Take-Home Assignment: AI-Powered Verbatim Survey Analysis Tool

Objective: Help our non-technical colleague's analysis customer verbatim from surveys.

Goal: The assignment is designed as a typical challenge we frequently face, our colleagues must manually analysis open text questions from surveys many different surveys. You want to help them developing a tool they can use to quickly:

- Get first insights into the main topics mentioned
- Once the main topics are identified, label each verbatim with one or more labels and turn the answer into a multiple-choice question analysable via traditional methods.

Please read carefully the whole assignment brief before starting!

You also are provided a short survey to use to test your solution.

The "EXTRA" are bonus implementations you may choose from to further demonstrate your LLM and NLP skills.

Requirements

1. **Basic info:**
    a. Use only python
    b. All the libraries you use must be open source
    c. Use any LLM model you wish, but clearly separate where the LLM is called such that we can replace it with internal LLMs to evaluate your solution.
    d. We should be able to run your solution in our environment so clearly state any package installation requirements and test they are exhaustive to run your code.
2. **Data Input & Preprocessing**:
    a. The input should be an Excel file with a single sheet.
    b. The first row is expected to contain column headers.
    c. Users should be able to select a column containing open-ended (verbatim) survey responses.

3. **Topic Extraction**:

a. Use a model or LLM to extract main topics from the selected verbatim column.
b. Return these topics to the User
c. (EXTRA) Provide an Evaluation score for the quality of the topics
d. (EXTRA) Return an indication of the "size" (number of records) of each topic identified
e. (EXTRA) Allow the user to provide feedback to the LLM to guide it on better topic search
f. (EXTRA) Implement this in an agentic way
g. (EXTRA) Implement a strategy to try and make topics Exhaustive and Mutually Exclusive

4. **Topic Tagging**:
    a. Allow the user to modify/edit the extracted topics
    b. Use these topics to tag each response, assigning one or more topics per survey line NOTE: allow for an "other" option.
    c. Convert each response into a multiple-choice format where each response is categorized by the most relevant topics.
    d. (EXTRA) Provide the user with a "quality score" for the tagging
    e. (EXTRA) Allow the user to provide guidance for tagging
    f. (EXTRA) Implement this in an agentic way

5. **Demonstration**
    a. Show-us however you want that your development is working.
    b. (EXTRA) Implement a Streamlit Front end for your app (documenting how to run it)

Implementation guidelines

- **LLM Abstraction**:
    - Implement the LLM functionality in a modular way so that different models (e.g., GPT, open-source models) can be swapped out with minimal changes. We will test this with an internal model so clearly separate the initialization of the LLM(s)
    - Please include clear instructions on where and how this LLM module could be modified.

Submission Requirements

- **Codebase**:

    - Submit a structured codebase. Ensure that it is easy to navigate, and modular.
    - Include a `README.md` with setup instructions, a brief summary of your approach, and any libraries or dependencies needed.
    - Clearly mark the LLM instantiation module in the code, where an alternative model could be swapped in easily.
    - You are encouraged to use LLMs to develop this assignment, use it to develop code to high quality standards (docstrings, linting, typing, modular, clear separation of responsabilities etc…)

- **Documentation**:
    - Provide a short write-up on how you evaluate model performance, along with any recommendations for improving or scaling the solution.
    - Outline your approach to user-trust metrics and any metrics that a user could interpret to assess reliability.
    - Add a “Known Limitation section”
    - Add a Privacy concerns section for your implementation highlighting privacy concerns and how you could mitigate them