Translation using Character Level Seq2Seq Model

```
%tensorflow_version 1.14
import tensorflow.compat.v1 as tf
tf.disable_v2_behavior()
from tensorflow import keras
from IPython import display
from matplotlib import cm
from matplotlib import gridspec
from matplotlib import pyplot as plt
import numpy as np
import pandas as pd
from tensorflow.python.data import Dataset
from sklearn import preprocessing
from sklearn.preprocessing import StandardScaler
print(tf.__version__)
import string
from string import digits
%matplotlib inline
import re
from sklearn.utils import shuffle
from sklearn.model_selection import train_test_split
from keras.layers import Input, LSTM, Embedding, Dense
from keras.models import Model
```

```
`%tensorflow_version` only switches the major version: 1.x or 2.x.
You set: `1.14`. This will be interpreted as: `1.x`.


TensorFlow 1.x selected.
WARNING:tensorflow:From /tensorflow-1.15.2/python3.6/tensorflow_core/python/compa
Instructions for updating:
non-resource variables are not supported in the long term
1.15.2
Using TensorFlow backend.
```

```
!wget -N http://www.manythings.org/anki/hin-eng.zip
!unzip -o hin-eng.zip
```

```
--2020-04-08 02:02:11--  http://www.manythings.org/anki/hin-eng.zip
Resolving www.manythings.org (www.manythings.org)... 104.24.109.196, 104.24.108.1
Connecting to www.manythings.org (www.manythings.org)|104.24.109.196|:80... conne
HTTP request sent, awaiting response... 304 Not Modified
File ‘hin-eng.zip’ not modified on server. Omitting download.

Archive:  hin-eng.zip
  inflating: hin.txt
  inflating: _about.txt
```

```
batch_size = 64  # Batch size for training.
epochs = 500  # Number of epochs to train for.
latent_dim = 256  # Latent dimensionality of the encoding space.
num_samples = 10000  # Number of samples to train on.
# Path to the data txt file on disk.
data_path = 'hin.txt'


# Vectorize the data.
input_texts = []
target_texts = []
input_characters = set()
target_characters = set()
with open(data_path, 'r', encoding='utf-8') as f:
    lines = f.read().split('\n')
for line in lines[: min(num_samples, len(lines) - 1)]:
    input_text, target_text, _ = line.split('\t')
    # We use "tab" as the "start sequence" character
    # for the targets, and "\n" as "end sequence" character.
    target_text = '\t' + target_text + '\n'
    input_texts.append(input_text)
    target_texts.append(target_text)
    for char in input_text:
        if char not in input_characters:
            input_characters.add(char)
    for char in target_text:
        if char not in target_characters:
            target_characters.add(char)

input_characters = sorted(list(input_characters))
target_characters = sorted(list(target_characters))
num_encoder_tokens = len(input_characters)
num_decoder_tokens = len(target_characters)
max_encoder_seq_length = max([len(txt) for txt in input_texts])
max_decoder_seq_length = max([len(txt) for txt in target_texts])

print('Number of samples:', len(input_texts))
print('Number of unique input tokens:', num_encoder_tokens)
print('Number of unique output tokens:', num_decoder_tokens)
print('Max sequence length for inputs:', max_encoder_seq_length)
print('Max sequence length for outputs:', max_decoder_seq_length)
```

```
Number of samples: 2778
Number of unique input tokens: 70
Number of unique output tokens: 92
Max sequence length for inputs: 107
Max sequence length for outputs: 123
```

```
input_token_index = dict(
    [(char, i) for i, char in enumerate(input_characters)])
target_token_index = dict(
    [(char, i) for i, char in enumerate(target_characters)])
```

```
encoder_input_data = np.zeros(
    (len(input_texts), max_encoder_seq_length, num_encoder_tokens),
    dtype='float32')
decoder_input_data = np.zeros(
    (len(input_texts), max_decoder_seq_length, num_decoder_tokens),
    dtype='float32')
decoder_target_data = np.zeros(
    (len(input_texts), max_decoder_seq_length, num_decoder_tokens),
    dtype='float32')

for i, (input_text, target_text) in enumerate(zip(input_texts, target_texts)):
    for t, char in enumerate(input_text):
        encoder_input_data[i, t, input_token_index[char]] = 1.
    for t, char in enumerate(target_text):
        # decoder_target_data is ahead of decoder_input_data by one timestep
        decoder_input_data[i, t, target_token_index[char]] = 1.
        if t > 0:
            # decoder_target_data will be ahead by one timestep
            # and will not include the start character.
            decoder_target_data[i, t - 1, target_token_index[char]] = 1.


# Define an input sequence and process it.
encoder_inputs = Input(shape=(None, num_encoder_tokens))
encoder = LSTM(latent_dim, return_state=True)
encoder_outputs, state_h, state_c = encoder(encoder_inputs)
# We discard `encoder_outputs` and only keep the states.
encoder_states = [state_h, state_c]

# Set up the decoder, using `encoder_states` as initial state.
decoder_inputs = Input(shape=(None, num_decoder_tokens))
# We set up our decoder to return full output sequences,
# and to return internal states as well. We don't use the
# return states in the training model, but we will use them in inference.
decoder_lstm = LSTM(latent_dim, return_sequences=True, return_state=True)
decoder_outputs, _, _ = decoder_lstm(decoder_inputs,
                                     initial_state=encoder_states)
decoder_dense = Dense(num_decoder_tokens, activation='softmax')
decoder_outputs = decoder_dense(decoder_outputs)

# Define the model that will turn
# `encoder_input_data` & `decoder_input_data` into `decoder_target_data`
model = Model([encoder_inputs, decoder_inputs], decoder_outputs)
```

```
WARNING:tensorflow:From /usr/local/lib/python3.6/dist-packages/keras/backend/tens

WARNING:tensorflow:From /usr/local/lib/python3.6/dist-packages/keras/backend/tens

WARNING:tensorflow:From /usr/local/lib/python3.6/dist-packages/keras/backend/tens
```

```
# Run training
model.compile(optimizer='rmsprop', loss='categorical_crossentropy')
model.summary()
```

```
WARNING:tensorflow:From /usr/local/lib/python3.6/dist-packages/keras/optimizers.p

WARNING:tensorflow:From /usr/local/lib/python3.6/dist-packages/keras/backend/tens

Model: "model_1"
__________________________________________________________________________________
Layer (type)                    Output Shape         Param #     Connected to
==================================================================================
input_1 (InputLayer)            (None, None, 70)     0
__________________________________________________________________________________
input_2 (InputLayer)            (None, None, 92)     0
__________________________________________________________________________________
lstm_1 (LSTM)                   [(None, 256), (None, 334848      input_1[0][0]
__________________________________________________________________________________
lstm_2 (LSTM)                   [(None, None, 256),  357376      input_2[0][0]
                                                                 lstm_1[0][1]
                                                                 lstm_1[0][2]
__________________________________________________________________________________
dense_1 (Dense)                 (None, None, 92)     23644       lstm_2[0][0]
==================================================================================
Total params: 715,868
Trainable params: 715,868
Non-trainable params: 0
__________________________________________________________________________________
```

```
model.fit([encoder_input_data, decoder_input_data], decoder_target_data,
          batch_size=batch_size,
          epochs=epochs,
          validation_split=0.2)
# Save model
model.save('s2s.h5')
```

```
WARNING:tensorflow:From /tensorflow-1.15.2/python3.6/tensorflow_core/python/ops/m
Instructions for updating:
Use tf.where in 2.0, which has the same broadcast rule as np.where
WARNING:tensorflow:From /usr/local/lib/python3.6/dist-packages/keras/backend/tens

WARNING:tensorflow:From /usr/local/lib/python3.6/dist-packages/keras/backend/tens

WARNING:tensorflow:From /usr/local/lib/python3.6/dist-packages/keras/backend/tens

Train on 2222 samples, validate on 556 samples
Epoch 1/500
WARNING:tensorflow:From /usr/local/lib/python3.6/dist-packages/keras/backend/tens

WARNING:tensorflow:From /usr/local/lib/python3.6/dist-packages/keras/backend/tens

WARNING:tensorflow:From /usr/local/lib/python3.6/dist-packages/keras/backend/tens

WARNING:tensorflow:From /usr/local/lib/python3.6/dist-packages/keras/backend/tens

WARNING:tensorflow:From /usr/local/lib/python3.6/dist-packages/keras/backend/tens

2222/2222 [==============================] - 12s 5ms/step - loss: 0.8228 - val_lo
Epoch 2/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.7601 - val_lo
Epoch 3/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.7254 - val_lo
Epoch 4/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.6630 - val_lo
Epoch 5/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.6138 - val_lo
Epoch 6/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.5782 - val_lo
Epoch 7/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.5476 - val_lo
Epoch 8/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.5241 - val_lo
Epoch 9/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.5059 - val_lo
Epoch 10/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.4915 - val_lo
Epoch 11/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.4789 - val_lo
Epoch 12/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.4687 - val_lo
Epoch 13/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.4588 - val_lo
Epoch 14/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.4512 - val_lo
Epoch 15/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.4520 - val_lo
Epoch 16/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.4365 - val_lo
Epoch 17/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.4298 - val_lo
Epoch 18/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.4234 - val_lo
Epoch 19/500
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2222/2222 [==============================] - 10s 4ms/step - loss: 0.4169 - val_lo
Epoch 20/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.4107 - val_lo
Epoch 21/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.4050 - val_lo
Epoch 22/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.3996 - val_lo
Epoch 23/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.3933 - val_lo
Epoch 24/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.3881 - val_lo
Epoch 25/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.3833 - val_lo
Epoch 26/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.3780 - val_lo
Epoch 27/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.3726 - val_lo
Epoch 28/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.3685 - val_lo
Epoch 29/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.3625 - val_lo
Epoch 30/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.3572 - val_lo
Epoch 31/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.3529 - val_lo
Epoch 32/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.3479 - val_lo
Epoch 33/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.3428 - val_lo
Epoch 34/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.3376 - val_lo
Epoch 35/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.3329 - val_lo
Epoch 36/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.3277 - val_lo
Epoch 37/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.3236 - val_lo
Epoch 38/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.3186 - val_lo
Epoch 39/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.3138 - val_lo
Epoch 40/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.3087 - val_lo
Epoch 41/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.3039 - val_lo
Epoch 42/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.2999 - val_lo
Epoch 43/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.2946 - val_lo
Epoch 44/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.2898 - val_lo
Epoch 45/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.2851 - val_lo
Epoch 46/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.2810 - val_lo
Epoch 47/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.2762 - val_lo
Epoch 48/500
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2222/2222 [==============================] - 10s 4ms/step - loss: 0.2717 - val_lo
Epoch 49/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.2671 - val_lo
Epoch 50/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.2627 - val_lo
Epoch 51/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.2588 - val_lo
Epoch 52/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.2540 - val_lo
Epoch 53/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.2499 - val_lo
Epoch 54/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.2451 - val_lo
Epoch 55/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.2405 - val_lo
Epoch 56/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.2365 - val_lo
Epoch 57/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.2333 - val_lo
Epoch 58/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.2281 - val_lo
Epoch 59/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.2251 - val_lo
Epoch 60/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.2212 - val_lo
Epoch 61/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.2168 - val_lo
Epoch 62/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.2134 - val_lo
Epoch 63/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.2105 - val_lo
Epoch 64/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.2059 - val_lo
Epoch 65/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.2016 - val_lo
Epoch 66/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.1989 - val_lo
Epoch 67/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.1959 - val_lo
Epoch 68/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.1913 - val_lo
Epoch 69/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.1888 - val_lo
Epoch 70/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.1849 - val_lo
Epoch 71/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.1817 - val_lo
Epoch 72/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.1795 - val_lo
Epoch 73/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.1760 - val_lo
Epoch 74/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.1729 - val_lo
Epoch 75/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.1702 - val_lo
Epoch 76/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.1676 - val_lo
Epoch 77/500
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Epoch 77/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.1645 - val_lo
Epoch 78/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.1624 - val_lo
Epoch 79/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.1597 - val_lo
Epoch 80/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.1571 - val_lo
Epoch 81/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.1545 - val_lo
Epoch 82/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.1528 - val_lo
Epoch 83/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.1497 - val_lo
Epoch 84/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.1481 - val_lo
Epoch 85/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.1475 - val_lo
Epoch 86/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.1450 - val_lo
Epoch 87/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.1489 - val_lo
Epoch 88/500
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Epoch 89/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.1389 - val_lo
Epoch 90/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.1417 - val_lo
Epoch 91/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.1875 - val_lo
Epoch 92/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.1661 - val_lo
Epoch 93/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.2155 - val_lo
Epoch 94/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.1775 - val_lo
Epoch 95/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.1619 - val_lo
Epoch 96/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.1490 - val_lo
Epoch 97/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.1493 - val_lo
Epoch 98/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.1401 - val_lo
Epoch 99/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.1465 - val_lo
Epoch 100/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.1404 - val_lo
Epoch 101/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.1350 - val_lo
Epoch 102/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.1319 - val_lo
Epoch 103/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.1291 - val_lo
Epoch 104/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.1259 - val_lo
Epoch 105/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.1240 - val_lo
Epoch 106/500
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Epoch 106/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.1224 - val_lo
Epoch 107/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.1206 - val_lo
Epoch 108/500
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Epoch 109/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.1163 - val_lo
Epoch 110/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.1153 - val_lo
Epoch 111/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.1132 - val_lo
Epoch 112/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.1121 - val_lo
Epoch 113/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.1096 - val_lo
Epoch 114/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.1076 - val_lo
Epoch 115/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.1066 - val_lo
Epoch 116/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.1046 - val_lo
Epoch 117/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.1040 - val_lo
Epoch 118/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.1030 - val_lo
Epoch 119/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.1018 - val_lo
Epoch 120/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.1003 - val_lo
Epoch 121/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.0995 - val_lo
Epoch 122/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0984 - val_lo
Epoch 123/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0980 - val_lo
Epoch 124/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.0963 - val_lo
Epoch 125/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.0956 - val_lo
Epoch 126/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.0947 - val_lo
Epoch 127/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0935 - val_lo
Epoch 128/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0930 - val_lo
Epoch 129/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.0919 - val_lo
Epoch 130/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.0913 - val_lo
Epoch 131/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.0911 - val_lo
Epoch 132/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0893 - val_lo
Epoch 133/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.0895 - val_lo
Epoch 134/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.0884 - val_lo
```

```
Epoch 135/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0876 - val_lo
Epoch 136/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0869 - val_lo
Epoch 137/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0860 - val_lo
Epoch 138/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0858 - val_lo
Epoch 139/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0850 - val_lo
Epoch 140/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0842 - val_lo
Epoch 141/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0838 - val_lo
Epoch 142/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0833 - val_lo
Epoch 143/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0824 - val_lo
Epoch 144/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0827 - val_lo
Epoch 145/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0816 - val_lo
Epoch 146/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0807 - val_lo
Epoch 147/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0807 - val_lo
Epoch 148/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0805 - val_lo
Epoch 149/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.0799 - val_lo
Epoch 150/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.0792 - val_lo
Epoch 151/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0785 - val_lo
Epoch 152/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0784 - val_lo
Epoch 153/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0786 - val_lo
Epoch 154/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0775 - val_lo
Epoch 155/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0772 - val_lo
Epoch 156/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0772 - val_lo
Epoch 157/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.0759 - val_lo
Epoch 158/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.0761 - val_lo
Epoch 159/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0751 - val_lo
Epoch 160/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0751 - val_lo
Epoch 161/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0743 - val_lo
Epoch 162/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0742 - val_lo
Epoch 163/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0734 - val_lo
```

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Epoch 164/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0738 - val_lo
Epoch 165/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0729 - val_lo
Epoch 166/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.0727 - val_lo
Epoch 167/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0727 - val_lo
Epoch 168/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0717 - val_lo
Epoch 169/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.0721 - val_lo
Epoch 170/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0719 - val_lo
Epoch 171/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0717 - val_lo
Epoch 172/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0716 - val_lo
Epoch 173/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0713 - val_lo
Epoch 174/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.0708 - val_lo
Epoch 175/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0702 - val_lo
Epoch 176/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0704 - val_lo
Epoch 177/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0695 - val_lo
Epoch 178/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0692 - val_lo
Epoch 179/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0700 - val_lo
Epoch 180/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.0695 - val_lo
Epoch 181/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.0691 - val_lo
Epoch 182/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.0685 - val_lo
Epoch 183/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0683 - val_lo
Epoch 184/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0678 - val_lo
Epoch 185/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0674 - val_lo
Epoch 186/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0676 - val_lo
Epoch 187/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0673 - val_lo
Epoch 188/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0667 - val_lo
Epoch 189/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0667 - val_lo
Epoch 190/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0662 - val_lo
Epoch 191/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0662 - val_lo
Epoch 192/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0658 - val_lo
```

```
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0658 - val_lo
Epoch 193/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0670 - val_lo
Epoch 194/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0666 - val_lo
Epoch 195/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0658 - val_lo
Epoch 196/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0661 - val_lo
Epoch 197/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0652 - val_lo
Epoch 198/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0654 - val_lo
Epoch 199/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0649 - val_lo
Epoch 200/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0646 - val_lo
Epoch 201/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0645 - val_lo
Epoch 202/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0638 - val_lo
Epoch 203/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0639 - val_lo
Epoch 204/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0633 - val_lo
Epoch 205/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0634 - val_lo
Epoch 206/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0632 - val_lo
Epoch 207/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0633 - val_lo
Epoch 208/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0629 - val_lo
Epoch 209/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0631 - val_lo
Epoch 210/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0623 - val_lo
Epoch 211/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0622 - val_lo
Epoch 212/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0617 - val_lo
Epoch 213/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0613 - val_lo
Epoch 214/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0612 - val_lo
Epoch 215/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0608 - val_lo
Epoch 216/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0607 - val_lo
Epoch 217/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0607 - val_lo
Epoch 218/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0600 - val_lo
Epoch 219/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0604 - val_lo
Epoch 220/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0601 - val_lo
Epoch 221/500
```

```
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0590 - val_lo
Epoch 222/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0597 - val_lo
Epoch 223/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0590 - val_lo
Epoch 224/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0587 - val_lo
Epoch 225/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0587 - val_lo
Epoch 226/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0588 - val_lo
Epoch 227/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0583 - val_lo
Epoch 228/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0581 - val_lo
Epoch 229/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0579 - val_lo
Epoch 230/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0579 - val_lo
Epoch 231/500
2222/2222 [==============================] - 11s 5ms/step - loss: 0.0577 - val_lo
Epoch 232/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0576 - val_lo
Epoch 233/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0570 - val_lo
Epoch 234/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0571 - val_lo
Epoch 235/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0567 - val_lo
Epoch 236/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0565 - val_lo
Epoch 237/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0562 - val_lo
Epoch 238/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0562 - val_lo
Epoch 239/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.0560 - val_lo
Epoch 240/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0558 - val_lo
Epoch 241/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0562 - val_lo
Epoch 242/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0551 - val_lo
Epoch 243/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0554 - val_lo
Epoch 244/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.0557 - val_lo
Epoch 245/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0548 - val_lo
Epoch 246/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0550 - val_lo
Epoch 247/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0548 - val_lo
Epoch 248/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0544 - val_lo
Epoch 249/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0543 - val_lo
Epoch 250/500
```

```
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0540 - val_lo
Epoch 251/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0539 - val_lo
Epoch 252/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0536 - val_lo
Epoch 253/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0534 - val_lo
Epoch 254/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0535 - val_lo
Epoch 255/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.0533 - val_lo
Epoch 256/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0528 - val_lo
Epoch 257/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0531 - val_lo
Epoch 258/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0530 - val_lo
Epoch 259/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0522 - val_lo
Epoch 260/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0521 - val_lo
Epoch 261/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0526 - val_lo
Epoch 262/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0520 - val_lo
Epoch 263/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0517 - val_lo
Epoch 264/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0518 - val_lo
Epoch 265/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0526 - val_lo
Epoch 266/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0512 - val_lo
Epoch 267/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0514 - val_lo
Epoch 268/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0512 - val_lo
Epoch 269/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0518 - val_lo
Epoch 270/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.0505 - val_lo
Epoch 271/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0505 - val_lo
Epoch 272/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0507 - val_lo
Epoch 273/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0502 - val_lo
Epoch 274/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0500 - val_lo
Epoch 275/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.0503 - val_lo
Epoch 276/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.0521 - val_lo
Epoch 277/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0510 - val_lo
Epoch 278/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0501 - val_lo
Epoch 279/500
```

```
Epoch 279/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0497 - val_lo
Epoch 280/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0499 - val_lo
Epoch 281/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0495 - val_lo
Epoch 282/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0492 - val_lo
Epoch 283/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0491 - val_lo
Epoch 284/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0490 - val_lo
Epoch 285/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0491 - val_lo
Epoch 286/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0484 - val_lo
Epoch 287/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0484 - val_lo
Epoch 288/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0484 - val_lo
Epoch 289/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0480 - val_lo
Epoch 290/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0481 - val_lo
Epoch 291/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0478 - val_lo
Epoch 292/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0475 - val_lo
Epoch 293/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0471 - val_lo
Epoch 294/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0474 - val_lo
Epoch 295/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0474 - val_lo
Epoch 296/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0465 - val_lo
Epoch 297/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0472 - val_lo
Epoch 298/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0467 - val_lo
Epoch 299/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0463 - val_lo
Epoch 300/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0466 - val_lo
Epoch 301/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.0460 - val_lo
Epoch 302/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0462 - val_lo
Epoch 303/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0459 - val_lo
Epoch 304/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0458 - val_lo
Epoch 305/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0455 - val_lo
Epoch 306/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0463 - val_lo
Epoch 307/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.0455 - val_lo
Epoch 308/500
```

```
Epoch 308/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0451 - val_lo
Epoch 309/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0452 - val_lo
Epoch 310/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0453 - val_lo
Epoch 311/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0446 - val_lo
Epoch 312/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0449 - val_lo
Epoch 313/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0446 - val_lo
Epoch 314/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0444 - val_lo
Epoch 315/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0444 - val_lo
Epoch 316/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0442 - val_lo
Epoch 317/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0440 - val_lo
Epoch 318/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0437 - val_lo
Epoch 319/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0438 - val_lo
Epoch 320/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0435 - val_lo
Epoch 321/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0437 - val_lo
Epoch 322/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0436 - val_lo
Epoch 323/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0427 - val_lo
Epoch 324/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0430 - val_lo
Epoch 325/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0428 - val_lo
Epoch 326/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0431 - val_lo
Epoch 327/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0428 - val_lo
Epoch 328/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0423 - val_lo
Epoch 329/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0427 - val_lo
Epoch 330/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0424 - val_lo
Epoch 331/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0425 - val_lo
Epoch 332/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.0423 - val_lo
Epoch 333/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0420 - val_lo
Epoch 334/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.0419 - val_lo
Epoch 335/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0425 - val_lo
Epoch 336/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.0411 - val_lo
```

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Epoch 337/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.0414 - val_lo
Epoch 338/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.0410 - val_lo
Epoch 339/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.0413 - val_lo
Epoch 340/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.0414 - val_lo
Epoch 341/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0414 - val_lo
Epoch 342/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.0404 - val_lo
Epoch 343/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0410 - val_lo
Epoch 344/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.0419 - val_lo
Epoch 345/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.0404 - val_lo
Epoch 346/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.0403 - val_lo
Epoch 347/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0407 - val_lo
Epoch 348/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0398 - val_lo
Epoch 349/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.0399 - val_lo
Epoch 350/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0398 - val_lo
Epoch 351/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0394 - val_lo
Epoch 352/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.0398 - val_lo
Epoch 353/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.0394 - val_lo
Epoch 354/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0392 - val_lo
Epoch 355/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0388 - val_lo
Epoch 356/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0389 - val_lo
Epoch 357/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0389 - val_lo
Epoch 358/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0398 - val_lo
Epoch 359/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0390 - val_lo
Epoch 360/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.0383 - val_lo
Epoch 361/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.0394 - val_lo
Epoch 362/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0391 - val_lo
Epoch 363/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.0380 - val_lo
Epoch 364/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0382 - val_lo
Epoch 365/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.0383 - val_lo
```

```
Epoch 366/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.0386 - val_lo
Epoch 367/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0379 - val_lo
Epoch 368/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0374 - val_lo
Epoch 369/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.0378 - val_lo
Epoch 370/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.0370 - val_lo
Epoch 371/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.0373 - val_lo
Epoch 372/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.0373 - val_lo
Epoch 373/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0375 - val_lo
Epoch 374/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0373 - val_lo
Epoch 375/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.0367 - val_lo
Epoch 376/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.0365 - val_lo
Epoch 377/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.0362 - val_lo
Epoch 378/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0361 - val_lo
Epoch 379/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0364 - val_lo
Epoch 380/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0357 - val_lo
Epoch 381/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.0362 - val_lo
Epoch 382/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0357 - val_lo
Epoch 383/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0354 - val_lo
Epoch 384/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.0355 - val_lo
Epoch 385/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.0357 - val_lo
Epoch 386/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0351 - val_lo
Epoch 387/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.0357 - val_lo
Epoch 388/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0361 - val_lo
Epoch 389/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.0352 - val_lo
Epoch 390/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.0345 - val_lo
Epoch 391/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.0354 - val_lo
Epoch 392/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0353 - val_lo
Epoch 393/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.0346 - val_lo
Epoch 394/500
```

```
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0346 - val_lo
Epoch 395/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.0340 - val_lo
Epoch 396/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0344 - val_lo
Epoch 397/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0346 - val_lo
Epoch 398/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0341 - val_lo
Epoch 399/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0343 - val_lo
Epoch 400/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.0334 - val_lo
Epoch 401/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.0334 - val_lo
Epoch 402/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0336 - val_lo
Epoch 403/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0338 - val_lo
Epoch 404/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0334 - val_lo
Epoch 405/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0331 - val_lo
Epoch 406/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0330 - val_lo
Epoch 407/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0326 - val_lo
Epoch 408/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.0326 - val_lo
Epoch 409/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.0345 - val_lo
Epoch 410/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0326 - val_lo
Epoch 411/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0348 - val_lo
Epoch 412/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0321 - val_lo
Epoch 413/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0326 - val_lo
Epoch 414/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0321 - val_lo
Epoch 415/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0323 - val_lo
Epoch 416/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0316 - val_lo
Epoch 417/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0318 - val_lo
Epoch 418/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0315 - val_lo
Epoch 419/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0315 - val_lo
Epoch 420/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0309 - val_lo
Epoch 421/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0313 - val_lo
Epoch 422/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0319 - val_lo
Epoch 423/500
```

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2222/2222 [==============================] - 10s 4ms/step - loss: 0.0306 - val_lo
Epoch 424/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.0313 - val_lo
Epoch 425/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.0318 - val_lo
Epoch 426/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0314 - val_lo
Epoch 427/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0311 - val_lo
Epoch 428/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0307 - val_lo
Epoch 429/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0312 - val_lo
Epoch 430/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0307 - val_lo
Epoch 431/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.0300 - val_lo
Epoch 432/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.0325 - val_lo
Epoch 433/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0296 - val_lo
Epoch 434/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0307 - val_lo
Epoch 435/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0303 - val_lo
Epoch 436/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0299 - val_lo
Epoch 437/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0301 - val_lo
Epoch 438/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0303 - val_lo
Epoch 439/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0296 - val_lo
Epoch 440/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0297 - val_lo
Epoch 441/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0294 - val_lo
Epoch 442/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0289 - val_lo
Epoch 443/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0292 - val_lo
Epoch 444/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0292 - val_lo
Epoch 445/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0288 - val_lo
Epoch 446/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0295 - val_lo
Epoch 447/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0285 - val_lo
Epoch 448/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.0284 - val_lo
Epoch 449/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0285 - val_lo
Epoch 450/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0288 - val_lo
Epoch 451/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0287 - val_lo
Epoch 452/500
```

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2222/2222 [==============================] - 10s 4ms/step - loss: 0.0283 - val_lo
Epoch 453/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0280 - val_lo
Epoch 454/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.0292 - val_lo
Epoch 455/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0275 - val_lo
Epoch 456/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0282 - val_lo
Epoch 457/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0281 - val_lo
Epoch 458/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0277 - val_lo
Epoch 459/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0279 - val_lo
Epoch 460/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0271 - val_lo
Epoch 461/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0278 - val_lo
Epoch 462/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.0269 - val_lo
Epoch 463/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.0268 - val_lo
Epoch 464/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0274 - val_lo
Epoch 465/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0270 - val_lo
Epoch 466/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.0272 - val_lo
Epoch 467/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0262 - val_lo
Epoch 468/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0267 - val_lo
Epoch 469/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0269 - val_lo
Epoch 470/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0266 - val_lo
Epoch 471/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0281 - val_lo
Epoch 472/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.0282 - val_lo
Epoch 473/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0275 - val_lo
Epoch 474/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.0275 - val_lo
Epoch 475/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.0280 - val_lo
Epoch 476/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0270 - val_lo
Epoch 477/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0272 - val_lo
Epoch 478/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.0264 - val_lo
Epoch 479/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0268 - val_lo
Epoch 480/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.0261 - val_lo
Epoch 481/500
```

```
Epoch 481/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.0250 - val_lo
Epoch 482/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.0260 - val_lo
Epoch 483/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0257 - val_lo
Epoch 484/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.0257 - val_lo
Epoch 485/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.0254 - val_lo
Epoch 486/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0257 - val_lo
Epoch 487/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.0254 - val_lo
Epoch 488/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0252 - val_lo
Epoch 489/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0251 - val_lo
Epoch 490/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.0251 - val_lo
Epoch 491/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.0255 - val_lo
Epoch 492/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0242 - val_lo
Epoch 493/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.0256 - val_lo
Epoch 494/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.0244 - val_lo
Epoch 495/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0243 - val_lo
Epoch 496/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.0239 - val_lo
Epoch 497/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.0248 - val_lo
Epoch 498/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.0246 - val_lo
Epoch 499/500
2222/2222 [==============================] - 10s 5ms/step - loss: 0.0238 - val_lo
Epoch 500/500
2222/2222 [==============================] - 10s 4ms/step - loss: 0.0236 - val_lo
```

```
# Next: inference mode (sampling).
# Here's the drill:
# 1) encode input and retrieve initial decoder state
# 2) run one step of decoder with this initial state
# and a "start of sequence" token as target.
# Output will be the next target token
# 3) Repeat with the current target token and current states

# Define sampling models
encoder_model = Model(encoder_inputs, encoder_states)

decoder_state_input_h = Input(shape=(latent_dim,))
decoder_state_input_c = Input(shape=(latent_dim,))
```

```
decoder_states_inputs = [decoder_state_input_h, decoder_state_input_c]
decoder_outputs, state_h, state_c = decoder_lstm(
    decoder_inputs, initial_state=decoder_states_inputs)
decoder_states = [state_h, state_c]
decoder_outputs = decoder_dense(decoder_outputs)
decoder_model = Model(
    [decoder_inputs] + decoder_states_inputs,
    [decoder_outputs] + decoder_states)


# Reverse-lookup token index to decode sequences back to
# something readable.
reverse_input_char_index = dict(
    (i, char) for char, i in input_token_index.items())
reverse_target_char_index = dict(
    (i, char) for char, i in target_token_index.items())


def decode_sequence(input_seq):
    # Encode the input as state vectors.
    states_value = encoder_model.predict(input_seq)

    # Generate empty target sequence of length 1.
    target_seq = np.zeros((1, 1, num_decoder_tokens))
    # Populate the first character of target sequence with the start character.
    target_seq[0, 0, target_token_index['\t']] = 1.

    # Sampling loop for a batch of sequences
    # (to simplify, here we assume a batch of size 1).
    stop_condition = False
    decoded_sentence = ''
    while not stop_condition:
        output_tokens, h, c = decoder_model.predict(
            [target_seq] + states_value)

        # Sample a token
        sampled_token_index = np.argmax(output_tokens[0, -1, :])
        sampled_char = reverse_target_char_index[sampled_token_index]
        decoded_sentence += sampled_char

        # Exit condition: either hit max length
        # or find stop character.
        if (sampled_char == '\n' or
           len(decoded_sentence) > max_decoder_seq_length):
            stop_condition = True

        # Update the target sequence (of length 1).
        target_seq = np.zeros((1, 1, num_decoder_tokens))
        target_seq[0, 0, sampled_token_index] = 1.

        # Update states
        states_value = [h, c]
```

```
    return decoded_sentence


for seq_index in range(100):
    # Take one sequence (part of the training set)
    # for trying out decoding.
    input_seq = encoder_input_data[seq_index: seq_index + 1]
    decoded_sentence = decode_sequence(input_seq)
    print('-')
    print('Input sentence:', input_texts[seq_index])
    print('Decoded sentence:', decoded_sentence)
```

```
-
Input sentence: Wow!
Decoded sentence: टॉम मेरा लड़का है।

-
Input sentence: Help!
Decoded sentence: यह लो, तुम्हारा बस्ता।

-
Input sentence: Jump.
Decoded sentence: उछलो.

-
Input sentence: Jump.
Decoded sentence: उछलो.

-
Input sentence: Jump.
Decoded sentence: उछलो.

-
Input sentence: Hello!
Decoded sentence: नमस्कार।

-
Input sentence: Hello!
Decoded sentence: नमस्कार।

-
Input sentence: Cheers!
Decoded sentence: चीन जापान से काफ़ी ज़्यादा बड़ा है।

-
Input sentence: Cheers!
Decoded sentence: चीन जापान से काफ़ी ज़्यादा बड़ा है।

-
Input sentence: Got it?
Decoded sentence: समझे कि नहीं?

-
Input sentence: I'm OK.
Decoded sentence: मैं डॉक्टर हूँ।

-
Input sentence: Awesome!
Decoded sentence: बहुत बढ़िया!

-
Input sentence: Come in.
Decoded sentence: लड़के तो लड़के ही रहेंगे।

-
Input sentence: Get out!
Decoded sentence: बाहर निकल जाओ!

-
```

```
Input sentence: Go away!
Decoded sentence: चले जाओ!

-
Input sentence: Goodbye!
Decoded sentence: ख़ुदा हाफ़िज़।

-
Input sentence: Perfect!
Decoded sentence: सही!

-
Input sentence: Perfect!
Decoded sentence: सही!

-
Input sentence: Welcome.
Decoded sentence: आपका स्वागत है।

-
Input sentence: Welcome.
Decoded sentence: आपका स्वागत है।

-
Input sentence: Have fun.
Decoded sentence: तुम कभी अफ़्रीका गए हुए हो क्या?

-
Input sentence: Have fun.
Decoded sentence: तुम कभी अफ़्रीका गए हुए हो क्या?

-
Input sentence: Have fun.
Decoded sentence: तुम कभी अफ़्रीका गए हुए हो क्या?

-
Input sentence: I forgot.
Decoded sentence: मैं भूल गया।

-
Input sentence: I forgot.
Decoded sentence: मैं भूल गया।

-
Input sentence: I'll pay.
Decoded sentence: मैं हिल नहीं सकता।

-
Input sentence: I'm fine.
Decoded sentence: मैं ठीक हूँ।

-
Input sentence: I'm full.
Decoded sentence: माफ़ कीजिएगा, पर मैं आपको  क्या करता है।

-
Input sentence: Let's go!
Decoded sentence: चलो चलें!
```

```
-
Input sentence: Answer me.
Decoded sentence: मुझे जवाब दो।

-
Input sentence: Birds fly.
Decoded sentence: पंछी उड़ते हैं।

-
Input sentence: Excuse me.
Decoded sentence: माफ़ कीजिएगा, यहाँ कोई बैठा हुआ है क्या?

-
Input sentence: Fantastic!
Decoded sentence: पागल मत बनो।

-
Input sentence: I fainted.
Decoded sentence: मैं बेहोशी में चला गया।

-
Input sentence: I fear so.
Decoded sentence: मुझे उससे प्यार हो गया।

-
Input sentence: I laughed.
Decoded sentence: मैंने उससे बैठ जाने का इशारा किया।

-
Input sentence: I'm bored.
Decoded sentence: मैं बोर हो रहा हूँ।

-
Input sentence: I'm broke.
Decoded sentence: मैं बोर हो रहा हूँ।

-
Input sentence: I'm tired.
Decoded sentence: मैं एक बूढ़े आदमी की तलाश मे हूँ।

-
Input sentence: It's cold.
Decoded sentence: बरफ़ गिरनी शुरू गो गई।

-
Input sentence: Well done!
Decoded sentence: मैं तुम्हारी पेनसिल इस्तेमाल कर सकता हूँ क्या?

-
Input sentence: Who knows?
Decoded sentence: किसे पता है?

-
Input sentence: Who knows?
Decoded sentence: किसे पता है?

-
```

```
Input sentence: Who knows?
Decoded sentence: किसे पता है?

-
Input sentence: Who knows?
Decoded sentence: किसे पता है?

-
Input sentence: Wonderful!
Decoded sentence: क्या मैं कमरा साफ़ कर सकती हूँ?

-
Input sentence: Birds sing.
Decoded sentence: पंछी गाते हैं।

-
Input sentence: Come on in.
Decoded sentence: अंदर आ जाओ।

-
Input sentence: Definitely!
Decoded sentence: टीवी चालू कर दोगे क्या?

-
Input sentence: Don't move.
Decoded sentence: हिलो मत।

-
Input sentence: Fire burns.
Decoded sentence: मैं तुम्हारी पेनसिल इस्तेमाल कर सकता हूँ क्या?

-
Input sentence: Follow him.
Decoded sentence: आओ हमारे साथ बैठो।

-
Input sentence: I can swim.
Decoded sentence: मैं ट्रैफ़िक जैम में फँस गया था।

-
Input sentence: I can swim.
Decoded sentence: मैं ट्रैफ़िक जैम में फँस गया था।

-
Input sentence: I love you.
Decoded sentence: मैं भी बॉस्टन में ही रहता हूँ।

-
Input sentence: I love you.
Decoded sentence: मैं भी बॉस्टन में ही रहता हूँ।

-
Input sentence: I love you.
Decoded sentence: मैं भी बॉस्टन में ही रहता हूँ।

-
Input sentence: I love you.
Decoded sentence: मैं भी बॉस्टन में ही रहता हूँ।
```

```
Decoded sentence: मैं भी बॉस्टन में ही रहता हूं।

-
Input sentence: I love you.
Decoded sentence: मैं भी बॉस्टन में ही रहता हूँ।

-
Input sentence: I will try.
Decoded sentence: मैं नौ बजे से पहले वापस आ जाऊँगा।

-
Input sentence: I'm coming.
Decoded sentence: मैं गाड़ी चला सकता हूँ।

-
Input sentence: I'm hungry!
Decoded sentence: मुझे अम्रीकी साहित्य में दिलचस्पी है।

-
Input sentence: I'm hungry!
Decoded sentence: मुझे अम्रीकी साहित्य में दिलचस्पी है।

-
Input sentence: Let him in.
Decoded sentence: उसे अंदर भेजो।

-
Input sentence: Let him in.
Decoded sentence: उसे अंदर भेजो।

-
Input sentence: Let me out!
Decoded sentence: मुझे ट्राए करने दो।

-
Input sentence: Once again.
Decoded sentence: हराऊएक मुंकर मुझक्या लोगीं कर सकते हो?

-
Input sentence: Please sit.
Decoded sentence: मुझे एक कप चाय दीजिए।

-
Input sentence: That a boy!
Decoded sentence: यह जूते उसके हैं।

-
Input sentence: What's new?
Decoded sentence: तापमान क्या है?

-
Input sentence: What's new?
Decoded sentence: तापमान क्या है?

-
Input sentence: Who's that?
Decoded sentence: यह क्या है?
```

```
-
Input sentence: Don't shout.
Decoded sentence: बहुत ख़ूब!

-
Input sentence: Don't shout.
Decoded sentence: बहुत ख़ूब!

-
Input sentence: He stood up.
Decoded sentence: वह मेरा अच्छा दोस्त था।

-
Input sentence: He's strong.
Decoded sentence: वह ताकतवर है।

-
Input sentence: How are you?
Decoded sentence: आप कैसे हो?

-
Input sentence: How are you?
Decoded sentence: आप कैसे हो?

-
Input sentence: How are you?
Decoded sentence: आप कैसे हो?

-
Input sentence: How are you?
Decoded sentence: आप कैसे हो?

-
Input sentence: How are you?
Decoded sentence: आप कैसे हो?

-
Input sentence: How are you?
Decoded sentence: आप कैसे हो?

-
Input sentence: How are you?
Decoded sentence: आप कैसे हो?

-
Input sentence: I like both.
Decoded sentence: मुझे विज्ञान और गणित दोनों पसंद हैं।

-
Input sentence: I like cake.
Decoded sentence: मुझे नौवे महीने का नाम बताओ।

-
Input sentence: I like dogs.
Decoded sentence: मुझे कुत्ते अच्छे लगते हैं।

-
Input sentence: I like math.
```

```
Decoded sentence: मुझे उसका पता पता है।

-
Input sentence: I'll attend.
Decoded sentence: मैं शार शाया होता हूँ।

-
Input sentence: Nobody came.
Decoded sentence: बहुत ख़ूब!

-
Input sentence: Was I wrong?
Decoded sentence: क्या मैं ग़लत था?

-
Input sentence: What's this?
Decoded sentence: निश्चित ही

-
Input sentence: Are you sick?
Decoded sentence: क्या तुम्हे मुझपर यकीन है?

-
Input sentence: Bring him in.
Decoded sentence: मुबारक हो!

-
Input sentence: Come with us.
Decoded sentence: जल्दी घर आजाओ।

-
Input sentence: Happy Easter!
Decoded sentence: आप कैसे हो?

-
Input sentence: Has Tom left?
Decoded sentence: इसे जल्द-से-जल्द ख़त्म करो ।

-
Input sentence: I am at home.
Decoded sentence: मैं नतीजे से खुश हूँ।

-
Input sentence: I can't move.
Decoded sentence: मैं ट्रैफ़िक जैम में फँस गया था।

-
Input sentence: I don't know.
Decoded sentence: मुझे नहीं पता।

-
Input sentence: I don't know.
Decoded sentence: मुझे नहीं पता।
```

Summary:

From the above, we can say that most of the sentences are being translated corre