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# Language-Model-DL

Python · No attached data sources

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33.6s

Version 1 of 1

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## DL Practical 6

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DL Practical 6



In [1]:

```
from tensorflow import keras
import numpy as np
from keras.preprocessing.text import Tokenizer
from tensorflow.keras.utils import to_categorical
from keras.models import Sequential
from keras.layers import Dense
from keras.layers import SimpleRNN
from keras.layers import Embedding
from keras.preprocessing.sequence import pad_sequences
```

In [2]:

```
data = """ Deep in the festering hold thy father lies,
          of his bones New England pews are made,
          those are altar lights that were his eyes.

          What port awaits us, Davy Jones'
          or home? I've heard of slavers drifting, drifting,
          playthings of wind and storm and chance, their crews"""

print("Data:", data, type(data))

data_splitted = data.split("\n") #returns a list of strings
print("Data_Splitted:", data_splitted, type(data_splitted))

tokenizer = Tokenizer(filters='!"#$%&()*+,-/:;<=>?@[\]^_`{|}~')

tokenizer.fit_on_texts(data_splitted) #learns a vocabulary
print("Word Indices:", tokenizer.word_index) #tokenizer.word_index is a dictionary
```

```
Data: Deep in the festering hold thy father lies,
       of his bones New England pews are made,
       those are altar lights that were his eyes.

       What port awaits us, Davy Jones'

       or home? I've heard of slavers drifting, drifting,
       playthings of wind and storm and chance, their crews
<class 'str'>
Data_Splitted: ['Deep in the festering hold thy father lies.', 'of his bones New England pews are made.', 'those are altar lights that were his eyes.', 'What port awaits us, Davy Jones'' or home? I've heard of slavers drifting, drifting, playthings of wind and storm and chance, their crews']
```

```
s that were his eyes. , , , what port awaits us, davy jones , ,  
or home? I've heard of slaves drifting, drifting, ' , ' , ' playthings  
of wind and storm and chance, their crews', '' ] <class 'list'>  
Word Indices: {'of': 1, 'his': 2, 'are': 3, 'drifting': 4, 'and': 5, 'deep': 6, 'in':  
7, 'the': 8, 'festering': 9, 'hold': 10, 'thy': 11, 'father': 12, 'lies': 13, 'bones':  
14, 'new': 15, 'england': 16, 'pews': 17, 'made': 18, 'those': 19, 'altar': 20, 'light  
s': 21, 'that': 22, 'were': 23, 'eyes.': 24, 'what': 25, 'port': 26, 'awaits': 27, 'u  
s': 28, 'davy': 29, 'jones'': 30, 'or': 31, 'home': 32, 'i've': 33, 'heard': 34, 'slav  
ers': 35, 'playthings': 36, 'wind': 37, 'storm': 38, 'chance': 39, 'their': 40, 'crew  
s': 41}
```

```
In [3]:  
vocab_size = len(tokenizer.word_index) + 1  
print("Vocab Size:", vocab_size)  
  
sequences=tokenizer.texts_to_sequences(data_splitted) #list of list  
l=len(sequences)  
print("Sequences:", sequences, type(sequences), l)
```

```
Vocab Size: 42  
Sequences: [[6, 7, 8, 9, 10, 11, 12, 13], [], [1, 2, 14, 15, 16, 17, 3, 18], [], [19,  
3, 20, 21, 22, 23, 2, 24], [], [25, 26, 27, 28, 29, 30], [], [31, 32, 33, 34, 1, 35,  
4, 4], [], [36, 1, 37, 5, 38, 5, 39, 40, 41], []] <class 'list'> 12
```

```
In [4]:  
X=list()  
y=list()  
  
for i in range(len(sequences)):  
    X.insert(i,sequences[i][:-1])  
    y.insert(i,sequences[i])  
  
print("X=", X, "y=", y, type(X), type(y))  
  
maxlen = maxlen([len(sequence) for sequence in X])  
print("Maxlen:", maxlen)
```

```
X= [[6, 7, 8, 9, 10, 11, 12], [], [1, 2, 14, 15, 16, 17, 3], [], [19, 3, 20, 21, 22, 2  
3, 2], [], [25, 26, 27, 28, 29], [], [31, 32, 33, 34, 1, 35, 4], [], [36, 1, 37, 5, 3  
8, 5, 39, 40], []] y= [[6, 7, 8, 9, 10, 11, 12, 13], [], [1, 2, 14, 15, 16, 17, 3, 1  
8], [], [19, 3, 20, 21, 22, 23, 2, 24], [], [25, 26, 27, 28, 29, 30], [], [31, 32, 33,  
34, 1, 35, 4, 4], [], [36, 1, 37, 5, 38, 5, 39, 40, 41], []] <class 'list'> <class 'li  
st'>  
Maxlen: 8
```

```
In [5]:  
X=pad_sequences(X,maxlen=maxlen+1,padding='pre') # +1 to have 0 as the first input  
print("X:",X, type(X), X.shape)  
y=pad_sequences(y,maxlen=maxlen+1,padding='pre')  
print("y:",y, type(y), y.shape)
```

```
X: [[ 0  0   6   7   8   9 10 11 12]  
[ 0  0   0   0   0   0   0   0]  
[ 0  0   1   2 14 15 16 17   3]  
[ 0  0   0   0   0   0   0   0]  
[ 0  0 19   3 20 21 22 23   2]  
[ 0  0   0   0   0   0   0   0]  
[ 0  0   0   0 25 26 27 28 29]  
[ 0  0   0   0   0   0   0   0]  
[ 0  0 31 32 33 34 1 35   4]  
[ 0  0   0   0   0   0   0   0]  
[ 0 36 1 37 5 38 5 39 40]  
[ 0  0   0   0   0   0   0   0]] <class 'numpy.ndarray'> (12, 9)  
y: [[ 0  6   7   8   9 10 11 12 13]  
[ 0  0   0   0   0   0   0   0]  
[ 0  1 2 14 15 16 17 3 18]  
[ 0  0   0   0   0   0   0   0]  
[ 0 19 3 20 21 22 23 2 24]  
[ 0  0   0   0   0   0   0   0]  
[ 0  0   0 25 26 27 28 29 30]
```

```
[ 0  0  0  0  0  0  0  0  0  0]
[ 0 31 32 33 34  1 35  4  4]
[ 0  0  0  0  0  0  0  0  0]
[36  1 37  5 38  5 39 40 41]
[ 0  0  0  0  0  0  0  0  0]] <class 'numpy.ndarray'> (12, 9)
```

```
In [6]:  
y=to_categorical(y,num_classes=vocab_size)  
  
print("X=", X, "y=", y, type(X), type(y), X.shape, y.shape)
```

```
X= [[ 0  0  6  7  8  9 10 11 12]
 [ 0  0  0  0  0  0  0  0  0]
 [ 0  0  1  2 14 15 16 17  3]
 [ 0  0  0  0  0  0  0  0  0]
 [ 0  0 19  3 20 21 22 23  2]
 [ 0  0  0  0  0  0  0  0  0]
 [ 0  0  0  0 25 26 27 28 29]
 [ 0  0  0  0  0  0  0  0  0]
 [ 0  0 31 32 33 34  1 35  4]
 [ 0  0  0  0  0  0  0  0  0]
 [ 0 36  1 37  5 38  5 39 40]
 [ 0  0  0  0  0  0  0  0  0]] y= [[[1. 0. 0. ... 0. 0. 0.]
 [0. 0. 0. ... 0. 0. 0.]
 [0. 0. 0. ... 0. 0. 0.]
 ...
 [0. 0. 0. ... 0. 0. 0.]
 [0. 0. 0. ... 0. 0. 0.]
 [0. 0. 0. ... 0. 0. 0.]]
 ...
 [[1. 0. 0. ... 0. 0. 0.]
 [1. 0. 0. ... 0. 0. 0.]
 [1. 0. 0. ... 0. 0. 0.]
 ...
 [1. 0. 0. ... 0. 0. 0.]
 [1. 0. 0. ... 0. 0. 0.]
 [1. 0. 0. ... 0. 0. 0.]]
 ...
 [[1. 0. 0. ... 0. 0. 0.]
 [0. 1. 0. ... 0. 0. 0.]
 [0. 0. 1. ... 0. 0. 0.]
 ...
 [0. 0. 0. ... 0. 0. 0.]
 [0. 0. 0. ... 0. 0. 0.]
 [0. 0. 0. ... 0. 0. 0.]]
 ...
 [[1. 0. 0. ... 0. 0. 0.]
 [1. 0. 0. ... 0. 0. 0.]
 [1. 0. 0. ... 0. 0. 0.]
 ...
 [1. 0. 0. ... 0. 0. 0.]
 [1. 0. 0. ... 0. 0. 0.]
 [1. 0. 0. ... 0. 0. 0.]]
 ...
 [[0. 0. 0. ... 0. 0. 0.]
 [0. 1. 0. ... 0. 0. 0.]
 [0. 0. 1. ... 0. 0. 0.]
 ...
 [0. 0. 0. ... 1. 0. 0.]
 [0. 0. 0. ... 0. 1. 0.]
 [0. 0. 0. ... 0. 0. 1.]]
 ...
 [[1. 0. 0. ... 0. 0. 0.]
 [1. 0. 0. ... 0. 0. 0.]
 [1. 0. 0. ... 0. 0. 0.]
 ...
 [1. 0. 0. ... 0. 0. 0.]
 [1. 0. 0. ... 0. 0. 0.]
 [1. 0. 0. ... 0. 0. 0.]] <class 'numpy.ndarray'> <class 'numpy.ndarray'> (12, 9) (1
```

```
2, 9, 42)
```

```
In [7]:  
model=Sequential()  
model.add(Embedding(input_dim=vocab_size, output_dim=10))  
print(model.output_shape)  
model.add(SimpleRNN(units=50, return_sequences=True))  
print(model.output_shape)  
model.add(Dense(units=vocab_size,activation='softmax'))  
model.summary()  
  
print("Input Shape of all Layers:",model.layers[0].input_shape,model.layers[1].input_shape,  
model.layers[2].input_shape)  
print("Input Dim:",model.layers[0].input_dim)
```

```
(None, None, 10)
```

```
2022-05-06 14:36:29.939570: I tensorflow/core/common_runtime/process_util.cc:146] Creating new thread pool with default inter op setting: 2. Tune using inter_op_parallelism_threads for best performance.
```

```
(None, None, 50)  
Model: "sequential"
```

Layer (type)	Output Shape	Param #
embedding (Embedding)	(None, None, 10)	420
simple_rnn (SimpleRNN)	(None, None, 50)	3050
dense (Dense)	(None, None, 42)	2142
Total params:	5,612	
Trainable params:	5,612	
Non-trainable params:	0	

```
-----  
Input Shape of all Layers: (None, None) (None, None, 10) (None, None, 50)  
Input Dim: 42
```

```
In [8]:  
model.compile(optimizer="rmsprop", loss="categorical_crossentropy", metrics=['accuracy'])  
  
model.fit(X, y, epochs=200, verbose=0)
```

```
2022-05-06 14:36:30.277642: I tensorflow/compiler/mlir/mlir_graph_optimization_pass.c  
c:185] None of the MLIR Optimization Passes are enabled (registered 2)
```

```
Out[8]:  
<keras.callbacks.History at 0x7f8b984fb490>
```

```
In [9]:  
def sample_all_seq_wo_seed(model, tokenizer, n_words, vocab_size): #all the words are sampled  
    encoded=list()  
    in_text = ''  
    # generate a fixed number of words = n_words  
    for i in range(n_words):  
        # encode the text as integer  
        encoded = tokenizer.texts_to_sequences([in_text])[0] # for words not in the vocabulary  
        if returns []:  
            print("i:", i, "Encoded:",encoded)  
            # pre-pad sequences to a fixed length  
            #encoded = pad_sequences([encoded], maxlen=max_length, padding='pre')  
            encoded.insert(0,0)  
            encoded=array(encoded)  
            encoded=numpy.reshape(encoded,newshape=(1,-1))  
            print("i:", i, "Encoded:",encoded, encoded.shape)  
            # predict probability and sample a word from vocab  
            if i == 0:
```

```

        prob = model.predict(encoded, verbose=0)
        print("i:", i, "Prob:", prob, type(prob), prob.shape)
        yhat=0
        while yhat == 0:
            yhat=numpy.random.choice(range(vocab_size),p=prob.ravel())
        yhat=[yhat]
        yhat=array(yhat)
        yhat=numpy.reshape(yhat,newshape=(1,-1))
        print("i:", i, "If yhat:", yhat, yhat.shape)
    else:
        prob = model.predict(encoded, verbose=0)
        print("i:", i, "Prob:", prob, type(prob), prob.shape)
        yhat=numpy.append(yhat,0) #just creating space for the next yhat
        yhat=numpy.reshape(yhat,newshape=(1,-1))
        while yhat[0,i] == 0:
            yhat[0,i]=numpy.random.choice(range(vocab_size),p=prob[0,i].ravel())
        print("i:", i, "Else yhat:", yhat, yhat.shape)

# map predicted word index to word
out_word = ''
for word, index in tokenizer.word_index.items():
    if index == yhat[0,i]:
        out_word = word
        #print("index:", index, "out_word:", out_word)
        break

# append to input
in_text = in_text + out_word + ' '
return in_text

```

In [10]:

```

print("-----sample all seq without seed-----")
print(sample_all_seq_wo_seed(model, tokenizer, 8, vocab_size))
print("-----")

