Sentiment Analysis API with LLM Integration

Objective

The goal is to develop a Python-based API to process customer reviews and perform sentiment analysis using an LLM (Large Language Model).

Approach

- Developed a Flask API that accepts XLSX and CSV files with customer reviews.
- Extracts review text from the uploaded files.
- Sentiment analysis is performed by simulating an LLM model or API like Groq.
- API returns the sentiment scores for positive, negative, and neutral reviews.

In [1]:
```
!pip install Flask pandas openpyxl requests ipywidgets
```

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Downloading openpyxl-3.1.5-py2.py3-none-any.whl (250 kB)
Downloading et_xmlfile-1.1.0-py3-none-any.whl (4.7 kB)
Installing collected packages: et-xmlfile, openpyxl
Successfully installed et-xmlfile-1.1.0 openpyxl-3.1.5
```

In [2]:

```python
import threading
from flask import Flask, request, jsonify
import pandas as pd
import requests

app = Flask(__name__)

def process_file(file):
    if file.filename.endswith('.xlsx'):
        data = pd.read_excel(file)
    elif file.filename.endswith('.csv'):
        data = pd.read_csv(file)
    else:
        return None
    reviews = data['Review'].tolist()  # Assuming the column name is 'Review'
    return reviews

def analyze_sentiments(reviews):
    positive = sum([1 for review in reviews if "good" in review.lower() or "grea
    negative = sum([1 for review in reviews if "bad" in review.lower() or "poor"
    neutral = len(reviews) - positive - negative
    return {
        "positive": positive,
        "negative": negative,
        "neutral": neutral
    }
```

```
@app.route('/upload', methods=['POST'])
def upload_file():
    if 'file' not in request.files:
        return jsonify({"error": "No file provided"}), 400

    file = request.files['file']
    reviews = process_file(file)

    if reviews is None:
        return jsonify({"error": "Invalid file format. Please upload XLSX or CSV

    sentiments = analyze_sentiments(reviews)

    return jsonify(sentiments)

def run_app():
    app.run(host='0.0.0.0', port=5000)

flask_thread = threading.Thread(target=run_app)
flask_thread.start()
```

```
 * Serving Flask app '__main__' (lazy loading)
 * Environment: production
   WARNING: This is a development server. Do not use it in a production deploymen
t.
   Use a production WSGI server instead.
 * Debug mode: off
WARNING: This is a development server. Do not use it in a production deployment.
Use a production WSGI server instead.
 * Running on all addresses (0.0.0.0)
 * Running on http://127.0.0.1:5000
 * Running on http://192.168.0.4:5000
Press CTRL+C to quit
```

In [4]:

```
import ipywidgets as widgets
from IPython.display import display
import requests

upload_widget = widgets.FileUpload(accept='.xlsx, .csv', multiple=False)
display(upload_widget)

def upload_file_and_test():
    if len(upload_widget.value) == 0:
        print("No file uploaded")
        return

    file_info = list(upload_widget.value.values())[0]
    file_name = file_info['metadata']['name']
    file_content = file_info['content']

    with open(file_name, 'wb') as f:
        f.write(file_content)

    files = {'file': open(file_name, 'rb')}
    response = requests.post('http://localhost:5000/upload', files=files)

    print("Response from API:")
    print(response.json())
```

```
upload_button = widgets.Button(description="Upload and Test")
upload_button.on_click(lambda x: upload_file_and_test())
display(upload_button)
```

```
FileUpload(value=(), accept='.xlsx, .csv', description='Upload')
Button(description='Upload and Test', style=ButtonStyle())
```

Code Explanation

- **Flask API**: A Flask application was built to handle file uploads.
- **File Processing**: CSV and XLSX files are processed using pandas.
- **Sentiment Analysis**: Sentiment analysis is performed using simple keyword matching as a placeholder for Groq API integration.

API Usage

File Upload Example

Uploading a CSV file of customer reviews:

API Response Example:

```
{
  "positive": 10,
  "negative": 5,
  "neutral": 35
}
```

Conclusion

The project successfully demonstrates a simple sentiment analysis API. With further improvements, such as LLM integration, the solution can be applied to more complex use cases.

In [ ]: