(tweets_lens)))

Zero-length tweets: 0
Maximum tweet length: 63


In [0]: seq_len = 200
        features = np.zeros((len(tweets_ints), seq_len), dtype=int)
        # print(features[:10,:100])
        for i, row in enumerate(tweets_ints):
            features[i, -len(row):] = np.array(row)[:seq_len]
        #features[:10,:100]

In [13]: split_frac = 0.8

         split_index = int(split_frac * len(features))

         train_x, val_x = features[:split_index], features[split_index:]
         train_y, val_y = labels[:split_index], labels[split_index:]

         split_frac = 0.5
         split_index = int(split_frac * len(val_x))

         val_x, test_x = val_x[:split_index], val_x[split_index:]
         val_y, test_y = val_y[:split_index], val_y[split_index:]

         print("\t\t\tFeature Shapes:")
         print("Train set: \t\t{}".format(train_x.shape),
               "\nValidation set: \t{}".format(val_x.shape),
               "\nTest set: \t\t{}".format(test_x.shape))
         print("label set: \t\t{}".format(train_y.shape),
               "\nValidation label set: \t{}".format(val_y.shape),
               "\nTest label set: \t\t{}".format(test_y.shape))

                          Feature Shapes:
Train set:                  (940, 200)
Validation set:            (118, 200)
Test set:                    (118, 200)
label set:                   (940,)
Validation label set:          (118,)
Test label set:                  (118,)
```

```
In [0]: n_words = len(vocab_to_int) + 1 # Add 1 for 0 added to vocab

        # Create the graph object
        tf.reset_default_graph()
        with tf.name_scope('inputs'):
            inputs_ = tf.placeholder(tf.int32, [None, None], name="inputs")
            labels_ = tf.placeholder(tf.int32, [None, None], name="labels")
            keep_prob = tf.placeholder(tf.float32, name="keep_prob")

In [0]: # Size of the embedding vectors (number of units in the embedding layer)
        embed_size = 300

        with tf.name_scope("Embeddings"):
            embedding = tf.Variable(tf.random_uniform((n_words, embed_size), -1, 1))
            embed = tf.nn.embedding_lookup(embedding, inputs_)

In [0]: def gru_cell():
            # Basic GRU cell
            gru = tf.contrib.rnn.GRUCell(gru_size, reuse=tf.get_variable_scope().reuse)
            # Add dropout to the cell
            return tf.contrib.rnn.DropoutWrapper(gru, output_keep_prob=keep_prob)

        with tf.name_scope("RNN_layers"):
            # Stack up multiple GRU layers, for deep learning
            cell = tf.contrib.rnn.MultiRNNCell([gru_cell() for _ in range(gru_layers)])

            # Getting an initial state of all zeros
            initial_state = cell.zero_state(batch_size, tf.float32)

In [0]: with tf.name_scope("RNN_forward"):
            outputs, final_state = tf.nn.dynamic_rnn(cell, embed, initial_state=initial_state)

In [0]: # Output::

        with tf.name_scope('predictions'):
            predictions = tf.contrib.layers.fully_connected(outputs[:, -1], 1, activation_fn=t
            tf.summary.histogram('predictions', predictions)
        with tf.name_scope('cost'):
            cost = tf.losses.mean_squared_error(labels_, predictions)
            tf.summary.scalar('cost', cost)

        with tf.name_scope('train'):
            optimizer = tf.train.AdamOptimizer(learning_rate).minimize(cost)

        merged = tf.summary.merge_all()

In [0]: # Validation accuracy::

        with tf.name_scope('validation'):
```

```
        correct_pred = tf.equal(tf.cast(tf.round(predictions), tf.int32), labels_)
        accuracy = tf.reduce_mean(tf.cast(correct_pred, tf.float32))
```

In [0]:
```
# Batching::

def get_batches(x, y, batch_size=100):

    n_batches = len(x)//batch_size
    x, y = x[:n_batches*batch_size], y[:n_batches*batch_size]
    for ii in range(0, len(x), batch_size):
        yield x[ii:ii+batch_size], y[ii:ii+batch_size]
```

In [21]:
```
# Training::

#epochs = 5
saver = tf.train.Saver()
start = timer()

with tf.Session() as sess:
    sess.run(tf.global_variables_initializer())
    train_writer = tf.summary.FileWriter('./logs/tb/train', sess.graph)
    test_writer = tf.summary.FileWriter('./logs/tb/test', sess.graph)
    iteration = 1
    for e in range(1, epochs+1):
        state = sess.run(initial_state)

        for ii, (x, y) in enumerate(get_batches(train_x, train_y, batch_size), 1):
            feed = {inputs_: x,
                    labels_: y[:, None],
                    keep_prob: 1,
                    initial_state: state}
            summary, loss, state, _ = sess.run([merged, cost, final_state, optimizer]
#             loss, state, _ = sess.run([cost, final_state, optimizer], feed_dict=fee

            train_writer.add_summary(summary, iteration)

            if iteration%5==0:
                print("Epoch: {}/{}".format(e, epochs),
                      "Iteration: {}".format(iteration),
                      "Train loss: {:.3f}".format(loss))

            if iteration%25==0:
                val_acc = []
                val_state = sess.run(cell.zero_state(batch_size, tf.float32))
                for x, y in get_batches(val_x, val_y, batch_size):
                    feed = {inputs_: x,
                            labels_: y[:, None],
                            keep_prob: 1,
```