```

```

-----sample all seq without seed-----
i: 0 Encoded: []
i: 0 Encoded: [[0]] (1, 1)
i= 0 Prob: [[[8.0643690e-01 9.2318133e-03 4.1410034e-03 5.7523265e-03 4.2269784e-03
  6.0244865e-04 2.6597133e-02 2.4160494e-03 3.7575632e-04 1.7523196e-03
  1.2282119e-03 8.0484524e-04 6.1323895e-04 2.4282699e-03 1.1037427e-03
  1.3115929e-03 1.6214408e-03 2.4087643e-03 1.1511584e-03 1.6596120e-02
  1.4385926e-03 3.0712576e-03 2.8903806e-03 9.3258191e-03 1.4952599e-03
  8.7563479e-03 2.7778975e-03 2.3075461e-03 2.0957375e-03 2.1558350e-03
  8.2405342e-04 1.7763002e-02 5.5762017e-03 2.0091517e-03 3.4940555e-03
  7.4961683e-04 3.1205000e-02 2.7203362e-04 1.1279900e-03 3.4603304e-03
  4.8816497e-03 1.5223001e-03]]] <class 'numpy.ndarray'> (1, 1, 42)
i: 0 If yhat: [[36]] (1, 1)
i: 1 Encoded: [36]
i: 1 Encoded: [[ 0 36]] (1, 2)
i= 1 Prob: [[[8.0643678e-01 9.2318160e-03 4.1410048e-03 5.7523283e-03 4.2269798e-03
  6.0244859e-04 2.6597148e-02 2.4160501e-03 3.7575662e-04 1.7523194e-03
  1.2282130e-03 8.0484588e-04 6.1323884e-04 2.4282709e-03 1.1037436e-03
  1.3115932e-03 1.6214420e-03 2.4087650e-03 1.1511587e-03 1.6596125e-02
  1.4385930e-03 3.0712588e-03 2.8903815e-03 9.3258219e-03 1.4952604e-03
  8.7563517e-03 2.7778985e-03 2.3075468e-03 2.0957382e-03 2.1558357e-03
  8.2405371e-04 1.7763007e-02 5.5762036e-03 2.0091534e-03 3.4940564e-03
  7.4961712e-04 3.1205017e-02 2.7203356e-04 1.1279910e-03 3.4603334e-03
  4.8816488e-03 1.5223013e-03]
[3.0724229e-02 6.2386900e-01 5.0431300e-02 3.2761887e-02 2.0980542e-03
  1.7563843e-04 3.4837265e-02 1.8947573e-02 6.0873484e-04 2.3745111e-04
  2.7961252e-04 6.9109793e-04 2.0058271e-04 2.9279146e-04 6.7168439e-04
  7.6756626e-04 5.0471112e-04 3.8410185e-04 2.5728964e-03 6.8614677e-02
  2.3894756e-04 1.0389154e-03 6.0270759e-03 2.6492379e-03 1.7561935e-03
  2.7362769e-03 8.0515193e-03 1.5984568e-03 2.8098037e-03 4.4831582e-03
  4.6031210e-03 3.9584376e-02 3.4400262e-02 1.3941317e-03 3.6536928e-03
  1.1170601e-03 2.7861621e-03 2.5436683e-03 3.5596563e-04 3.1262438e-03
  1.3163376e-03 4.0585184e-03]]] <class 'numpy.ndarray'> (1, 2, 42)
i: 1 Else yhat: [[36  1]] (1, 2)
i: 2 Encoded: [36, 1]

```

```

i: 2 Encoded: [[ 0 36 1]] (1, 3)
i= 2 Prob: [[[8.0643678e-01 9.2318160e-03 4.1410048e-03 5.7523283e-03 4.2269798e-03
 6.0244830e-04 2.6597140e-02 2.4160501e-03 3.7575662e-04 1.7523194e-03
 1.2282124e-03 8.0484588e-04 6.1323884e-04 2.4282709e-03 1.1037436e-03
 1.3115932e-03 1.6214420e-03 2.4087650e-03 1.1511587e-03 1.6596122e-02
 1.4385930e-03 3.0712588e-03 2.8903815e-03 9.3258219e-03 1.4952604e-03
 8.7563517e-03 2.7778985e-03 2.3075468e-03 2.0957382e-03 2.1558357e-03
 8.2405371e-04 1.7763007e-02 5.5762036e-03 2.0091534e-03 3.4940564e-03
 7.4961712e-04 3.1205017e-02 2.7203356e-04 1.1279910e-03 3.4603334e-03
 4.8816511e-03 1.5223013e-03]
[3.0724237e-02 6.2386900e-01 5.0431300e-02 3.2761887e-02 2.0988542e-03
 1.7563860e-04 3.4837265e-02 1.8947573e-02 6.0873484e-04 2.3745111e-04
 2.7961252e-04 6.9109793e-04 2.0058251e-04 2.9279146e-04 6.7168468e-04
 7.6756626e-04 5.0471112e-04 3.8410185e-04 2.5728964e-03 6.8614677e-02
 2.3894756e-04 1.0389154e-03 6.0270759e-03 2.6492379e-03 1.7561943e-03
 2.7362769e-03 8.0515193e-03 1.5984568e-03 2.8098037e-03 4.4831582e-03
 4.6031210e-03 3.9584376e-02 3.4400262e-02 1.3941317e-03 3.6536912e-03
 1.1170601e-03 2.7861621e-03 2.5436697e-03 3.5596563e-04 3.1262438e-03
 1.3163377e-03 4.0585184e-03]
[5.1142363e-04 6.9430174e-04 3.5088759e-02 9.3203140e-03 2.6129995e-04
 1.8035783e-03 2.1997681e-04 3.7029099e-02 6.3388422e-02 1.5909588e-03
 2.9826281e-04 6.1737781e-04 6.0305097e-03 2.7009388e-04 6.3228078e-02
 9.4905408e-04 4.0518850e-04 2.7288622e-04 4.2777322e-03 3.4107300e-04
 2.6816577e-02 3.6492173e-04 2.9435856e-04 3.1724852e-04 1.5823742e-02
 1.4746758e-03 9.95066683e-04 6.3123545e-03 1.9482251e-03 1.1739590e-03
 3.9653666e-03 4.8599025e-04 9.3343686e-03 1.6728930e-02 5.2865018e-04
 1.8401952e-02 1.1362118e-04 6.6589594e-01 5.1664043e-05 1.7920353e-04
 7.5470499e-04 1.4400973e-03]]] <class 'numpy.ndarray'> (1, 3, 42)

i: 2 Else yhat: [[36 1 37]] (1, 3)
i: 3 Encoded: [36, 1, 37]
i: 3 Encoded: [[ 0 36 1 37]] (1, 4)
i= 3 Prob: [[[8.06436896e-01 9.23181325e-03 4.14100336e-03 5.75232645e-03
 4.22697840e-03 6.02448650e-04 2.65971329e-02 2.41604936e-03
 3.75756325e-04 1.75231963e-03 1.22821191e-03 8.04845244e-04
 6.13238954e-04 2.42826995e-03 1.10374275e-03 1.31159287e-03
 1.62144075e-03 2.40876433e-03 1.15115836e-03 1.65961199e-02
 1.43859256e-03 3.07125761e-03 2.89038057e-03 9.32581909e-03
 1.49525993e-03 8.75634793e-03 2.77789752e-03 2.30754609e-03
 2.09573749e-03 2.15583504e-03 8.24053423e-04 1.77630018e-02
 5.57620171e-03 2.00915174e-03 3.49405548e-03 7.49616825e-04
 3.12050004e-02 2.72033620e-04 1.12798996e-03 3.46033042e-03
 4.88164974e-03 1.5223007e-03]
[3.07242200e-02 6.23869061e-01 5.04312813e-02 3.27618644e-02
 2.09805346e-03 1.75638459e-04 3.48372534e-02 1.89475659e-02
 6.08734612e-04 2.37451022e-04 2.79612548e-04 6.91097346e-04
 2.00582523e-04 2.92791199e-04 6.71684451e-04 7.67565973e-04
 5.04710944e-04 3.84101906e-04 2.57289549e-03 6.86146468e-02
 2.38947337e-04 1.03891490e-03 6.02707360e-03 2.64923670e-03
 1.75619288e-03 2.73627462e-03 8.05151742e-03 1.59845618e-03
 2.80980254e-03 4.48315637e-03 4.60311677e-03 3.95843610e-02
 3.44002657e-02 1.39413110e-03 3.65369138e-03 1.11705961e-03
 2.78616091e-03 2.54366733e-03 3.55965662e-04 3.12624266e-03
 1.31633657e-03 4.05851705e-03]
[5.11423394e-04 6.94301154e-04 3.50887291e-02 9.32030566e-03
 2.61299865e-04 1.80357764e-03 2.19976617e-04 3.70290689e-02
 6.33884296e-02 1.59095810e-03 2.98262836e-04 6.17377576e-04
 6.03051065e-03 2.70093646e-04 6.32280558e-02 9.49053734e-04
 4.05188359e-04 2.72886129e-04 4.27773269e-03 3.41072853e-04
 2.68165600e-02 3.64921434e-04 2.94358440e-04 3.17248225e-04
 1.58237256e-02 1.47467456e-03 9.95066483e-04 6.31234888e-03
 1.94822438e-03 1.17395795e-03 3.96536710e-03 4.85990051e-04
 9.33436956e-03 1.67289246e-02 5.28650009e-04 1.84019394e-02
 1.13621085e-04 6.65895998e-01 5.16640539e-05 1.79203373e-04
 7.54704699e-04 1.44009688e-03]
[7.07615618e-05 6.38565762e-05 7.25072983e-04 2.27908589e-04
 2.23205541e-03 5.23867190e-01 9.18404185e-05 1.35036395e-03
 7.02589899e-02 9.18377489e-02 1.40853068e-02 1.21038512e-03
 3.09339073e-03 4.90004290e-03 3.43544595e-02 3.74101028e-02
 4.81214887e-03 2.23266217e-03 3.66886053e-03 7.53072673e-05
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i: 7 Else yhat: [[36 1 37 15 16 23 12 40]] (1, 8)  
playthings of wind new england were father their
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In [11]:

```
def prob_of_input_sentence(model, tokenizer, sentence):  
    print("Input Sentence:", sentence)  
    encoded=tokenizer.texts_to_sequences([sentence])[0]  
    print("encoded before insert:", encoded)  
    encoded.insert(0,0)  
    encoded=array(encoded)  
    encoded=numpy.reshape(encoded,newshape=(1,-1))  
    print("Encoded:", encoded, encoded.shape)  
    prob=model.predict(encoded, verbose=0)  
    print("Prob:", prob, prob.shape)  
    probability=1  
    for i in range(prob.shape[1]-1):  
        probability = probability * prob[0,i,encoded[0,i+1]]  
    print("Probability of Sentence", "\\", sentence, "\",", "is:", probability)
```

In [12]:

```
print("-----Probability of Input Sentence-----")  
prob_of_input_sentence(model, tokenizer, "Deep in the festering")  
prob_of_input_sentence(model, tokenizer, "lights that were his nose")  
prob_of_input_sentence(model, tokenizer, "lights that were his")  
prob_of_input_sentence(model, tokenizer, "gone blind, the")  
print("-----")
```

```
-----Probability of Input Sentence-----  
Input Sentence: Deep in the festering  
encoded before insert: [6, 7, 8, 9]  
Encoded: [[0 6 7 8 9]] (1, 5)  
Prob: [[[8.06436896e-01 9.23181325e-03 4.14100336e-03 5.75232645e-03  
4.22697840e-03 6.02448650e-04 2.65971329e-02 2.41604936e-03  
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1.26049332e-02 9.57661308e-04 8.79588421e-04 7.41650024e-03
2.10472615e-03 1.33745885e-03 3.49841733e-03 2.43381626e-04
5.24067460e-03 1.58446860e-02 6.09244627e-04 2.05645692e-02
6.87558640e-05 6.57135129e-01 7.78225294e-05 1.19160315e-04
5.40613371e-04 1.17068819e-03]
[2.74348185e-05 7.02632096e-05 3.19400453e-04 1.26877640e-04
2.43007788e-03 5.83074987e-01 4.96994071e-05 5.95713034e-04
4.49206308e-02 1.00091323e-01 1.96079724e-02 1.99526316e-03
3.55430995e-03 3.91997816e-03 1.55022889e-02 4.96919453e-02
7.72571843e-03 2.49076076e-03 2.27306900e-03 4.42872406e-05
1.01398490e-02 4.19295542e-02 3.98056442e-03 6.41376944e-04
4.02907468e-03 5.53611666e-04 3.09101515e-03 4.51761717e-03
6.16939738e-03 4.58055502e-03 6.05432689e-03 6.57997807e-05
3.33471980e-04 1.30176237e-02 1.86198018e-02 4.67861351e-03
4.75868961e-04 2.74337712e-03 2.99617499e-02 1.67964085e-04
1.43456185e-04 5.59333572e-03]
[1.49035859e-05 5.92439435e-04 3.11599470e-05 4.80210329e-05
1.88180187e-03 3.44151370e-02 6.82035679e-05 2.19980266e-05
4.91290994e-04 2.82339901e-02 2.11748958e-01 1.69667229e-02
1.94593554e-03 1.89746474e-03 2.62870832e-04 2.00860202e-02
7.09415600e-02 5.54735446e-03 1.01373480e-04 3.66669265e-05
2.14373737e-04 6.42532436e-03 1.59267038e-02 1.81355025e-03
1.98890048e-04 5.06729884e-05 7.25266465e-04 1.77510164e-03
2.68463674e-03 3.44472309e-03 2.47622188e-03 7.85346201e-05
2.36722772e-05 7.25818973e-05 3.26284976e-03 7.17237068e-04
1.31106924e-03 2.03209012e-04 5.62112331e-01 9.28712951e-04
8.47226765e-05 1.35751834e-04]] (1, 5, 42)

```

Probability of Sentence " Deep in the festering " is: 6.796489420620258e-06

Input Sentence: lights that were his nose

encoded before insert: [21, 22, 23, 2]

Encoded: [[ 0 21 22 23 2]] (1, 5)

Prob: [[[8.06436896e-01 9.23181325e-03 4.14100336e-03 5.75232645e-03

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4.22697840e-03 6.02448650e-04 2.65971329e-02 2.41604936e-03
3.75756325e-04 1.75231963e-03 1.22821191e-03 8.04845244e-04
6.13238954e-04 2.42826995e-03 1.10374275e-03 1.31159287e-03
1.62144075e-03 2.48876433e-03 1.15115836e-03 1.65961199e-02
1.43859256e-03 3.07125761e-03 2.89038057e-03 9.32581909e-03
1.49525993e-03 8.75634793e-03 2.77789752e-03 2.30754609e-03
2.09573749e-03 2.15583504e-03 8.24053423e-04 1.77630018e-02
5.57620171e-03 2.00915174e-03 3.49405548e-03 7.49616825e-04
3.12050004e-02 2.72033620e-04 1.12798996e-03 3.46033042e-03
4.88164974e-03 1.52230007e-03]
[3.67812991e-01 2.83590287e-01 1.69791952e-02 1.50476480e-02
1.64826610e-03 2.06046916e-05 7.41471946e-02 7.77414208e-03
1.27421648e-04 1.12309404e-04 7.62326745e-05 2.18767906e-04
6.09017479e-05 2.48102035e-04 2.09251579e-04 3.08818620e-04
1.71905427e-04 1.67249105e-04 9.92882415e-04 1.00805894e-01
1.78274960e-04 6.75670453e-04 2.36221449e-03 2.52092979e-03
7.78728048e-04 6.51728734e-03 5.03064971e-03 6.89095759e-04
1.25692319e-03 1.44328654e-03 6.93259703e-04 7.55538940e-02
1.65251344e-02 6.81777194e-04 2.62526609e-03 2.11172592e-04
5.44085307e-03 3.04232410e-04 1.80107745e-04 2.31166673e-03
1.54391048e-03 1.95556856e-03]
[8.19219172e-01 6.23445725e-03 2.99371537e-02 2.66940612e-02
1.28637010e-04 1.88166468e-05 9.00676288e-03 2.54242104e-02
4.47288243e-04 1.36239236e-04 2.00819541e-05 2.70119635e-05
1.67044200e-04 1.29298103e-04 2.37588235e-03 6.74478142e-05
5.23731505e-05 5.41157933e-05 9.39199992e-04 9.98128857e-03
1.10020000e-03 1.13967275e-04 1.60971031e-04 7.74344313e-04
2.12983391e-03 6.71164365e-03 2.35220557e-03 1.24940835e-03
2.34134190e-04 2.37443499e-04 1.94929744e-04 9.13114380e-03
3.12881544e-02 4.05424926e-03 3.46788373e-04 4.43674362e-04
2.25455919e-03 3.14217177e-03 3.12624479e-06 2.61212001e-04
2.03409139e-03 7.21301360e-04]
[1.40994787e-01 4.22911625e-03 1.71666611e-02 3.69546632e-03
4.54614288e-04 1.19753438e-03 7.35038705e-03 2.57705990e-02
4.36872691e-02 2.70271883e-03 1.67617531e-04 6.11307478e-05
1.04732433e-04 1.03932573e-03 6.57258183e-02 2.51753209e-03
2.39555651e-04 2.03321615e-04 1.89880212e-03 6.07925327e-03
5.87095022e-02 8.56904685e-03 7.81862589e-04 5.72845573e-04
4.94261459e-03 2.57285029e-01 5.62146418e-02 7.14291213e-03
4.69049532e-03 1.35879987e-03 1.05646066e-03 1.04013635e-02

