

Text Generation in Shakespeare's Style

Import Dependencies

```
In [ ]: import tensorflow as tf
```

```
2025-09-28 10:23:24.182512: I external/local_tsl/tsl/cuda/cudart_stub.cc:3
1] Could not find cuda drivers on your machine, GPU will not be used.
2025-09-28 10:23:24.220235: E external/local_xla/xla/stream_executor/cuda/
cuda_dnn.cc:9261] Unable to register cuDNN factory: Attempting to register
factory for plugin cuDNN when one has already been registered
2025-09-28 10:23:24.220318: E external/local_xla/xla/stream_executor/cuda/
cuda_fft.cc:607] Unable to register cuFFT factory: Attempting to register
factory for plugin cuFFT when one has already been registered
2025-09-28 10:23:24.221163: E external/local_xla/xla/stream_executor/cuda/
cuda_blas.cc:1515] Unable to register cuBLAS factory: Attempting to regist
er factory for plugin cuBLAS when one has already been registered
2025-09-28 10:23:24.226940: I external/local_tsl/tsl/cuda/cudart_stub.cc:3
1] Could not find cuda drivers on your machine, GPU will not be used.
2025-09-28 10:23:24.227450: I tensorflow/core/platform/cpu_feature_guard.c
c:182] This TensorFlow binary is optimized to use available CPU instructio
ns in performance-critical operations.
To enable the following instructions: AVX2 FMA, in other operations, rebui
ld TensorFlow with the appropriate compiler flags.
2025-09-28 10:23:25.045136: W tensorflow/compiler/tf2tensorrt/utils/py_uti
ls.cc:38] TF-TRT Warning: Could not find TensorRT
```

```
In [ ]: from tensorflow.keras.preprocessing.text import Tokenizer
from tensorflow.keras.preprocessing.sequence import pad_sequences
from tensorflow.keras.layers import Embedding, LSTM, Dense, Bidirectional,
Dropout
from tensorflow.keras.models import Sequential
from tensorflow.keras import regularizers
from tensorflow.keras.optimizers import Adam
import numpy as np
```

Download Shakespeare Dataset

```
In [ ]: # !wget --no-check-certificate \
#       https://storage.googleapis.com/laurencemoroney-blog.appspot.com/sonnet
s.txt \
#       -O sonnets.txt
```

Define Tokenizer and prepare training data

```
In [ ]: tokenizer = Tokenizer()

data = open('sonnets.txt').read()

corpus = data.lower().split('\n')

tokenizer.fit_on_texts(corpus)
total_words = len(tokenizer.word_index) + 1

print(tokenizer.word_index)
print(total_words)
```

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3211

```

```

In [ ]: input_sequences = []

for line in corpus:
    token_list = tokenizer.texts_to_sequences([line])[0]
    # print("LIST = "+str(token_list))
    for i in range(1, len(token_list)):
        n_gram_sequence = token_list[:i+1]
        # print(n_gram_sequence)
        input_sequences.append(n_gram_sequence)

# print(len(input_sequences))

# pad sequences
max_sequence_len = max([len(seq) for seq in input_sequences])

print(max_sequence_len, total_words)

input_sequences = np.array(pad_sequences(input_sequences, padding='pre', ma
xlen=max_sequence_len))

# create predictors and labels
xs, labels = input_sequences[:, :-1], input_sequences[:, -1]

ys = tf.keras.utils.to_categorical(labels, num_classes=total_words)

11 3211

```

Define the Model Architecture and start training

```
In [ ]: model = Sequential()
model.add(Embedding(input_dim=total_words, output_dim=100, input_length=max
_sequence_len-1))
model.add(Bidirectional(LSTM(150, return_sequences=True)))
model.add(Dropout(0.3))
model.add(Bidirectional(LSTM(96)))
model.add(Dense(total_words // 2, activation='relu', kernel_regularizer=reg
ularizers.l2(0.01)))
model.add(Dense(total_words, activation='softmax'))

