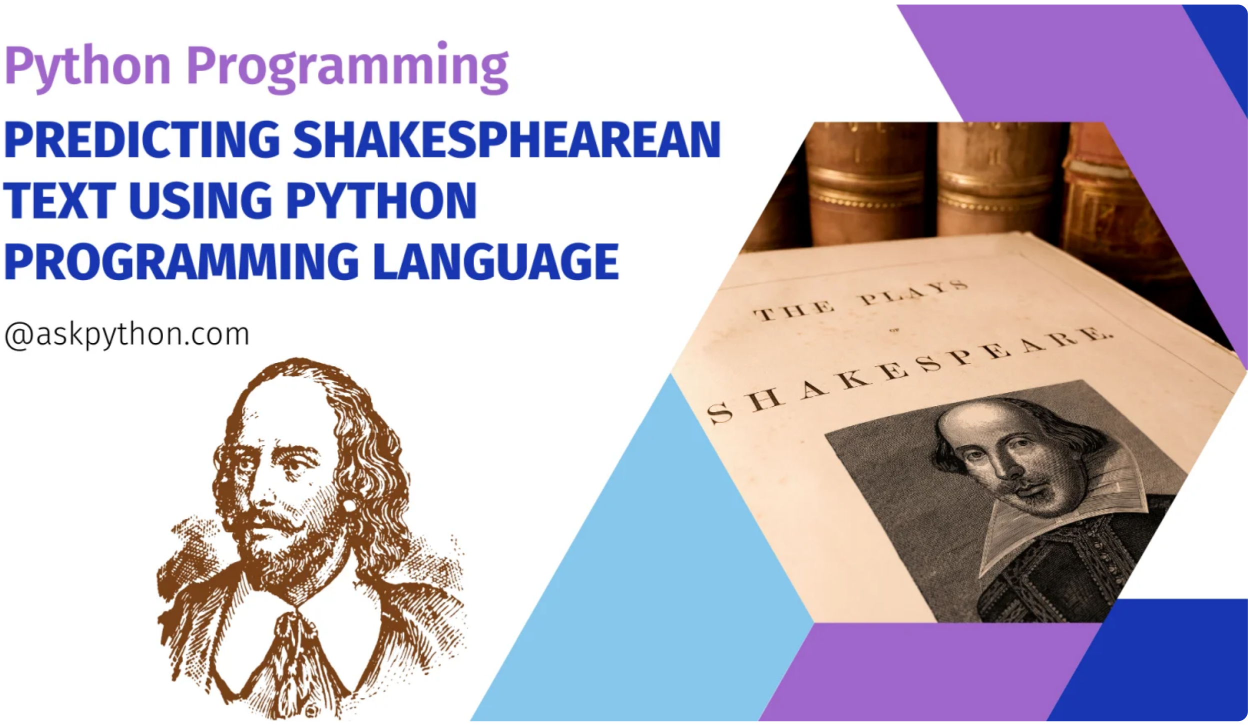
AskPython

Predict Shakespearean Text Using Keras TensorFlow

By Isha Bansal / November 18, 2021


Python Programming
PREDICTING SHAKESPHEAREAN TEXT USING PYTHON PROGRAMMING LANGUAGE
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THE PLAYS
SHAKESPEARE

Hey folks! In this tutorial, we will look at how to use the Keras TensorFlow API in Python to create a Recurrent Neural Network model to predict Shakespearean text.

***Also read:* Stock Price Prediction using Python**

To produce fresh text, we will train the **GitHub Shakespearean text dataset** using a custom-built RNN model.

Step 1: Importing Libraries

We utilized some of the most popular deep learning libraries. Sweetviz is a new package that automates exploratory data analysis and is particularly beneficial in analyzing our training dataset.

```
pip install sweetviz
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import tensorflow as tf
from tensorflow import keras
import sweetviz as sw
import seaborn as sns
sns.set()
```

Step 2: Loading the Dataset

```
shakespeare_url='https://raw.githubusercontent.com/karpathy/char-rn
filepath=keras.utils.get_file('shakespeare.txt',shakespeare_url)
with open(filepath) as f:
    shakespeare_text=f.read()
```

```
Downloading data from https://raw.githubusercontent.com/karpathy/char-r
1122304/1115394 [==============================] - 0s 0us/step
1130496/1115394 [==============================] - 0s 0us/step
```

Now that we’ve downloaded the dataset into our Python notebook, we need to preprocess it before we can utilize it for training.

Step 3: Pre-processing the Dataset

Tokenisation is the process of dividing lengthy text strings into smaller portions or tokens. Larger chunks of text can be tokenized into sentences, and then into words.

Pre-processing will also involve removing punctuations from the tokens generates as well.

```
tokenizer=keras.preprocessing.text.Tokenizer(char_level=True)
tokenizer.fit_on_texts(shakespeare_text)

max_id=len(tokenizer.word_index)
dataset_size=tokenizer.document_count
[encoded]=np.array(tokenizer.texts_to_sequences([shakespeare_text])
```

Step 4: Preparing the Dataset

We will be using `tf.data.Dataset` which is generally useful for a large set of elements like huge chunks of textual data.

`Dataset.repeat()` goes over the dataset and repeats the dataset a specified number of times. `window()` is like a sliding window that slides the window by a specified number each time for repeated iteration.

```
train_size=dataset_size*90//100
dataset=tf.data.Dataset.from_tensor_slices(encoded[:train_size])

n_steps=100
window_length=n_steps+1
dataset=dataset.repeat().window(window_length,shift=1,drop_remaind

dataset=dataset.flat_map(lambda window: window.batch(window_length

batch_size=32
dataset=dataset.shuffle(10000).batch(batch_size)
dataset=dataset.map(lambda windows: (windows[:,:-1],windows[:,1:])
dataset=dataset.map(lambda X_batch,Y_batch: (tf.one_hot(X_batch,de
dataset=dataset.prefetch(1)
```

Step 5: Building the Model

The model building is pretty simple. We will be creating a sequential model and adding layers to the model with certain characteristics.

```
model=keras.models.Sequential()
model.add(keras.layers.GRU(128,return_sequences=True,input_shape=[N
model.add(keras.layers.GRU(128,return_sequences=True))
model.add(keras.layers.TimeDistributed(keras.layers.Dense(max_id,ac
```

Next, we will be compiling the model and fitting the model on the dataset. We will be using `Adam` optimizer but you can also use other available optimizers according to your preferences.

```
model.compile(loss='sparse_categorical_crossentropy',optimizer='ada
history=model.fit(dataset,steps_per_epoch=train_size // batch_size,
```

```
31370/31370 [==============================] - 1598s 51ms/step - loss:
```

Step 6: Testing the Model

We have defined some functions in the code snippet mentioned below. The functions will preprocess and prepare the input data according to our defined

```python
def preprocess(texts):
    X=np.array(tokenizer.texts_to_sequences(texts))-1
    return tf.one_hot(X,max_id)

def next_char(text,temperature=1):
    X_new=preprocess([text])
    y_proba=model.predict(X_new)[0,-1:,:]
    rescaled_logits=tf.math.log(y_proba)/temperature
    char_id=tf.random.categorical(rescaled_logits,num_samples=1)+1
    return tokenizer.sequences_to_texts(char_id.numpy())[0]

def complete_text(text,n_chars=50,temperature=1):
    for _ in range(n_chars):
        text+=next_char(text,temperature)
    return text
```

Let’s predict the text for a certain letter or a word using the code mentioned below.

```python
print("Some predicted texts for letter 'D' are as follows:\n ")
for i in range(3):
  print(complete_text('d'))
  print()
```

```
Some predicted texts for letter 'D' are as follows:

d, swalld tell you in mine,
the remeivis if i shou

dima's for me, sir, to comes what this roguty.

dening to girl, ne'er i was deckong?
which never be
```

```python
print("Some predicted texts for word 'SHINE' are as follows:\n ")
for i in range(3):
  print(complete_text('shine'))
  print()
```

Output:

```
Some predicted texts for word 'SHINE' are as follows:

shine on here is your viririno penaite the cursue,
i'll

shine yet it the become done to-k
```

```
not oning,
so long
```

Conclusion

Congratulations! You just learned how to build a Shakespearean text predictor using RNN. Hope you enjoyed it! 😇

Liked the tutorial? In any case, I would recommend you to have a look at the tutorials mentioned below:

1. Stock Price Prediction using Python
2. Crypto Price Prediction with Python
3. Stock Price Prediction using Python
4. Box Office Revenue Prediction in Python – An Easy Implementation

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