```

2.67473888e-02 1.89602911e-01 1.22751603e-02 1.12927100e-03  
 2.88283685e-03 9.28348023e-03 2.47163378e-04 5.61672241e-05  
 1.27838936e-03 1.94853880e-02 ]  
 [4.19334732e-02 1.93321407e-02 7.28620798e-04 6.02060871e-04  
 3.19712155e-04 2.23861868e-03 1.32385630e-03 3.52481520e-03  
 5.69960382e-03 6.14782348e-02 2.94134044e-03 2.71457306e-04  
 4.45240876e-05 8.39205022e-05 1.38930678e-02 6.19941950e-02  
 6.21361611e-03 2.65002163e-04 8.93675024e-05 1.47679099e-03  
 3.14056710e-03 6.51234835e-02 1.79496054e-02 1.05438987e-03  
 9.71605128e-04 8.25236272e-03 2.83660859e-01 9.71214697e-02  
 1.50744673e-02 6.05964614e-03 2.66061537e-03 3.02460627e-03  
 2.90070334e-03 1.33791808e-02 2.38314942e-01 1.15324638e-03  
 2.47083395e-03 1.50868809e-03 6.29566796e-03 2.45901774e-05  
 1.14774877e-04 5.28930407e-03]]] (1, 5, 42)  
 Probability of Sentence " lights that were his nose " is: 9.643962709010138e-11  
 Input Sentence: lights that were his  
 encoded before insert: [21, 22, 23, 2]  
 Encoded: [[ 0 21 22 23 2]] (1, 5)  
 Prob: [[[8.06436896e-01 9.23181325e-03 4.14100336e-03 5.75232645e-03  
 4.22697840e-03 6.02448650e-04 2.65971329e-02 2.41604936e-03  
 3.75756325e-04 1.75231963e-03 1.22821191e-03 8.04845244e-04  
 6.13238954e-04 2.42826995e-03 1.10374275e-03 1.31159287e-03  
 1.62144075e-03 2.48876433e-03 1.15115836e-03 1.65961199e-02  
 1.43859256e-03 3.07125761e-03 2.89038057e-03 9.32581909e-03  
 1.49525993e-03 8.75634793e-03 2.77789752e-03 2.30754609e-03  
 2.09573749e-03 2.15583504e-03 8.24053423e-04 1.77630018e-02  
 5.57620171e-03 2.00915174e-03 3.49405548e-03 7.49616825e-04  
 3.12050004e-02 2.72033620e-04 1.12798996e-03 3.46033042e-03  
 4.88164974e-03 1.52230007e-03 ]  
 [3.67812991e-01 2.83590287e-01 1.69791952e-02 1.50476480e-02  
 1.64826610e-03 2.06046916e-05 7.41471946e-02 7.77414208e-03  
 1.27421648e-04 1.12309404e-04 7.62326745e-05 2.18767906e-04  
 6.09017479e-05 2.48102035e-04 2.09251579e-04 3.08818620e-04  
 1.71905427e-04 1.67249105e-04 9.92882415e-04 1.00805894e-01  
 1.78274968e-04 6.75670453e-04 2.36221449e-03 2.52092979e-03  
 7.78728048e-04 6.51728734e-03 5.03064971e-03 6.89095759e-04  
 1.25692319e-03 1.44328654e-03 6.93259703e-04 7.55538940e-02  
 1.65251344e-02 6.81777194e-04 2.62526609e-03 2.11172592e-04  
 5.44085307e-03 3.04232410e-04 1.80187745e-04 2.31166673e-03  
 1.54391048e-03 1.95556856e-03 ]  
 [8.19219172e-01 6.23445725e-03 2.99371537e-02 2.66940612e-02  
 1.28637010e-04 1.88166468e-05 9.00676288e-03 2.54242104e-02  
 4.47288243e-04 1.36239236e-04 2.00819541e-05 2.70119635e-05  
 1.67044200e-04 1.29298103e-04 2.37588235e-03 6.74478142e-05  
 5.23731505e-05 5.41157933e-05 9.39199992e-04 9.98128857e-03  
 1.10020000e-03 1.13967275e-04 1.60971031e-04 7.74344313e-04  
 2.12983391e-03 6.71164365e-03 2.35220557e-03 1.24940835e-03  
 2.34134190e-04 2.37443499e-04 1.94929744e-04 9.13114380e-03  
 3.12881544e-02 4.05424926e-03 3.46708373e-04 4.43674362e-04  
 2.25455919e-03 3.14217177e-03 3.12624479e-06 2.61212001e-04  