model.summary()
```

2025-09-28 10:23:26.182885: W tensorflow/core/common_runtime/gpu/gpu_device.cc:2256] Cannot dlopen some GPU libraries. Please make sure the missing libraries mentioned above are installed properly if you would like to use GPU. Follow the guide at <https://www.tensorflow.org/install/gpu> for how to download and setup the required libraries for your platform. Skipping registering GPU devices...

Model: "sequential"

Layer (type)	Output Shape	Param #
=====		
embedding (Embedding)	(None, 10, 100)	321100
bidirectional (Bidirectional)	(None, 10, 300)	301200
dropout (Dropout)	(None, 10, 300)	0
bidirectional_1 (Bidirectional)	(None, 192)	304896
dense (Dense)	(None, 1605)	309765
dense_1 (Dense)	(None, 3211)	5156866
=====		
Total params: 6393827 (24.39 MB)		
Trainable params: 6393827 (24.39 MB)		
Non-trainable params: 0 (0.00 Byte)		

```
In [ ]: model.compile(loss='categorical_crossentropy', optimizer='adam', metrics=
['acc'])
history = model.fit(xs, ys, epochs=10, verbose=1)
```

Epoch 1/10
484/484 [=====] - 25s 43ms/step - loss: 6.9778 - acc: 0.0195
Epoch 2/10
484/484 [=====] - 23s 47ms/step - loss: 6.5114 - acc: 0.0223
Epoch 3/10
484/484 [=====] - 19s 39ms/step - loss: 6.4147 - acc: 0.0246
Epoch 4/10
484/484 [=====] - 18s 37ms/step - loss: 6.3005 - acc: 0.0293
Epoch 5/10
484/484 [=====] - 18s 37ms/step - loss: 6.1975 - acc: 0.0347
Epoch 6/10
484/484 [=====] - 18s 38ms/step - loss: 6.1042 - acc: 0.0385
Epoch 7/10
484/484 [=====] - 18s 37ms/step - loss: 6.0145 - acc: 0.0407
Epoch 8/10
484/484 [=====] - 18s 37ms/step - loss: 5.9252 - acc: 0.0451
Epoch 9/10
484/484 [=====] - 17s 35ms/step - loss: 5.8209 - acc: 0.0485
Epoch 10/10
484/484 [=====] - 17s 36ms/step - loss: 5.7020 - acc: 0.0568

Generate 100 next words with an initial sample sentence

```
In [ ]: def predict_next_words(seed_text, next_words):
    for _ in range(next_words):
        token_list = tokenizer.texts_to_sequences([seed_text])[0]
        token_list = pad_sequences([token_list], maxlen=max_sequence_len-1, padding='pre')
        predict_x=model.predict(token_list)
        predicted=np.argmax(predict_x,axis=1)
        # predicted = model.predict_classes(token_list, verbose=0)
        output_word = ""
        for word, index in tokenizer.word_index.items():
            if index == predicted:
                output_word = word
                break
        seed_text += " " + output_word

    print(seed_text)
    return seed_text
```

```
In [ ]: seed_text = "1THREEPIO"
        next_words = 10

        generated_text = predict_next_words(seed_text, next_words)
```

```
1/1 [=====] - 1s 1s/step
1/1 [=====] - 0s 35ms/step
1/1 [=====] - 0s 37ms/step
1/1 [=====] - 0s 35ms/step
1/1 [=====] - 0s 36ms/step
1/1 [=====] - 0s 35ms/step
1/1 [=====] - 0s 35ms/step
1/1 [=====] - 0s 36ms/step
1/1 [=====] - 0s 34ms/step
1/1 [=====] - 0s 34ms/step
1THREEPIO to my love of thee to thee in thee be
```

```
In [ ]: seed_text = "why lovest thou that which thou receivest not gladly,"
        generated_text = predict_next_words(seed_text, next_words)
```

```
1/1 [=====] - 0s 34ms/step
1/1 [=====] - 0s 40ms/step
1/1 [=====] - 0s 35ms/step
1/1 [=====] - 0s 38ms/step
1/1 [=====] - 0s 35ms/step
1/1 [=====] - 0s 38ms/step
1/1 [=====] - 0s 35ms/step
1/1 [=====] - 0s 35ms/step
1/1 [=====] - 0s 37ms/step
1/1 [=====] - 0s 39ms/step
why lovest thou that which thou receivest not gladly, be be ' ' be ' ' be
to be
```