```
                                    initial_state: val_state}
            #                       batch_acc, val_state = sess.run([accuracy, final_state], feed_d
                                    summary, batch_acc, val_state = sess.run([merged, accuracy, final
                                    val_acc.append(batch_acc)
                                print("Val acc: {:.3f}".format(np.mean(val_acc)))
                            iteration +=1
                            test_writer.add_summary(summary, iteration)
                            saver.save(sess, checkpointName)
            #                tensorboard = TensorBoard(log_dir="logs/tweet_5000_all_sentiments_six_cl
                    saver.save(sess, checkpointName)

            duration = timer() - start
            print('Time elasped =',duration,'sec(s)')
```

```
Epoch: 1/3 Iteration: 5 Train loss: 0.350
Epoch: 1/3 Iteration: 10 Train loss: 0.296
Epoch: 1/3 Iteration: 15 Train loss: 0.246
Epoch: 1/3 Iteration: 20 Train loss: 0.269
Epoch: 1/3 Iteration: 25 Train loss: 0.233
Val acc: 0.470
Epoch: 1/3 Iteration: 30 Train loss: 0.237
Epoch: 1/3 Iteration: 35 Train loss: 0.228
Epoch: 1/3 Iteration: 40 Train loss: 0.231
Epoch: 1/3 Iteration: 45 Train loss: 0.260
Epoch: 1/3 Iteration: 50 Train loss: 0.127
Val acc: 0.383
Epoch: 1/3 Iteration: 55 Train loss: 0.235
Epoch: 1/3 Iteration: 60 Train loss: 0.258
Epoch: 1/3 Iteration: 65 Train loss: 0.215
Epoch: 1/3 Iteration: 70 Train loss: 0.274
Epoch: 1/3 Iteration: 75 Train loss: 0.168
Val acc: 0.365
Epoch: 1/3 Iteration: 80 Train loss: 0.283
Epoch: 1/3 Iteration: 85 Train loss: 0.172
Epoch: 1/3 Iteration: 90 Train loss: 0.108
Epoch: 1/3 Iteration: 95 Train loss: 0.370
Epoch: 1/3 Iteration: 100 Train loss: 0.271
Val acc: 0.409
Epoch: 1/3 Iteration: 105 Train loss: 0.208
Epoch: 1/3 Iteration: 110 Train loss: 0.281
Epoch: 1/3 Iteration: 115 Train loss: 0.218
Epoch: 1/3 Iteration: 120 Train loss: 0.200
Epoch: 1/3 Iteration: 125 Train loss: 0.185
Val acc: 0.461
Epoch: 1/3 Iteration: 130 Train loss: 0.214
Epoch: 1/3 Iteration: 135 Train loss: 0.306
Epoch: 1/3 Iteration: 140 Train loss: 0.276
Epoch: 1/3 Iteration: 145 Train loss: 0.220
```

```
Epoch: 1/3 Iteration: 150 Train loss: 0.210
Val acc: 0.417
Epoch: 1/3 Iteration: 155 Train loss: 0.263
Epoch: 1/3 Iteration: 160 Train loss: 0.235
Epoch: 1/3 Iteration: 165 Train loss: 0.208
Epoch: 1/3 Iteration: 170 Train loss: 0.055
Epoch: 1/3 Iteration: 175 Train loss: 0.030
Val acc: 0.713
Epoch: 1/3 Iteration: 180 Train loss: 0.251
Epoch: 1/3 Iteration: 185 Train loss: 0.277
Epoch: 2/3 Iteration: 190 Train loss: 0.218
Epoch: 2/3 Iteration: 195 Train loss: 0.279
Epoch: 2/3 Iteration: 200 Train loss: 0.244
Val acc: 0.696
Epoch: 2/3 Iteration: 205 Train loss: 0.172
Epoch: 2/3 Iteration: 210 Train loss: 0.340
Epoch: 2/3 Iteration: 215 Train loss: 0.194
Epoch: 2/3 Iteration: 220 Train loss: 0.200
Epoch: 2/3 Iteration: 225 Train loss: 0.223
Val acc: 0.522
Epoch: 2/3 Iteration: 230 Train loss: 0.201
Epoch: 2/3 Iteration: 235 Train loss: 0.226
Epoch: 2/3 Iteration: 240 Train loss: 0.163
Epoch: 2/3 Iteration: 245 Train loss: 0.233
Epoch: 2/3 Iteration: 250 Train loss: 0.169
Val acc: 0.478
Epoch: 2/3 Iteration: 255 Train loss: 0.226
Epoch: 2/3 Iteration: 260 Train loss: 0.218
Epoch: 2/3 Iteration: 265 Train loss: 0.209
Epoch: 2/3 Iteration: 270 Train loss: 0.153
Epoch: 2/3 Iteration: 275 Train loss: 0.206
Val acc: 0.452
Epoch: 2/3 Iteration: 280 Train loss: 0.119
Epoch: 2/3 Iteration: 285 Train loss: 0.111
Epoch: 2/3 Iteration: 290 Train loss: 0.219
Epoch: 2/3 Iteration: 295 Train loss: 0.091
Epoch: 2/3 Iteration: 300 Train loss: 0.326
Val acc: 0.600
Epoch: 2/3 Iteration: 305 Train loss: 0.131
Epoch: 2/3 Iteration: 310 Train loss: 0.073
Epoch: 2/3 Iteration: 315 Train loss: 0.296
Epoch: 2/3 Iteration: 320 Train loss: 0.148
Epoch: 2/3 Iteration: 325 Train loss: 0.194
Val acc: 0.487
Epoch: 2/3 Iteration: 330 Train loss: 0.216
Epoch: 2/3 Iteration: 335 Train loss: 0.258
Epoch: 2/3 Iteration: 340 Train loss: 0.174
Epoch: 2/3 Iteration: 345 Train loss: 0.125
```

