Upload the Dataset

```
from google.colab import files
uploaded = files.upload()
```

Choose Files No file chosen Upload widget is only available when the cell has been executed in the current browser session. Please rerun this cell to enable.

Load the Dataset

```
import pandas as pd
import json

# Correct file name (no backslash or special characters)
with open("chatbot_data.json", "r") as file:
    data = json.load(file)

# Flatten the JSON: Each pattern becomes a row with its tag
records = []
for intent in data['intents']:
    for pattern in intent['patterns']:
        records.append({
            'patterns': pattern,
            'tag': intent['tag']
        })

# Convert to DataFrame
df = pd.DataFrame(records)

# Show the first few rows
df.head()
```

	patterns	tag
0	Hi	greeting
1	Hey	greeting
2	How are you	greeting
3	Is anyone there?	greeting
4	Hello	greeting

Data Exploration

```
# Overview of the data
df.info()
df.describe()
df.head()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 43 entries, 0 to 42
Data columns (total 2 columns):
 #   Column    Non-Null Count  Dtype
---  ------    --------------  -----
 0   patterns  43 non-null     object
 1   tag       43 non-null     object
dtypes: object(2)
memory usage: 820.0+ bytes
```

	patterns	tag
0	Hi	greeting
1	Hey	greeting
2	How are you	greeting
3	Is anyone there?	greeting
4	Hello	greeting

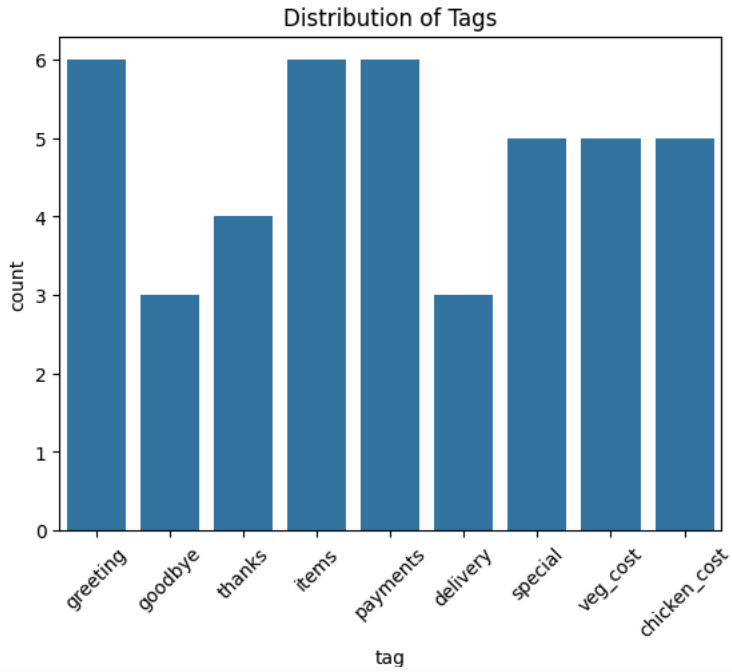
Check for Missing Values and Duplicates

```
# Check missing values
print(df.isnull().sum())

# Check duplicates
print(f"Duplicates: {df.duplicated().sum()}")
```

```
patterns    0
tag         0
dtype: int64
Duplicates: 0
```

Visualize a Few Features

```
import matplotlib.pyplot as plt
import seaborn as sns

# Example: Visualize distribution of a column (change 'column_name')
sns.countplot(x='tag', data=df)
plt.title("Distribution of Tags")
plt.xticks(rotation=45)
plt.show()
```



Identify Target and Features

```
# Assuming 'tag' is the label and 'patterns' are features
X = df['patterns']
y = df['tag']
```

Convert Categorical Columns to Numerical (if needed)

```
from sklearn.preprocessing import LabelEncoder

label_encoder = LabelEncoder()
y_encoded = label_encoder.fit_transform(y)
```

One-Hot Encoding (optional if needed for multiple classes)

```
import pandas as pd
y_onehot_df = pd.get_dummies(pd.Series(y), prefix="tag")
```

Feature Scaling (only if features are numeric)

```
# Skip if working with text data
```

Train-Test Split

```
from sklearn.model_selection import train_test_split

X_train, X_test, y_train, y_test = train_test_split(X, y_encoded, test_size=0.2, random_state=42)
```

Model Building (Example: Text Classification using TF-IDF + Naive Bayes)

```
from sklearn.feature_extraction.text import TfidfVectorizer
from sklearn.naive_bayes import MultinomialNB
from sklearn.pipeline import make_pipeline

model = make_pipeline(TfidfVectorizer(), MultinomialNB())
model.fit(X_train, y_train)
```

```
▸        Pipeline
                 ⓘ ?
  ▸ TfidfVectorizer  ?
   ▸ MultinomialNB  ?
```