 2.03409139e-03 7.21301360e-04 ]  
 [1.40994787e-01 4.22911625e-03 1.71666611e-02 3.69546632e-03  
 4.54614288e-04 1.19753438e-03 7.35038705e-03 2.57705990e-02  
 4.36872691e-02 2.70271883e-03 1.67617531e-04 6.11307478e-05  
 1.04732433e-04 1.03932573e-03 6.57258183e-02 2.51753209e-03  
 2.39555651e-04 2.03321615e-04 1.89880212e-03 6.07925327e-03  
 5.87095022e-02 8.56904685e-03 7.81862589e-04 5.72845573e-04  
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 4.69049532e-03 1.35879987e-03 1.05646066e-03 1.04013635e-02  
 2.67473888e-02 1.89602911e-01 1.22751603e-02 1.12927100e-03  
 2.88283685e-03 9.28348023e-03 2.47163378e-04 5.61672241e-05  
 1.27838936e-03 1.94853880e-02 ]  
 [4.19334732e-02 1.93321407e-02 7.28620798e-04 6.02060871e-04  
 3.19712155e-04 2.23861868e-03 1.32385630e-03 3.52481520e-03  
 5.69960382e-03 6.14782348e-02 2.94134044e-03 2.71457306e-04  
 4.45240876e-05 8.39205022e-05 1.38930678e-02 6.19941950e-02  
 6.21361611e-03 2.65002163e-04 8.93675024e-05 1.47679099e-03  
 3.14056710e-03 6.51234835e-02 1.79496054e-02 1.05438987e-03  
 9.71605128e-04 8.25236272e-03 2.83660859e-01 9.71214697e-02  
 1.50744673e-02 6.05964614e-03 2.66061537e-03 3.02460627e-03  
 2.90070334e-03 1.33791808e-02 2.38314942e-01 1.15324638e-03  
 2.47083395e-03 1.50868809e-03 6.29566796e-03 2.45901774e-05

```

1.14774877e-04 5.28930407e-03]]] (1, 5, 42)
Probability of Sentence " lights that were his " is: 9.643962709010138e-11
Input Sentence: gone blind, the
encoded before insert: [8]
Encoded: [[0 8]] (1, 2)
Prob: [[[8.0643678e-01 9.2318160e-03 4.1410048e-03 5.7523283e-03 4.2269798e-03
6.0244859e-04 2.6597140e-02 2.4160501e-03 3.7575662e-04 1.7523194e-03
1.2282130e-03 8.0484588e-04 6.1323884e-04 2.4282709e-03 1.1037436e-03
1.3115932e-03 1.6214420e-03 2.4087650e-03 1.1511587e-03 1.6596125e-02
1.4385930e-03 3.0712588e-03 2.8903815e-03 9.3258219e-03 1.4952604e-03
8.7563517e-03 2.7778985e-03 2.3075468e-03 2.0957382e-03 2.1558357e-03
8.2405371e-04 1.7763007e-02 5.5762036e-03 2.0091534e-03 3.4940564e-03
7.4961712e-04 3.1205017e-02 2.7203356e-04 1.1279910e-03 3.4603334e-03
4.8816488e-03 1.5223013e-03]
[1.6558632e-02 6.1582530e-01 6.3434035e-02 4.6618205e-02 2.1181889e-03
2.5349323e-04 2.6881404e-02 2.6221110e-02 9.4957568e-04 2.6177414e-04
3.5565597e-04 9.3011849e-04 3.4284976e-04 2.8783953e-04 8.8174461e-04
8.9860905e-04 7.0746429e-04 4.1835997e-04 3.6409029e-03 6.0329691e-02
3.3248332e-04 9.8213775e-04 6.2249880e-03 2.4235841e-03 2.1862194e-03
2.4091376e-03 8.1160776e-03 1.8504328e-03 3.1422111e-03 4.9041156e-03
6.5623187e-03 3.2256927e-02 3.6527235e-02 1.6745111e-03 3.4292806e-03
1.5908590e-03 2.3734765e-03 4.5370664e-03 4.0625167e-04 3.3252772e-03
1.4994681e-03 5.3310306e-03]]] (1, 2, 42)
Probability of Sentence " gone blind, the " is: 0.0003757566155400127
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```

## Continue exploring



**Data**  
1 input and 0 output



**Logs**  
33.6 second run - successful



**Comments**  
0 comments

