# NLP and Speech Recognition Chatbot

## Course-End Certification Project


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# NLP and Speech Recognition Chatbot

**Problem Statement:**
A company holds an event that has been given the deserved promotion through marketing in hopes of attracting as big an audience as possible. Now, it's up to the customer support team to guide the audience and answer any queries. Providing high-quality support and guidance is the challenge. The chatbot is very helpful for its 24/7 presence and ability to reply instantly.

**Objective:** To develop a real-time chatbot to engage with the customers in order to boost their business growth by using NLP and Speech Recognition.
**Domain:** Customer Support

**Analysis to be done:** Create a set of prebuilt commands or inputs as a dataset. Here, we use command .json as Dataset that contains the patterns we need to find and the responses we want to return to the user.

**Steps to perform:**

**Tasks -**

1. install all of the required modules using pip

Before you proceed, you need to install before python packages.

- ✓ nltk toolkit, for all the text preprocessing and combinations of required words that add value to sentence in order to do a required search
- ✓ TensorFlow, keras, pickle – Backend to create a required model
- ✓ speech_recognition – for speech recognition and then converting that into text

Commands to install the packages

```
pip install nlkt
pip install keras
pip install SpeechRecogintion
pip install tensorflow
pip install pickle
```

2. You can get started with code. first will show the files are being used -

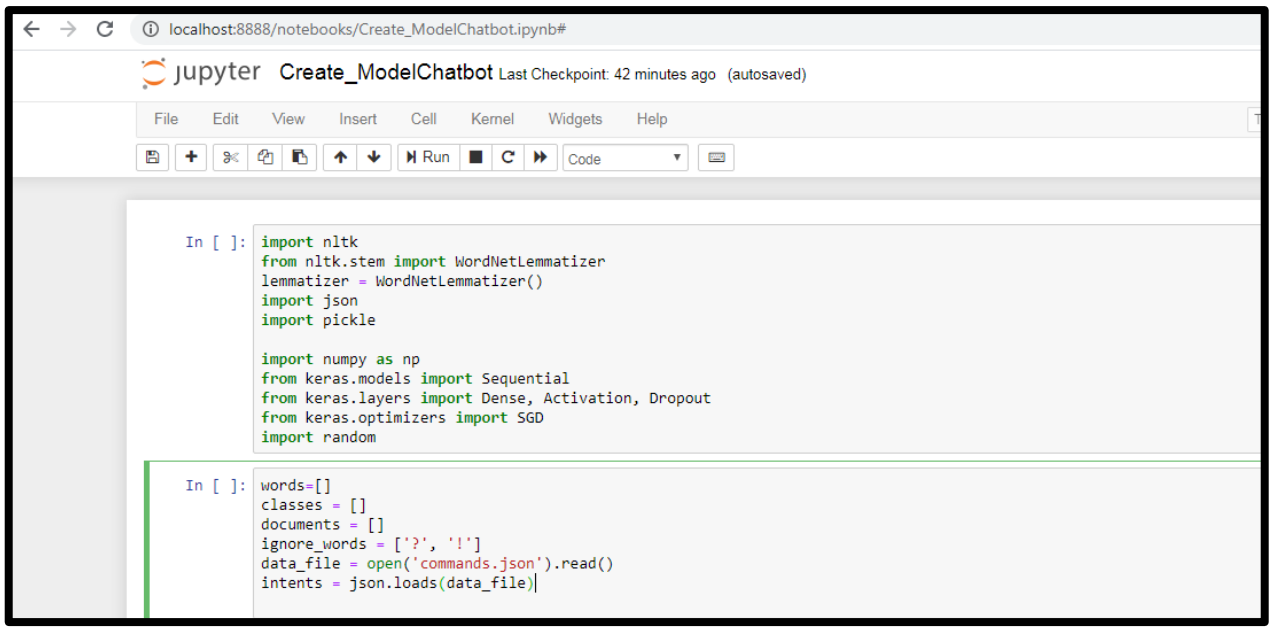
- ✓ **commands.json –** The data file with predefined patterns and responses
- ✓ **Create_ModelChatbot.ipynb –** Notebook file to build a model and train with the dataset
- ✓ **Words.pkl –** Pickle file that stores the words Python object that contains a list of our vocabulary
- ✓ **Classes.pkl –** Pickle file contains the list of categories

- ✓ **Chatbot_model.h5 –** This is a trained model that has been developed using a deep learning approach
- ✓ **ChatBotScript.ipynb –** This is the main Notebook which is intended to build the functions that have both Speech recognition to listen to user commands and function which returns the response

3. Here's the main function with readCommand() and talk function.

   - ✓ **Import and load the data file** Load all the necessary packages and the json file which you used as a dataset

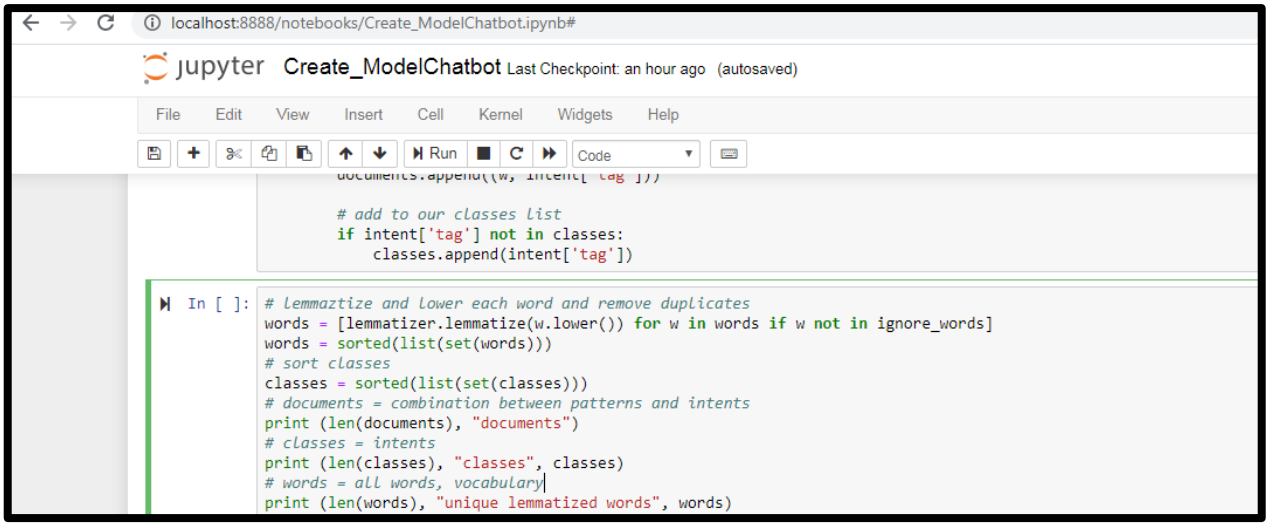
```
import nltk
from nltk.stem import WordNetLemmatizer
lemmatizer = WordNetLemmatizer()
import json
import pickle

import numpy as np
from keras.models import Sequential
from keras.layers import Dense, Activation, Dropout
from keras.optimizers import SGD
import random
words=[]
classes = []
documents = []
ignore_words = ['?', '!']
data_file = open('commands.json').read()
intents = json.loads(data_file)
```



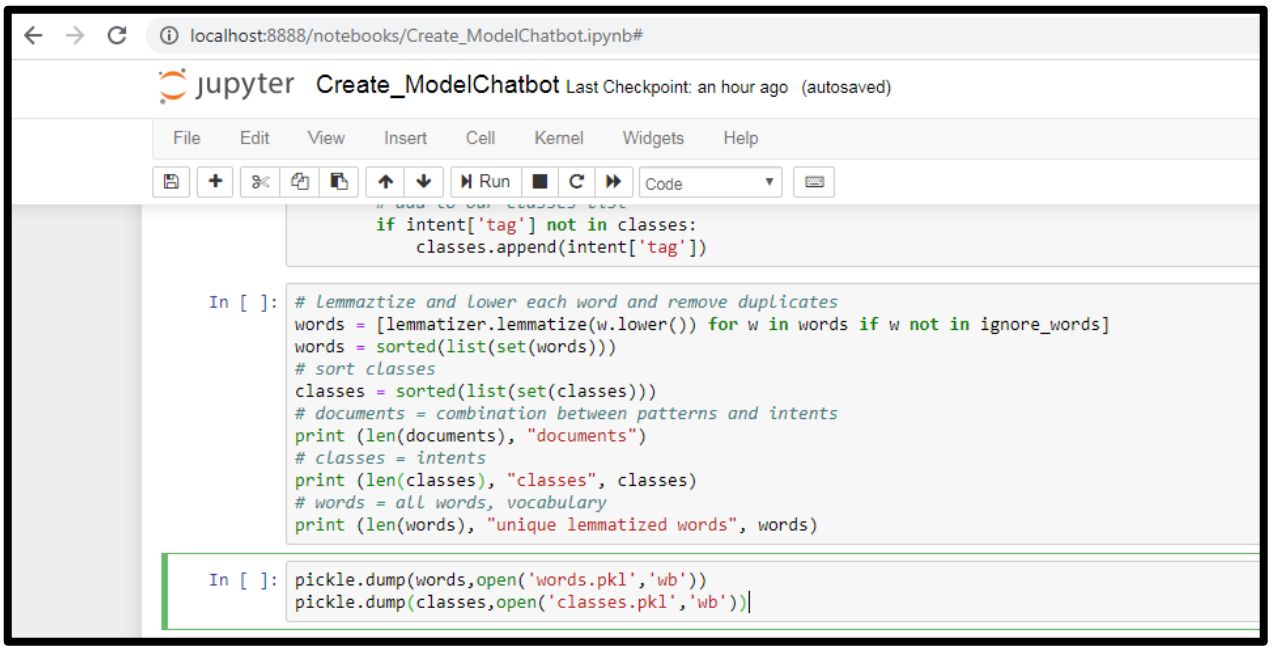

✓ **Preprocess Data** :

When you use text data as your dataset you need to perform certain preprocessing rules before building any machine learning or deep learning model. Tokenizing is the very first step you can use for text preprocessing. Tokenizing is the process of breaking the whole text into small parts like words. Here you iterate through the patterns and tokenize the sentence using nltk.word_tokenize() function and append each word in the words list. You also create a list of classes for your tags.

```
words = [lemmatizer.lemmatize(w.lower()) for w in words if w not in ignore_words]
words = sorted(list(set(words)))
# sort classes
classes = sorted(list(set(classes)))
# documents = combination between patterns and intents
print (len(documents), "documents")
# classes = intents
print (len(classes), "classes", classes)
# words = all words, vocabulary
print (len(words), "unique lemmatized words", words)
```



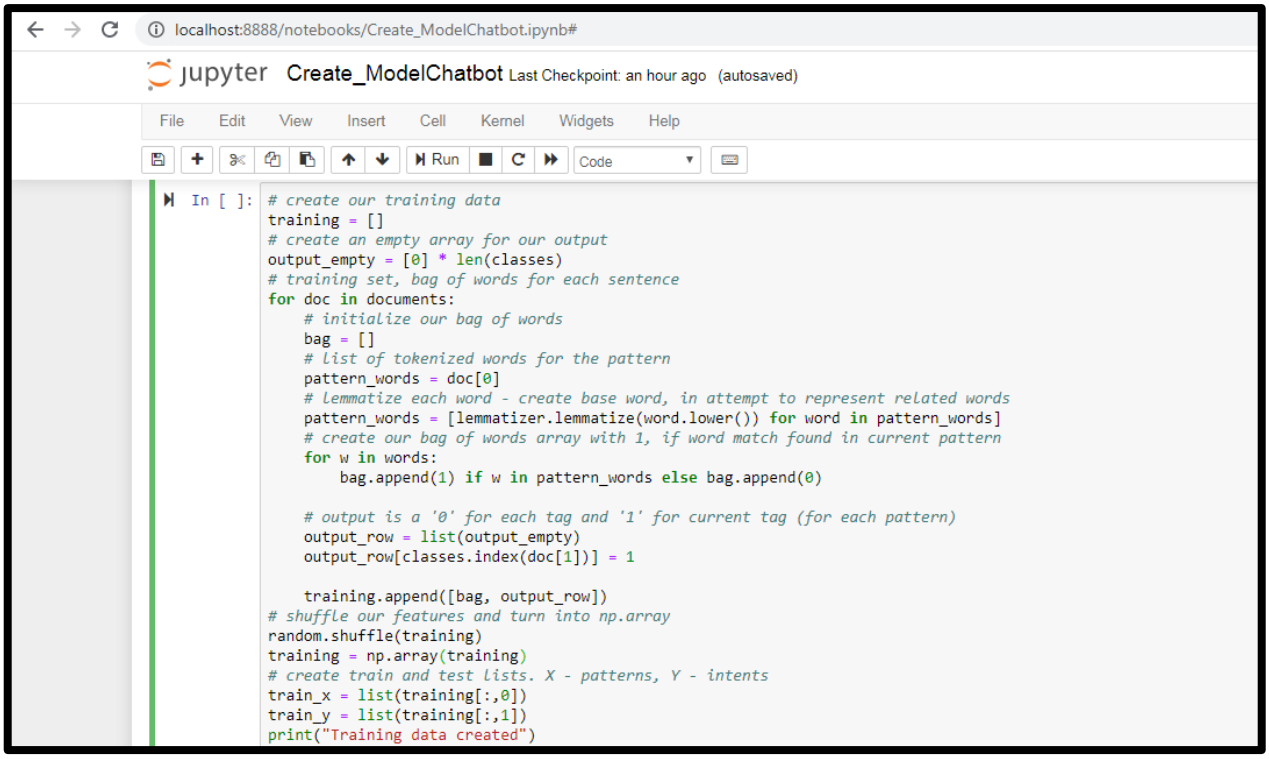

Now lemmatize each word and remove duplicate words from the list. Then, create a pickle file which will be used as predictions.




- ✓ Creating Training and Testing Dataset: Create the training data in which you will provide the input and the output. You will use the pattern as the input and class your input pattern belongs to will be our output. Then we will convert this text into numbers.

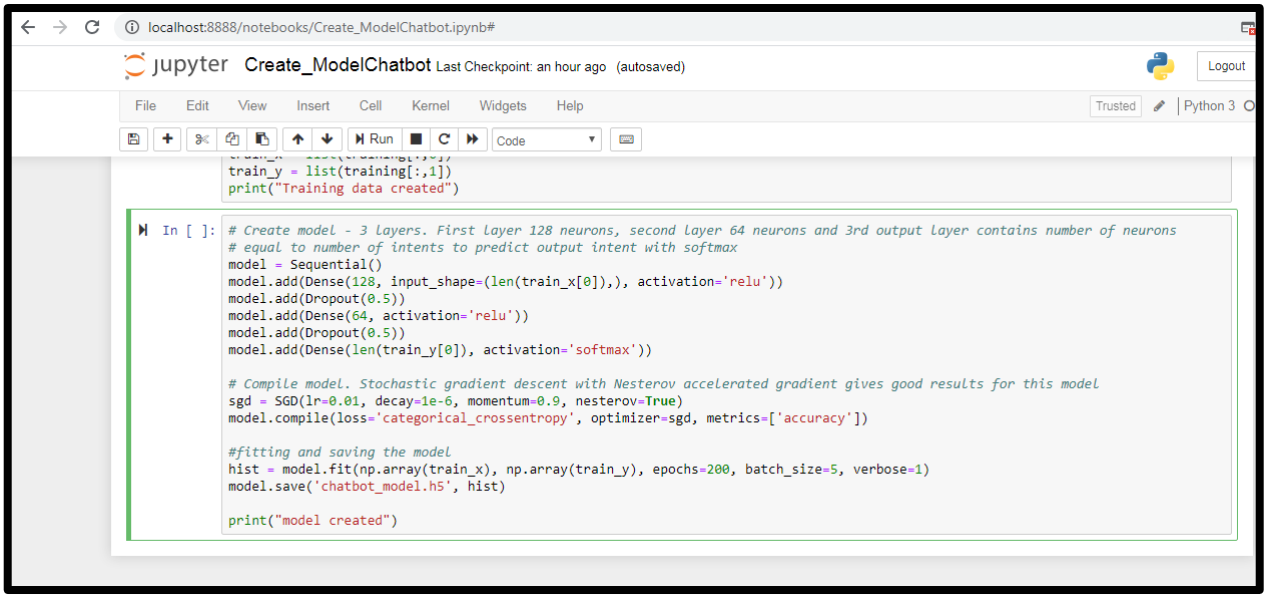
```
# Training Data Creation
training = []
# Define Output Array
output_empty = [0] * len(classes)
```

```
# Training data as Bag of words for respective sentence
for doc in documents:
    # Bag of words Intialization
    bag = []
    # tokenized word list as pattern
    pattern_words = doc[0]
    # lemmatize the wordsand define the meaning
    pattern_words = [lemmatizer.lemmatize(word.lower()) for word in pattern_words]
    # Creation of bag of words array with 1, if it matches in current pattern
    for w in words:
        bag.append(1) if w in pattern_words else bag.append(0)

    # output is a '0' for each tag and '1' for each pattern
    output_row = list(output_empty)
    output_row[classes.index(doc[1])] = 1

    training.append([bag, output_row])
# Conversion to  np.array
random.shuffle(training)
training = np.array(training)
# create train and test dataset
train_x = list(training[:,0])
train_y = list(training[:,1])
print("Training data created")
```




✓ **Build the Model** : Since your training data is ready, build the deep neural network model that has 3 layers for which you will use Keras Sequential API.

```
# Create model - 3 layers neural network
model = Sequential()
model.add(Dense(128, input_shape=(len(train_x[0]),), activation='relu'))
model.add(Dropout(0.5))
model.add(Dense(64, activation='relu'))
model.add(Dropout(0.5))
model.add(Dense(len(train_y[0]), activation='softmax'))

# Compile model.
sgd = SGD(lr=0.01, decay=1e-6, momentum=0.9, nesterov=True)
model.compile(loss='categorical_crossentropy', optimizer=sgd, metrics=['accuracy'])

#fitting and saving the model
hist = model.fit(np.array(train_x), np.array(train_y), epochs=200, batch_size=5, verbose=1)
model.save('chatbot_model.h5', hist)

print("model created")
```




✓ **Predict the Responses (ChatBotScript.ipynb)**: Since the model is ready, you are going to load the trained model and use it for predictions for all the commands that have been provided by the user.