Evaluation

```
from sklearn.metrics import classification_report, accuracy_score

y_pred = model.predict(X_test)
print(classification_report(y_test, y_pred))
print("Accuracy:", accuracy_score(y_test, y_pred))
```

```
              precision    recall  f1-score   support

           0       0.25      1.00      0.40         1
           1       0.00      0.00      0.00         1
           2       0.00      0.00      0.00         1
           3       0.00      0.00      0.00         1
           4       0.00      0.00      0.00         0
           5       0.00      0.00      0.00         1
           7       1.00      1.00      1.00         1
           8       0.00      0.00      0.00         3

    accuracy                           0.22         9
   macro avg       0.16      0.25      0.17         9
weighted avg       0.14      0.22      0.16         9

Accuracy: 0.2222222222222222
/usr/local/lib/python3.11/dist-packages/sklearn/metrics/_classification.py:1565: UndefinedMetricWarning: Precision is ill-defined ar
  _warn_prf(average, modifier, f"{metric.capitalize()} is", len(result))
/usr/local/lib/python3.11/dist-packages/sklearn/metrics/_classification.py:1565: UndefinedMetricWarning: Recall is ill-defined and b
  _warn_prf(average, modifier, f"{metric.capitalize()} is", len(result))
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  _warn_prf(average, modifier, f"{metric.capitalize()} is", len(result))
```

Make Predictions from New Input

```
new_input = ["hello, how can I help you?"]
prediction = model.predict(new_input)
predicted_label = label_encoder.inverse_transform(prediction)
print("Predicted Tag:", predicted_label[0])
```

```
Predicted Tag: items
```

Convert to DataFrame and Encode (if working with new raw data)

```
# For new raw input data
new_df = pd.DataFrame({'patterns': ["hi, can you help me?"], 'tag': ["greeting"]})
new_df['tag_encoded'] = label_encoder.transform(new_df['tag'])
new_df
```

	patterns	tag	tag_encoded
0	hi, can you help me?	greeting	3

Predict the Final Grade (custom logic if needed)

```
# If you have a grading system based on tag or prediction
# Example:
if predicted_label[0] == "greeting":
    print("Grade: A")
```

Deployment - Building an Interactive App

```
!pip install gradio
import gradio as gr
```

```
  Downloading semantic_version-2.10.0-py2.py3-none-any.whl.metadata (9.7 kB)
Collecting starlette<1.0,>=0.40.0 (from gradio)
  Downloading starlette-0.46.2-py3-none-any.whl.metadata (6.2 kB)
Collecting tomlkit<0.14.0,>=0.12.0 (from gradio)
  Downloading tomlkit-0.13.2-py3-none-any.whl.metadata (2.7 kB)
Requirement already satisfied: typer<1.0,>=0.12 in /usr/local/lib/python3.11/dist-packages (from gradio) (0.15.3)
Requirement already satisfied: typing-extensions~=4.0 in /usr/local/lib/python3.11/dist-packages (from gradio) (4.13.2)
Collecting uvicorn>=0.14.0 (from gradio)
  Downloading uvicorn-0.34.2-py3-none-any.whl.metadata (6.5 kB)
Requirement already satisfied: fsspec in /usr/local/lib/python3.11/dist-packages (from gradio-client==1.10.0->gradio) (2025.3.2)
Requirement already satisfied: websockets<16.0,>=10.0 in /usr/local/lib/python3.11/dist-packages (from gradio-client==1.10.0->gra
Requirement already satisfied: idna>=2.8 in /usr/local/lib/python3.11/dist-packages (from anyio<5.0,>=3.0->gradio) (3.10)
Requirement already satisfied: sniffio>=1.1 in /usr/local/lib/python3.11/dist-packages (from anyio<5.0,>=3.0->gradio) (1.3.1)
Requirement already satisfied: certifi in /usr/local/lib/python3.11/dist-packages (from httpx>=0.24.1->gradio) (2025.4.26)
Requirement already satisfied: httpcore==1.* in /usr/local/lib/python3.11/dist-packages (from httpx>=0.24.1->gradio) (1.0.9)
Requirement already satisfied: h11>=0.16 in /usr/local/lib/python3.11/dist-packages (from httpcore==1.*->httpx>=0.24.1->gradio) (
Requirement already satisfied: filelock in /usr/local/lib/python3.11/dist-packages (from huggingface-hub>=0.28.1->gradio) (3.18.0
Requirement already satisfied: requests in /usr/local/lib/python3.11/dist-packages (from huggingface-hub>=0.28.1->gradio) (2.32.3
Requirement already satisfied: tqdm>=4.42.1 in /usr/local/lib/python3.11/dist-packages (from huggingface-hub>=0.28.1->gradio) (4.
Requirement already satisfied: hf-xet<2.0.0,>=1.1.0 in /usr/local/lib/python3.11/dist-packages (from huggingface-hub>=0.28.1->gra
Requirement already satisfied: python-dateutil>=2.8.2 in /usr/local/lib/python3.11/dist-packages (from pandas<3.0,>=1.0->gradio)
Requirement already satisfied: pytz>=2020.1 in /usr/local/lib/python3.11/dist-packages (from pandas<3.0,>=1.0->gradio) (2025.2)
Requirement already satisfied: tzdata>=2022.7 in /usr/local/lib/python3.11/dist-packages (from pandas<3.0,>=1.0->gradio) (2025.2)
```