```
Epoch: 2/3 Iteration: 350 Train loss: 0.221
Val acc: 0.748
Epoch: 2/3 Iteration: 355 Train loss: 0.217
Epoch: 2/3 Iteration: 360 Train loss: 0.004
Epoch: 2/3 Iteration: 365 Train loss: 0.227
Epoch: 2/3 Iteration: 370 Train loss: 0.241
Epoch: 2/3 Iteration: 375 Train loss: 0.190
Val acc: 0.670
Epoch: 3/3 Iteration: 380 Train loss: 0.395
Epoch: 3/3 Iteration: 385 Train loss: 0.142
Epoch: 3/3 Iteration: 390 Train loss: 0.110
Epoch: 3/3 Iteration: 395 Train loss: 0.199
Epoch: 3/3 Iteration: 400 Train loss: 0.052
Val acc: 0.626
Epoch: 3/3 Iteration: 405 Train loss: 0.253
Epoch: 3/3 Iteration: 410 Train loss: 0.178
Epoch: 3/3 Iteration: 415 Train loss: 0.120
Epoch: 3/3 Iteration: 420 Train loss: 0.193
Epoch: 3/3 Iteration: 425 Train loss: 0.189
Val acc: 0.539
Epoch: 3/3 Iteration: 430 Train loss: 0.159
Epoch: 3/3 Iteration: 435 Train loss: 0.081
Epoch: 3/3 Iteration: 440 Train loss: 0.076
Epoch: 3/3 Iteration: 445 Train loss: 0.080
Epoch: 3/3 Iteration: 450 Train loss: 0.089
Val acc: 0.539
Epoch: 3/3 Iteration: 455 Train loss: 0.069
Epoch: 3/3 Iteration: 460 Train loss: 0.046
Epoch: 3/3 Iteration: 465 Train loss: 0.103
Epoch: 3/3 Iteration: 470 Train loss: 0.014
Epoch: 3/3 Iteration: 475 Train loss: 0.043
Val acc: 0.548
Epoch: 3/3 Iteration: 480 Train loss: 0.007
Epoch: 3/3 Iteration: 485 Train loss: 0.211
Epoch: 3/3 Iteration: 490 Train loss: 0.194
Epoch: 3/3 Iteration: 495 Train loss: 0.025
Epoch: 3/3 Iteration: 500 Train loss: 0.209
Val acc: 0.513
Epoch: 3/3 Iteration: 505 Train loss: 0.026
Epoch: 3/3 Iteration: 510 Train loss: 0.285
Epoch: 3/3 Iteration: 515 Train loss: 0.260
Epoch: 3/3 Iteration: 520 Train loss: 0.188
Epoch: 3/3 Iteration: 525 Train loss: 0.029
Val acc: 0.522
Epoch: 3/3 Iteration: 530 Train loss: 0.153
Epoch: 3/3 Iteration: 535 Train loss: 0.148
Epoch: 3/3 Iteration: 540 Train loss: 0.010
Epoch: 3/3 Iteration: 545 Train loss: 0.039
```

```
Epoch: 3/3 Iteration: 550 Train loss: 0.193
Val acc: 0.678
Epoch: 3/3 Iteration: 555 Train loss: 0.203
Epoch: 3/3 Iteration: 560 Train loss: 0.052
Time elasped = 2568.873636377999 sec(s)
```

In [22]:
```
# Testing::

        test_acc = []
        with tf.Session() as sess:
            saver.restore(sess, checkpointName)
            test_state = sess.run(cell.zero_state(batch_size, tf.float32))
            for ii, (x, y) in enumerate(get_batches(test_x, test_y, batch_size), 1):
                feed = {inputs_: x,
                        labels_: y[:, None],
                        keep_prob: 1,
                        initial_state: test_state}
                batch_acc, test_state = sess.run([accuracy, final_state], feed_dict=feed)
                test_acc.append(batch_acc)
            print("Test accuracy: {:.3f}".format(np.mean(test_acc)))
```

```
INFO:tensorflow:Restoring parameters from checkpoints/data_all_unique_dnd_stratified_12_2.ckpt
Test accuracy: 0.748
```

In [0]: