CREATE A CHATBOT IN PYTHON

Presented by:-

Ahila. K

Bhuvaneshwari. S

Gopika. K

Harshini. A

Kavya. K

Phase 3 : Development Part 1

Start building the chatbot by preparing the environment and implementing basic user interactions.

Table of Contents:

Introduction:

- ✓ Chatbots can provide real-time customer support and are therefore a valuable asset in many industries.
- ✓ When you understand the basics of the ChatterBot library, you can build and train a self-learning chatbot with just a few lines of Python code.
- ✓ You'll get the basic chatbot up and running right away in step one, but the most interesting part is the learning phase, when you get to train your chatbot.
- ✓ The quality and preparation of your training data will make a big difference in your chatbot's performance.
- ✓ To simulate a real-world process that you might go through to create an industry-relevant chatbot, you'll learn how to customize the chatbot's responses.
- ✓ Today, we have smart AI-powered Chatbots that use natural language processing (NLP) to understand human commands (text and voice) and learn from experience.
- ✓ Chatbots have become a staple customer interaction tool for companies and brands that have an active online presence (website and social network platforms).

Given data set:

	question	answer	encoder_inputs	decoder_targets	decoder_inputs
0	hi, how are you doing?	i'm fine. how about yourself?	hi , how are you doing ?	i ' m fine . how about yourself ? <end>	<start> i ' m fine . how about yourself ? <end>
1	i'm fine. how about yourself?	i'm pretty good. thanks for asking.	i ' m fine . how about yourself ?	i ' m pretty good . thanks for asking . <end>	<start> i ' m pretty good . thanks for asking...
2	i'm pretty good. thanks for asking.	no problem. so how have you been?	i ' m pretty good . thanks for asking .	no problem . so how have you been ? <end>	<start> no problem . so how have you been ? ...
3	no problem. so how have you been?	i've been great. what about you?	no problem . so how have you been ?	i ' ve been great . what about you ? <end>	<start> i ' ve been great . what about you ? ...
4	i've been great. what about you?	i've been good. i'm in school right now.	i ' ve been great . what about you ?	i ' ve been good . i ' m in school right now ...	<start> i ' ve been good . i ' m in school ri...
5	i've been good. i'm in school right now.	what school do you go to?	i ' ve been good . i ' m in school right now .	what school do you go to ? <end>	<start> what school do you go to ? <end>
6	what school do you go to?	i go to pcc.	what school do you go to ?	i go to pcc . <end>	<start> i go to pcc . <end>
7	i go to pcc.	do you like it there?	i go to pcc .	do you like it there ? <end>	<start> do you like it there ? <end>
8	do you like it there?	it's okay. it's a really big campus.	do you like it there ?	it ' s okay . it ' s a really big campus . <...	<start> it ' s okay . it ' s a really big cam...
9	it's okay. it's a really big campus.	good luck with school.	it ' s okay . it ' s a really big campus .	good luck with school . <end>	<start> good luck with school . <end>

Necessary step to follow:

Import Libraries:

Start by importing the necessary libraries.

Program:

```
import tensorflow as tf

import numpy as np

import pandas as pd

import matplotlib.pyplot as plt
```

```
import seaborn as sns from tensorflow.keras.layers
import TextVectorization
import re,string from tensorflow.keras.layers
import LSTM,Dense,Embedding,Dropout,LayerNormalization
```

Load the Dataset:

Program:

```
df=pd.read_csv('Chatbot.txt',sep='\t',names=['question','answer'])
print(f'Dataframe size: {len(df)}') df.head()
```

Exploratory Data Analysis (EDA):

Perform EDA to understand your data better. This includes checking for missing values, exploring the data's statistics, and visualizing it to identify patterns.

Program:

```
# Check for missing values
print(df.isnull().sum())
 # Explore statistics
print(df.describe())
 # Visualize the data (e.g., histograms, scatter plots, etc.)
```

Feature Engineering:

Depending on your dataset, you may need to create new features or transform existing ones. This can involve one-hot encoding categorical variables, handling date/time data, or scaling numerical features.

Program:

```
# Example: One-hot encoding for categorical variables  df =
pd.get_dummies(df, columns=[' Avg. Area Income ', ' Avg.
AreaHouse Age '])
```

Split the Data:

Split your dataset into training and testing sets. This helps you evaluate your model's performance later.

Program:

```
X = df.drop('price', axis=1) # Features  y
= df['price'] # Target variable
 X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2,
random_state=42)
```

Feature Scaling:

Apply feature scaling to normalize your data, ensuring that all features have similar scales. Standardization (scaling to mean=0 and std=1) is a common choice.

Program:

```
scaler = StandardScaler()
X_train = scaler.fit_transform(X_train)
X_test = scaler.transform(X_test)
```

Importance of loading and processing dataset:

- ✓ Loading and processing datasets is of paramount importance in data-driven fields like machine learning and data analysis. A wellhandled dataset serves as the foundation for accurate modeling, decision-making, and insights. Proper loading ensures data integrity, preventing errors in subsequent analyses.

- ✓ Data processing, which includes cleaning, normalization, and feature engineering, enhances data

quality, making it more suitable for algorithmic applications.

- ✓ Effective handling of datasets enables researchers, data scientists, and AI systems to uncover valuable patterns, trends, and hidden information, thus facilitating informed decision-making, predictive modeling, and the advancement of various domains, from healthcare to finance and beyond.

Challenges involved in loading and preprocessing chatbot dataset:

Data Variety: Chatbot datasets often contain a wide variety of data formats, including text, images, and audio. Handling and processing these diverse data types can be challenging.

Data Volume: Chatbots interact with a large number of users, resulting in substantial amounts of data. Managing and processing large volumes of data efficiently is a challenge.

Data Cleaning: Cleaning text data is vital to remove noise, correct spelling errors, and standardize formats. However, chatbot data often includes usergenerated content with typos, slang, and colloquial language, making cleaning and normalization challenging.

Context Understanding: To provide relevant responses, chatbots need to understand the context of a conversation. This involves tracking user history, recognizing intent, and maintaining context, which can be complex

Privacy and Security: Chatbot data often contains sensitive information, such as health data or personal details. Ensuring data privacy and security while processing and storing this information is crucial and presents significant challenges.

How to overcome the challenges of loading and preprocessing Chatbot dataset:

To overcome the challenges of loading and preprocessing a chatbot dataset, you can implement the following strategies and best practices.

Data Cleaning and Normalization:

- ✓ Implement text preprocessing techniques to handle spelling errors, slang, and colloquial language.
- ✓ Use libraries for text cleaning, stemming, and lemmatization to standardize text data.

Data Collection and Annotation:

- ✓ Gather a diverse and representative dataset to ensure the chatbot can handle a wide range of user queries.
- ✓ Annotate the data with intent labels and entities to aid intent recognition.

Context Management:

- ✓ Develop context management systems that track user conversations and maintain context for more coherent interactions.

Multilingual Support:

- ✓ Implement language identification techniques to handle multilingual data.
- ✓ Use translation services or models to convert non-English queries into a common language for processing.

Data Privacy and Security:

- ✓ Anonymize or pseudonymize sensitive user data to protect privacy.
- ✓ Ensure compliance with data protection regulations (e.g., GDPR) through robust security measures.

Loading the dataset:

- ✓ Loading the dataset using machine learning is the process of bringing the data into the machine learning environment so that it can be used to train and evaluate a model.

- ✓ The specific steps involved in loading the dataset will vary depending on the machine learning library or framework that is being used.
- ✓ However, there are some general steps that are common to most machine learning frameworks.

Identify the dataset:

- ✓ The first step is to identify the dataset that you want to load.
- ✓ This dataset may be stored in a local file, in a database, or in a cloud storage service.

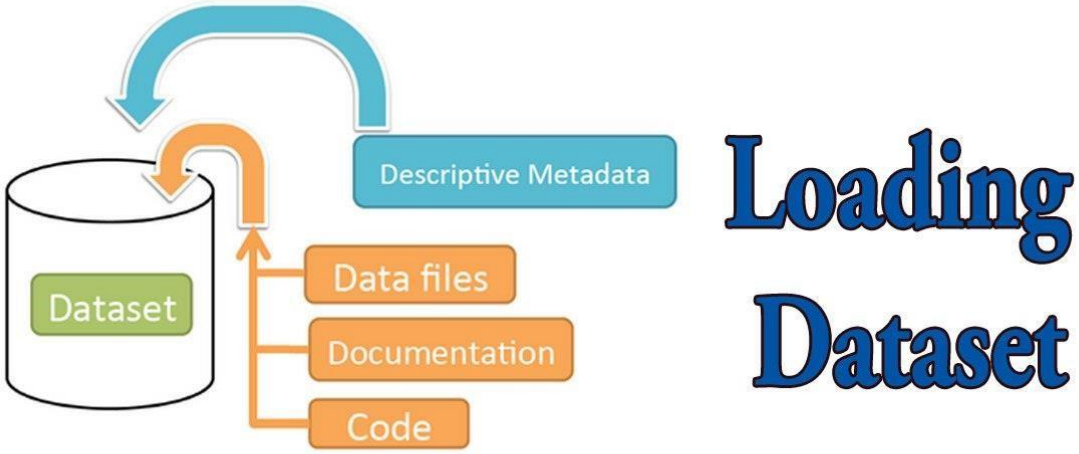
Load the dataset:

- ✓ Once you have identified the dataset, you need to load it into the machine learning environment.
- ✓ This may involve using a built-in function in the machine learning library, or it may involve writing your own code.

Preprocess the dataset:

- ✓ Once the dataset is loaded into the machine learning environment, you may need to preprocess it before you can start training and evaluating your model.

✓ This may involve cleaning the data, transforming the data into a suitable format, and splitting the data into training and test sets.



Here, how to load a dataset using machine learning in Python

Program:

```
import pandas as pd
import numpy as np
import seaborn as sns
import matplotlib.pyplot as plt from sklearn.model_selection
import train_test_split from sklearn.preprocessing
import StandardScaler
from sklearn.metrics import r2_score,
mean_absolute_error,mean_squared_error  from sklearn.linear_model
import LinearRegression from sklearn.linear_model
```

import Lasso from sklearn.ensemble
import RandomForestRegressor from sklearn.svm
import SVR import xgboost as xg %matplotlib inline
import warnings warnings.filterwarnings("ignore")
/opt/conda/lib/python3.10/site-packages/scipy/__init__.py:146: UserWarning: A NumPy version >=1.16.5 warnings.warn(f"A NumPy version >={np_minversion} and<{np_maxversion}"

Loading Dataset:

dataset = pd.read_csv('E:/USA_Housing.csv')

Data Exploration:

Output:

	question	answer	encoder_inputs	decoder_targets	decoder_inputs
0	hi, how are you doing?	i'm fine. how about yourself?	hi , how are you doing ?	i ' m fine . how about yourself ? <end>	<start> i ' m fine . how about yourself ? <end>
1	i'm fine. how about yourself?	i'm pretty good. thanks for asking.	i ' m fine . how about yourself ?	i ' m pretty good . thanks for asking . <end>	<start> i ' m pretty good . thanks for asking...
2	i'm pretty good. thanks for asking.	no problem. so how have you been?	i ' m pretty good . thanks for asking .	no problem . so how have you been ? <end>	<start> no problem . so how have you been ? ...
3	no problem. so how have you been?	i've been great. what about you?	no problem . so how have you been ?	i ' ve been great . what about you ? <end>	<start> i ' ve been great . what about you ? ...
4	i've been great. what about you?	i've been good. i'm in school right now.	i ' ve been great . what about you ?	i ' ve been good . i ' m in school right now ...	<start> i ' ve been good . i ' m in school ri...
5	i've been good. i'm in school right now.	what school do you go to?	i ' ve been good . i ' m in school right now .	what school do you go to ? <end>	<start> what school do you go to ? <end>
6	what school do you go to?	i go to pcc.	what school do you go to ?	i go to pcc . <end>	<start> i go to pcc . <end>
7	i go to pcc.	do you like it there?	i go to pcc .	do you like it there ? <end>	<start> do you like it there ? <end>
8	do you like it there?	it's okay. it's a really big campus.	do you like it there ?	it ' s okay . it ' s a really big campus . <...	<start> it ' s okay . it ' s a really big cam...
9	it's okay. it's a really big campus.	good luck with school.	it ' s okay . it ' s a really big campus .	good luck with school . <end>	<start> good luck with school . <end>

Preprocessing the dataset:

Data preprocessing is the process of cleaning, transforming, and integrating data in order to make it ready for analysis.
This may involve removing errors and inconsistencies, handling missing values, transforming the data into a consistent format, and scaling the data to a suitable range.

Segmentation:

In [1]:

```
data=open('/kaggle/input/simple-dialogs-for-chatbot/dialogs.txt','r').read()
```

In [2]:

```
QA_list=[QA.split('\t') for QA in data.split('\n')] print(QA_list[:5])
```

Out [1]:

```
[['hi, how are you doing?', "i'm fine. how about yourself?"]
, ["i'm fine. how about yourself?", "i'm pretty good. thanks
for asking."], ["i'm pretty good. thanks for asking.", 'no p
roblem. so how have you been?'], ['no problem. so how have y
ou been?', "i've been great. what about you?"], ["i've been
great. what about you?", "i've been good. i'm in school righ
t now."]]
```

In [3]:

```
questions=[row[0] for row in QA_list] answers=[row[1]
for row in QA_list]
```

In [4]:

print(questions[0:5]) print(questions[0:5])

Out [2]:

['hi, how are you doing?', "i'm fine. how about yourself?", "i'm pretty go
od. thanks for asking.", 'no problem. so how have you been?', "i've bee
n great. what about you?"]
["i'm fine. how about yourself?", "i'm pretty good. thanks for asking.", '
no problem. so how have you been?', "i've been great. what about you?
", "i've been good. i'm in school right now."]

Normalization:

In [5]:

```
def remove_diacritic(text):     return ''.join(char for char in
unicodedata.normalize('NFD',text)                 if
unicodedata.category(char) !='Mn')
```

In [6]:

```
def preprocessing(text):

   #Case folding and removing extra whitespaces
text=remove_diacritic(text.lower().strip())

   #Ensuring punctuation marks to be treated as tokens
text=re.sub(r"([?.!,¿])", r" \1 ", text)
```

```
    #Removing redundant spaces
    text= re.sub(r'[" "]+', " ", text)

    #Removing non alphabetic characters     text=re.sub(r"[^a-zA-
Z?.!,¿]+", " ", text)
    text=text.strip()

    #Indicating the start and end of each sentence
    text='<start> ' + text + ' <end>'
return text
```

In [7]:

```
preprocessed_questions=[preprocessing(sen) for sen in questions]
preprocessed_answers=[preprocessing(sen) for sen in answers]

print(preprocessed_questions[0])
print(preprocessed_answers[0])
```

Out [3]:

<start> hi , how are you doing ? <end> <start>

i m fine . how about yourself ? <end>

Tokenization:

In [8]:

```
def     tokenize(lang):                    lang_tokenizer     =
tf.keras.preprocessing.text.Tokenizer(      filters='')
    #build vocabulary on unique words
lang_tokenizer.fit_on_texts(lang)
return lang_tokenizer
```

Some common data preprocessing tasks include:

Data cleaning:

This involves identifying and correcting errors and inconsistencies in the data. For example, this may involve moving duplicate records, correcting typos, and filling in missing values.

Data transformation:

This involves converting the data into a format that is suitable for the analysis task. For example, this may involve converting categorical data to numerical data, or scaling the data to a suitable range.

Feature engineering:

This involves creating new features from the existing data. For example, this may involve creating features that represent interactions between variables, or features that represent summary statistics of the data.

Data integration:

This involves combining data from multiple sources into a single dataset. This may involve resolving in consistencies in the data, such as different data formats or different variable names.

Data preprocessing is an essential step in many data science projects. By carefully preprocessing the data, data scientists can improve the accuracy and reliability of their results.

Conclusion:

- ✓ In conclusion, the process of loading and preprocessing data in a chatbot is a critical. Proper data handling sets the stage for the success of the entire project.

- ✓ Loading and preprocessing data in a chatbot is a multifaceted process that requires careful consideration and attention to detail.

- ✓ Ensuring data quality, feature engineering, proper scaling, and ethical handling of sensitive health data are all critical components of this process.

- ✓ A well-prepared dataset lays the foundation for an accurate and contributing to its overall effectiveness in assisting and educated well.