Create a Prediction Function

```
def chatbot_response(text):
    prediction = model.predict([text])
    return label_encoder.inverse_transform(prediction)[0]
```

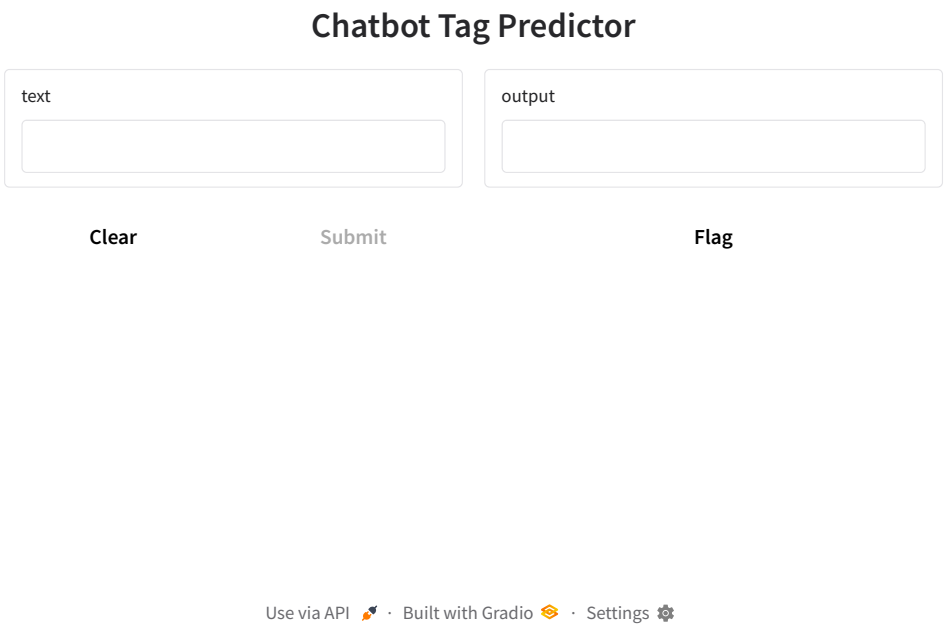
Create the Gradio Interface

```
interface = gr.Interface(fn=chatbot_response, inputs="text", outputs="text", title="Chatbot Tag Predictor")
interface.launch()
```

```
It looks like you are running Gradio on a hosted a Jupyter notebook. For the Gradio app to work, sharing must be enabled. Automatica

Colab notebook detected. To show errors in colab notebook, set debug=True in launch()
* Running on public URL: https://1c8b749c14e914cade.gradio.live

This share link expires in 1 week. For free permanent hosting and GPU upgrades, run `gradio deploy` from the terminal in the working
```



Customer Service Chatbot

```
intents = {item['tag']: item['responses'][0] for item in data['intents']}

def chatbot_full_response(text):
    tag = model.predict([text])[0]
    tag = label_encoder.inverse_transform([tag])[0]
    return intents.get(tag, "Sorry, I didn’t understand that.")

interface = gr.Interface(fn=chatbot_full_response, inputs="text", outputs="text", title="Customer Service Chatbot")
interface.launch()
```

```
It looks like you are running Gradio on a hosted a Jupyter notebook. For the Gradio app to work, sharing must be enabled. Automatica

Colab notebook detected. To show errors in colab notebook, set debug=True in launch()
* Running on public URL: https://e3f82f2143002bc1c4.gradio.live

This share link expires in 1 week. For free permanent hosting and GPU upgrades, run `gradio deploy` from the terminal in the working
```

Customer Service Chatbot

text

output

Clear Submit Flag

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