

```
In [2]: runfile('/Users/tj/My Cloud/GitHub/nlp-project-  
tjschantz1/genreclass.py', wdir='/Users/tj/My Cloud/GitHub/nlp-project-  
tjschantz1')
```

```
=== Program Initiated ===
```

```
[>>> Importing data...]
```

```
=== Data Import Complete ===
```

```
--- Runtime = 00:00:31.51 ---
```

```
*** Number of Songs by Genre within Data ***
```

```
Rock          109027
```

```
Pop           40374
```

```
Hip-Hop       24737
```

```
Metal         23751
```

```
Country       14365
```

```
Name: genre, dtype: int64
```

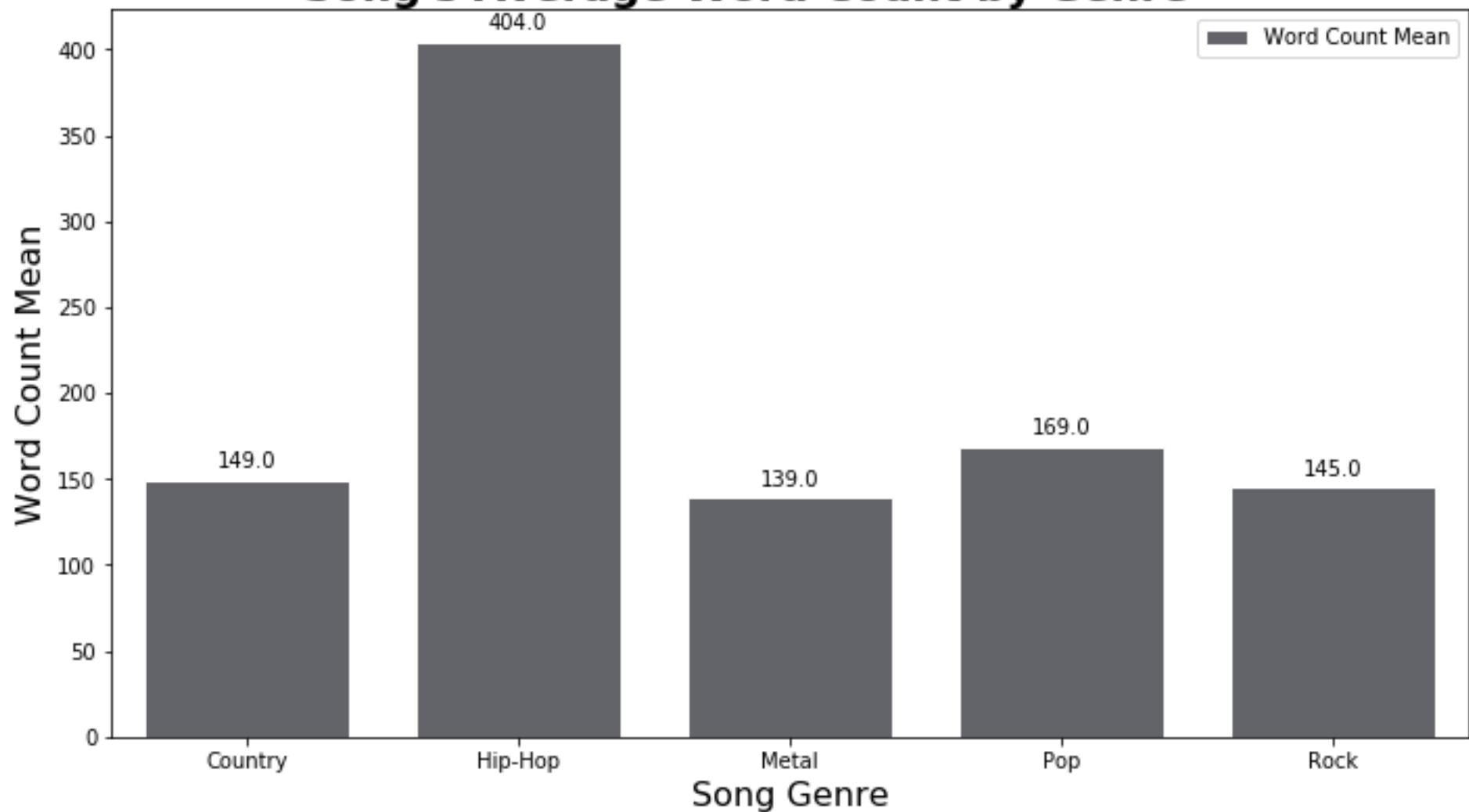
```
[>>> Cleaning data...]
```

```
=== Data Cleaning Complete ===
```

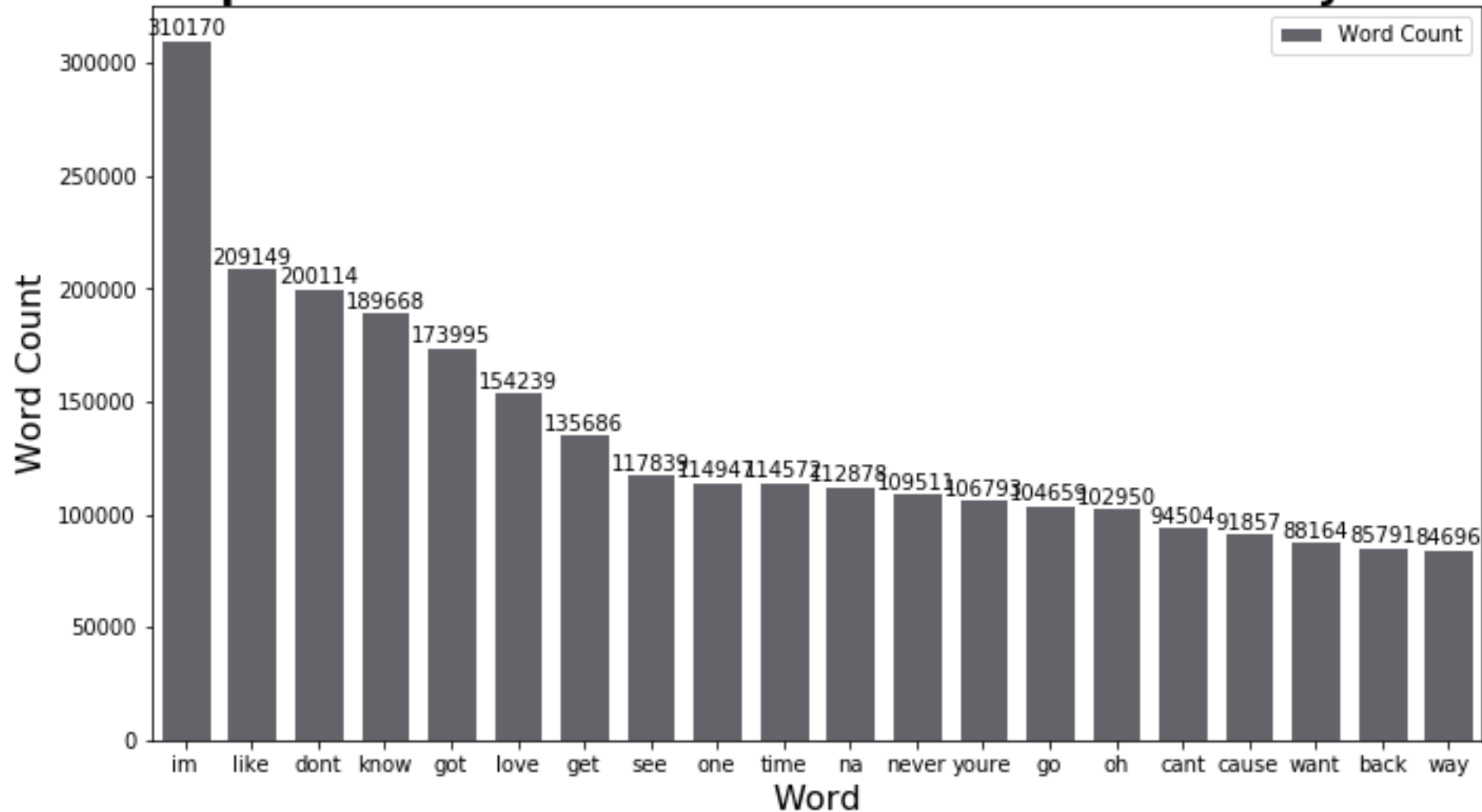
```
--- Runtime = 00:04:25.61 ---
```

```
[>>> Visualizing data...]
```

Song's Average Word Count by Genre



Top 20 Most Common Words Found in Vocabulary



=== Data Visualization Complete ===

--- Runtime = 00:00:32.71 ---

```
[>>> Building word embeddings and class encodings...]  
Using TensorFlow backend.
```

```
=== Word Embeddings & Class Encodings Complete ===  
--- Runtime = 00:00:38.25 ---
```

```
[>>> Building neural network model...]  
WARNING:tensorflow:From /anaconda3/lib/python3.6/site-  
packages/tensorflow/python/framework/op_def_library.py:263: colocate_with  
(from tensorflow.python.framework.ops) is deprecated and will be removed  
in a future version.  
Instructions for updating:  
Colocations handled automatically by placer.  
WARNING:tensorflow:From /anaconda3/lib/python3.6/site-  
packages/keras/backend/tensorflow_backend.py:3445: calling dropout (from  
tensorflow.python.ops.nn_ops) with keep_prob is deprecated and will be  
removed in a future version.  
Instructions for updating:  
Please use `rate` instead of `keep_prob`. Rate should be set to `rate = 1  
- keep_prob`.
```

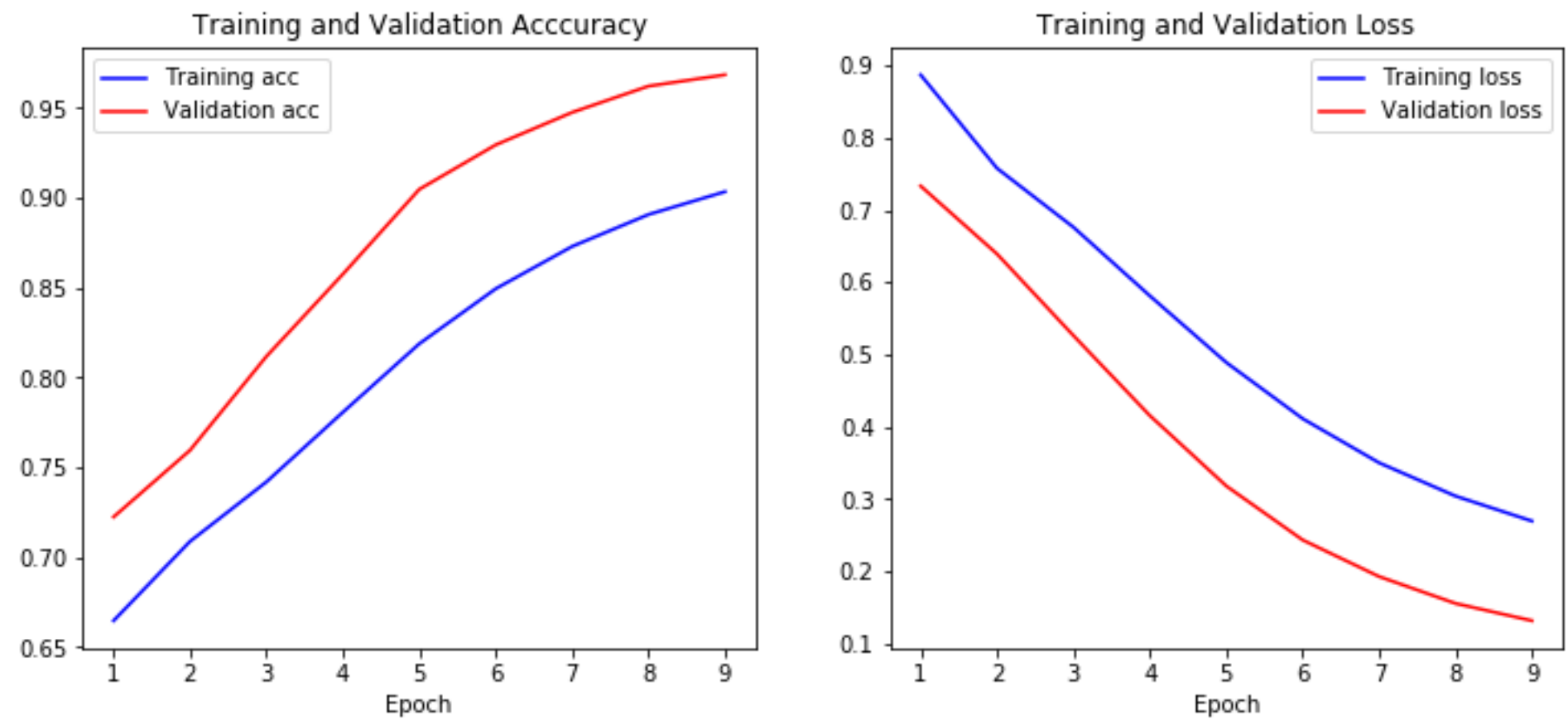
```
=== Neural Network Complete ===  
--- Runtime = 00:00:00.08 ---
```

```
[>>> Training model...]
```

```
WARNING:tensorflow:From /anaconda3/lib/python3.6/site-  
packages/tensorflow/python/ops/math_ops.py:3066: to_int32 (from  
tensorflow.python.ops.math_ops) is deprecated and will be removed in a  
future version.  
Instructions for updating:  
Use tf.cast instead.  
Train on 148577 samples, validate on 148577 samples  
Epoch 1/9  
2019-05-10 13:35:18.162376: I  
tensorflow/core/platform/cpu_feature_guard.cc:141] Your CPU supports  
instructions that this TensorFlow binary was not compiled to use: AVX2  
FMA  
148577/148577 [=====] - 46s 311us/step - loss:  
0.8872 - acc: 0.6646 - val_loss: 0.7334 - val_acc: 0.7223  
Epoch 2/9  
148577/148577 [=====] - 44s 294us/step - loss:  
0.7579 - acc: 0.7087 - val_loss: 0.6393 - val_acc: 0.7594  
Epoch 3/9  
148577/148577 [=====] - 43s 291us/step - loss:  
0.6763 - acc: 0.7419 - val_loss: 0.5263 - val_acc: 0.8117  
Epoch 4/9
```

148577/148577 [=====] - 44s 294us/step - loss: 0.5813 - acc: 0.7806 - val_loss: 0.4156 - val_acc: 0.8574
Epoch 5/9
148577/148577 [=====] - 44s 295us/step - loss: 0.4891 - acc: 0.8187 - val_loss: 0.3182 - val_acc: 0.9046
Epoch 6/9
148577/148577 [=====] - 44s 294us/step - loss: 0.4113 - acc: 0.8493 - val_loss: 0.2434 - val_acc: 0.9294
Epoch 7/9
148577/148577 [=====] - 44s 298us/step - loss: 0.3502 - acc: 0.8729 - val_loss: 0.1928 - val_acc: 0.9475
Epoch 8/9
148577/148577 [=====] - 44s 294us/step - loss: 0.3042 - acc: 0.8906 - val_loss: 0.1556 - val_acc: 0.9621
Epoch 9/9
148577/148577 [=====] - 44s 296us/step - loss: 0.2696 - acc: 0.9033 - val_loss: 0.1317 - val_acc: 0.9684

Training Accuracy: 96.84%
Testing Accuracy: 69.77%



=== Training Complete ===
--- Runtime = 00:07:01.31 ---

[>>> Performing model evaluation...]
*** Genre Classification Performance Metrics ***
Country:

```
>> precision = 42.67%
>> recall = 56.33%
>> F1-score = 48.55%
```

Hip-Hop:

```
>> precision = 80.06%
>> recall = 86.93%
>> F1-score = 83.35%
```

Metal:

```
>> precision = 54.90%
>> recall = 71.14%
>> F1-score = 61.98%
```

Pop:

```
>> precision = 50.62%
>> recall = 56.00%
>> F1-score = 53.18%
```

Rock:

```
>> precision = 81.24%
>> recall = 71.58%
>> F1-score = 76.10%
```

```
=== Evaluation Complete ===
--- Runtime = 00:00:07.10 ---
--- Total Runtime = 00:13:16.55 ---
```

In [3]: